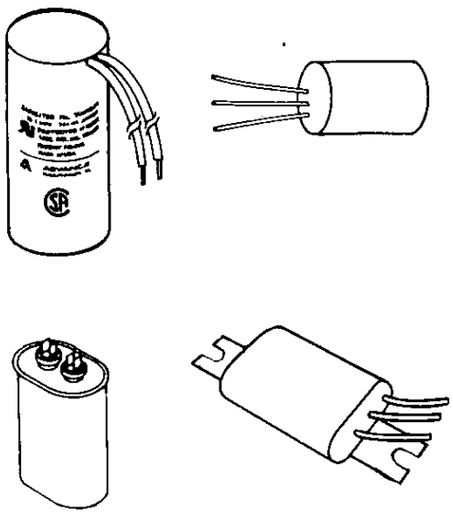
Polychlorinated Biphenyls - PCBs

Bulletin No.: 151
September 1993

BACKGROUND INFORMATION

PCB is a common name for a family of chemicals called polychlorinated biphenyls. PCBs have been widely used for over 50 years, primarily as insulating (dielectric) fluids in electrical equipment such as transformers and capacitors. They have also been used extensively as heat exchange fluids. The principal advantages of PCBs in these applications have been their stability, resistance to fire and electrical insulating properties. However, uncontrolled use of PCBs and disposal practices can result in contami nation of the environment, since PCBs accumulate in the environment and do not break down easily. The use of these chemicals is strictly regulated in Canada.



WORKERS WHO MAY BE EXPOSED TO PCBs

They include electricians servicing electrical equipment, maintenance workers required to clean up spills or leaks or to transfer PCB fluids, employees of scrap metal or salvage companies, and garbage/waste collection workers.

ROUTES of HUMAN EXPOSURE

PCBs can be ingested, inhaled and absorbed through the skin. Inhalation and skin absorption are the most likely routes of occupational exposure.

HEALTH EFFECTS OF OCCUPATIONAL EXPOSURE

Accidental spills and similar incidents can result in short-term exposure of workers to PCBs. Normally, no health effects are seen following brief exposures. Skin and eye irritation may occur if there is prolonged direct contact with the liquid. Long-term exposure to PCBs can cause a variety of symptoms such as skin irritation, chloracne, skin pigmentation and thickening of the skin, digestive disturbances, eye irritation, liver disease, as well as reproductive and nervous system disorders (headaches, dizz iness, depression, memory loss, fatigue, nervousness, sleeplessness, and drowsiness). There are indications that PCBs may lead to cancer in humans. Children born to mothers exposed to large amounts of PCBs may have below-normal birth weights.

OCCUPATIONAL EXPOSURE LIMITS

The American Conference of Governmental Industrial Hygienists (ACGIH) has published exposure limits (TLVs) for two of the most common PCBs.

- 42% chlorine, Time Weighted Average (TLV-TWA): 1 mg/m
- 54% chlorine, TLV-TWA: 0.5 mg/m

The PCB TLV has a skin notation which means that this chemical can be absorbed into the body via skin and mucuous membranes and the eyes, thereby increasing a worker’s total exposure.

PRECAUTIONS TO BE TAKEN WHILE HANDLING PCBs

- educate and train all the personnel handling PCBs in the use and maintenance of personal protective equipment such as impervious gloves, apron, boots, faceshield or chemical goggles.
- inform the workers about the hazards of exposure to PCBs.
- if exposed to PCB vapours/fumes from overheating equipment, the appropriate type of respirator must be worn. High airborne concentrations may require self-contained breathing apparatus or a supplied air respirator.
- educate the worker in recognising the acrid and irritating odour of the PCB vapour/fume.
- proper ventilation to control exposure levels below the TLV should be provided.
- personal hygiene and clean-up procedures should be emphasized.

FIRST AID PROCEDURES

- Skin Contact - wash with warm water and soap; apply cold cream to reduce irritation
- Eye Contact - flush with lukewarm water for at least 15 minutes; seek medical attention.
- Ingestion - do not induce vomitting; consult a physician
- Inhalation - get victim to fresh air; take victim to physician.

FIRE AND EXPLOSION

PCBs are fire resistant compounds. They may decompose to form carbon monoxide, carbon dioxide, hydrogen chloride, phenolics, aldehydes and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

At temperatures in the range of 600 - 650 degrees C and in the presence of excess oxygen, PCBs may form polychlorinated dibenzofurans (PCDFs). Some reports indicate electrical equipment containing PCBs have produced both chlorinated dioxins (PCDDS) and furans during fire situations. Both furans and dioxins are considered to be highly toxic (carcinogenic) and therefore extreme precautions should be taken when PCBs are involved in a fire.

DEFINITION OF PCB CONTAMINATED MATERIAL

Manitoba Conservation defines it to include any material containing more than 50 parts per million (ppm) of PCB.

DISPOSAL OF PCBs

Manitoba Conservation has regulations regarding the handling, transportation, and storage of PCB wastes, (MR 474/88).

Contact the Manitoba Conservation for advice on PCB disposal at 945-7039 or 945-7081. The 24-hour emergency number is 945-4888.