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Managing PCB Wastes

Polychlorinated biphenyls (PCBs) have been in commercial use for more than 50 years, but have come to public attention only in the late 1960s. While most people have heard or read about the potential environmental and health hazards of PCBs, many are still unaware of what these hazards are, and what is being done to eliminate them. The cooperative efforts of government and industry to ensure the safe handling, transport, storage, and ultimate safe disposal of PCB-contaminated equipment and wastes provide an interesting example of the challenges of hazardous waste management, and how these challenges are being successfully met.

Hazards associated with PCBs

PCBs are synthetic liquid chemical compounds consisting of chlorine, carbon, and hydrogen. Their fire-resistant and insulating properties make them ideally suited for use as cooling and insulating fluids in industrial transformers and capacitors; in hydraulic and heat transfer systems; and in products such as plasticizers, rubbers, inks, and waxes. Unfortunately, PCBs are also highly resistant to chemical and biological breakdown by natural processes in the environment, and as a result, persist in the environment and accumulate in living organisms.

From the 1930's to early 1970's, PCBs were widely used by a variety of industries. In most cases, the wastes generated by the scrapping of PCB-contaminated equipment and products were disposed of without special precautions. Considerable amounts of PCBs were released into the environment through disposal in open landfills, incomplete (low-temperature) burning of municipal wastes containing discarded PCB products, illegal dumping, leakage into sewers and streams, and accidental spills.

Although few concerns were originally raised about the possible effects of PCBs on human health, by 1972, scientists and environmental experts generally agreed that long-term exposure to PCBs presented health and environmental risks.

Minimizing the hazards

When the potential hazards of PCBs became evident, industries and governments throughout the world limited both their use and allowable release into the environment. The manufacture of PCBs in the United States was halted completely in 1977.

In Canada, the federal and provincial governments have taken a number of steps to address the PCB problem. Regulations have been enacted which ban or restrict the manufacture, sale and use of PCBs and PCB-containing equipment and limit the release of PCBs to the environment. These regulations, along with other non-regulatory initiatives by the private sector and provincial governments are resulting in the gradual phase-out of PCB-containing equipment across the

Canada

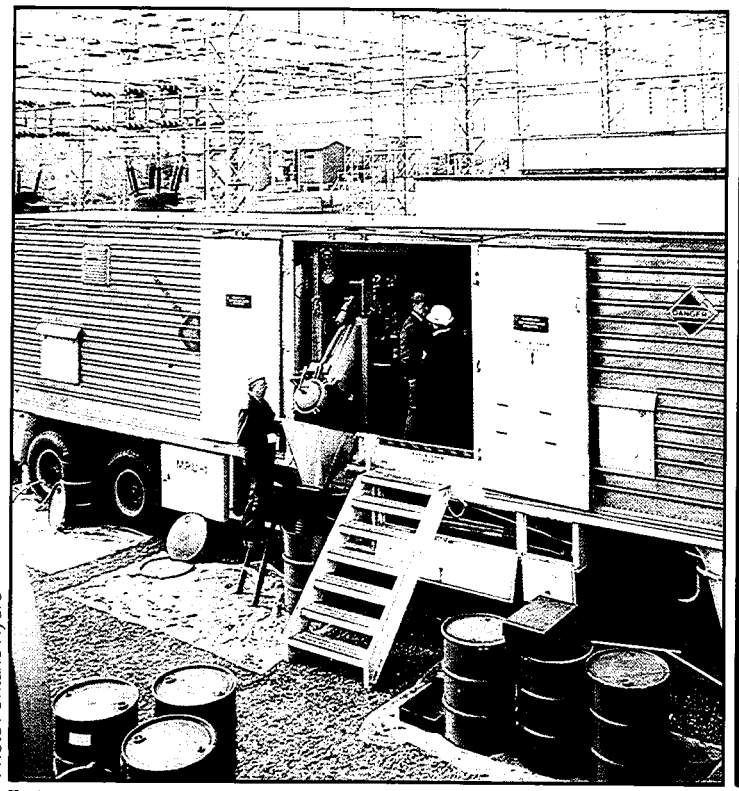
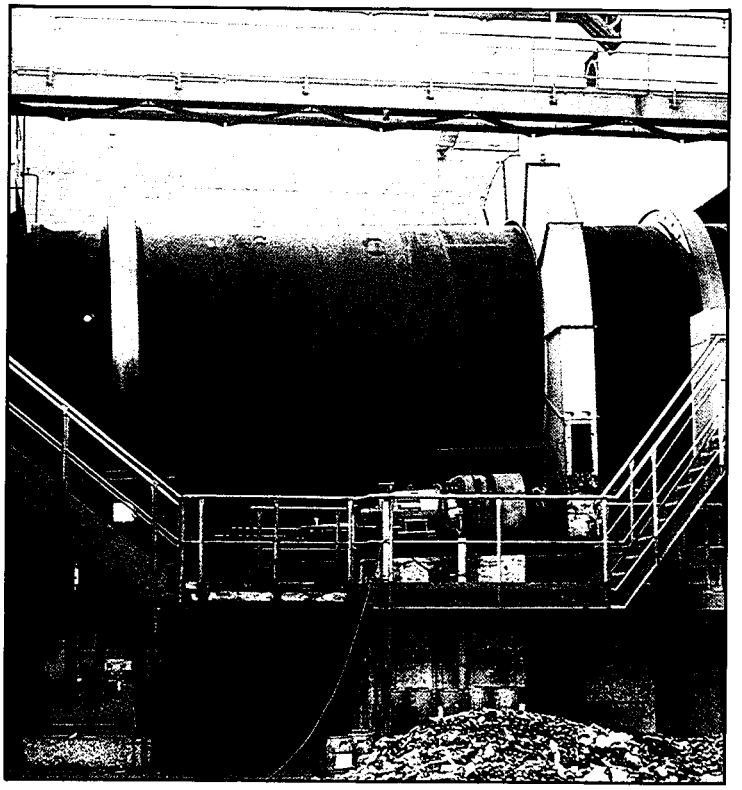


Photo: Ontario Hydro

Typical Mobile PCB Decontamination Unit for liquids



Typical Rotary Kiln Incinerator

country. In addition, strict federal and provincial regulations have been established regarding the handling, transportation, storage and disposal of PCBs. These steps ensure the safe operation of PCB-containing equipment still in use, as well as the proper management and disposal of this equipment and wastes after removal from service.

As a special coordinated effort to address the PCB issue in Canada, the federal and provincial governments initiated a joint "PCB Action Plan" in May 1985. The plan calls for:

- a national system of PCB disposal facilities;
- the creation of uniform national standards governing the transport of all dangerous goods, including PCBs;
- the establishment of environmental quality objectives;
- improved coordination of emergency response capabilities for chemical accidents;
- increased access to information on PCBs among the federal and provincial governments, and to the public; and
- the accelerated phase-out of PCB-containing equipment.

Most of these initiatives have been addressed, and the remaining are proceeding on schedule.

Industrial practices

Electrical equipment manufacturers and utilities, as well as other industrial and commercial firms, have responded positively to the PCB waste challenge. Most companies have cooperated with federal initiatives to maintain a national inventory of PCB-containing equipment, as well as PCB-contaminated equipment and wastes and are using good PCB waste management procedures. Plans are being implemented to replace PCB-containing equipment that presents a particular hazard to health or the environment. Canadian utilities, in particular, are progressing with PCB phase-out programs, and are adopting codes of good practice covering handling procedures, training of maintenance staff, and building of PCB-waste storage facilities. Some companies, however, could better manage their PCB-contaminated equipment and wastes. The appropriate authorities are influencing these companies to improve their methods by making them aware of good management practices as well as by strict enforcement of regulations.

Handle with care

The proper identification and handling of PCB-contaminated equipment and wastes is critical to the prevention of future waste management problems. All equipment or waste containing PCBs should be properly labelled, alerting people to the requirement for special handling procedures. While procedures may vary depending on the industry or specific operation, as a general rule, any time there is a risk of contact with PCBs, appropriate protective equipment should be worn to limit contact with the skin and eyes and to protect against inhalation of PCB fumes. Such equipment may include plastic or rubber gloves, boots, overalls, aprons, face shields or self-contained breathing apparatus. For workers cleaning up a major spill containing high concentrations of PCBs, a full suit of non-porous material should be worn. Clothing that has become contaminated should be disposed of along with other PCB wastes.

Sending PCBs on a safe trip

In 1985, much public attention was focussed on the transportation of PCBs following an accidental spill of transformer oil containing PCBs. That spill contaminated a stretch of the Trans-Canada Highway outside Kenora, Ontario, and brought into question current procedures for transporting hazardous wastes. In response to this concern, the federal and provincial regulations on PCB transport were further strengthened. Federally,

regulations under the **Transportation of Dangerous Goods Act** now require shippers to prepare precise documentation for the interprovincial or international movement of PCBs. Rigid, leakproof containers must be used where liquids are involved and all items being shipped must be firmly secured to the transport vehicle. Similarly, each province has implemented legislation controlling the movement of PCBs within its own borders. Both federal and provincial regulations apply to the transport of PCB equipment and materials whether intended for further use or as wastes.

Storage — A temporary solution

At present, there are no commercial facilities in Canada for the destruction of high concentration PCB liquid or solid wastes. Accordingly, these wastes must be stored until such time as commercial destruction facilities become operational. While PCB storage facilities may be built in various sizes, the same basic concerns should be addressed regardless of whether the facility will house a single out-of-service PCB transformer on existing premises or whether it will be a commercially-operated facility storing thousands of kilograms of PCBs. In all cases, precautions should be taken to minimize the risk of accidental releases of PCBs; contingency measures, such as spill containment, fire control and emergency response training for personnel, all appropriate to the degree of hazard, should be put in place to deal effectively with an emergency, should it occur.

Destruction of PCB wastes

Technologies to destroy PCBs effectively and safely are available and in use in many countries. The most effective destruction technology currently being employed is thermal treatment. Two examples of this method are the burning of high-concentration PCB liquid wastes in liquid injection incinerators, and PCB-containing solids and sludges in rotary kiln incinerators.

Low-concentration PCB liquids (less than 500 parts per million) can be destroyed in high-efficiency boilers that have residence times and temperature characteristics similar to those specified for liquid injection incinerators. Mineral oils contaminated with PCBs in concentrations of up to a few thousand parts per million can also be decontaminated through chemical treatment processes. The most common of these is chemical dechlorination. By destroying PCBs that contaminate otherwise valuable oils, chemical dechlorination also allows these oils to be reused.

In Canada, the provinces of Alberta, Ontario and Quebec are currently constructing or studying the possibility of constructing fixed PCB destruction facilities. In addition, all provinces are currently using or actively considering the use of mobile treatment/destruction units. These mobile units have an advantage of being more readily acceptable to the general public than the larger fixed units since they are not based permanently at one particular location.

Towards a lasting solution

Canadian actions to eliminate the threat of PCBs in the environment are paying off. Recent studies show that the rates of PCB wastes being released into the environment are decreasing. The federal and provincial governments, with the full cooperation of industry, are committed through legislation and other initiatives to eliminate the PCB problem in Canada. With the phasing out of PCB-containing equipment, the implementation of good waste management practices, and the expected establishment of nation-wide disposal facilities, Canada is well on its way towards a lasting solution in this regard.

For more information

For owners of PCB-containing equipment, or generators of PCB wastes, Environment Canada has published the "Handbook on PCBs in Electrical Equipment", the "Manual for the Management of Wastes Containing Polychlorinated Biphenyls (PCBs)", and the "Question and Answer Guide Concerning PCBs". For more general information, a booklet entitled "The PCB Story" as well as three fact sheets on PCBs are also available:
1) **"Controlling PCBs: The Nature of the Problem"** 2) **"Controlling PCBs: Management of PCBs in Canada"** 3) **"Controlling PCBs: The Options Available".**

For more specific information on PCB handling, transportation, and storage regulations, contact your provincial environment department or, for general information on management of PCB wastes, contact:

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