

CHAPTER 25

POLYCHLORINATED BIPHENYLS (PCBs)

2501. Policy

a. Navy policy is to minimize the potential for polychlorinated biphenyl (PCB) exposure by substitution with non-PCB containing materials, using engineering and administrative controls and using appropriate personal protective equipment (PPE).

b. Occupational exposures to PCBs may arise from processes such as retrofilling PCB-containing electrical transformers, removing PCB-impregnated felts or gaskets or working with synthetic rubber, plasticizers or other materials that contain PCBs.

2502. Discussion

a. The Occupational Safety and Health Administration (OSHA) regulates workplace PCBs as air contaminants per reference 25-1. The Environmental Protection Agency (EPA) regulates environmental contamination involving PCBs under reference 25-2. The only human health hazard that has been definitively associated with prolonged exposure to liquid PCBs is a type of skin lesion characterized as chloracne. Eye irritation, chloracne and subclinical liver enzyme abnormalities have been recorded with high inhalation exposures. Note that no adverse human effects have ever been described for exposures to PCB surface contamination alone (references 25-3 and 25-4). For additional information regarding toxicological evaluation, guidance on occupational and environmental issues and other technical information, refer to reference 25-5.

b. The low vapor pressure associated with PCBs suggests that air concentrations on the order of 0.5 milligram per cubic meter (mg/m^3) of air are difficult to achieve under normal workplace conditions. High concentrations of liquid PCBs, optimal temperature and pressure conditions and/or subjection to mechanical dispersion processes would be required to achieve such airborne levels. Air sampling, which has been conducted at a variety of occupational worksites for industrial processes involving PCBs, confirms that airborne concentrations of PCBs are rarely detectable.

c. Under certain conditions such as industrial transformer fires, polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs) can be generated from PCBs or PCB solvents (chlorophenols). It must be noted that the health effects of these toxic by-products do not apply to unpyrolyzed PCB compounds, as is sometimes falsely assumed.

d. The National Institute for Occupational Safety and Health (NIOSH) and the International Agency for Research on Cancer have concluded that there is sufficient toxicological evidence to characterize PCBs as "suspected carcinogens." Neither OSHA nor the American Conference of Governmental Industrial Hygienists (ACGIH) characterize PCBs as suspected human carcinogens.

2503. Permissible Exposure Limits, Skin Designation

a. Permissible Exposure Limits (PELs). PCB PELs relate to allowable airborne exposure concentrations for an 8-hour day in a 40-hour workweek. There are two PELs for PCBs depending on the approximate percentage by weight of chlorine in the compound:

- (1) Chlorodiphenyl (42 percent chlorine) - 1.0 mg/m³
- (2) Chlorodiphenyl (54 percent chlorine) - 0.5 mg/m³

b. Skin Designation. Skin designation denotes that PCBs can be absorbed through the skin. Activities shall prevent or reduce skin exposure to PCBs to the extent necessary through the use of substitution, engineering controls, work practices or PPE, such as gloves, coveralls, goggles or other appropriate PPE.

2504. Control of PCB Exposure in the Workplace Environment

a. General Workplace Control Practices. For situations not exceeding the PELs and not involving unprotected PCB skin contact, activities shall employ routine work and personal hygiene measures appropriate for any occupational setting.

(1) When working with PCB-impregnated materials, such as insulating felts, or with articles that contain liquid PCB solutions, personnel shall strictly observe good housekeeping procedures to avoid the possibility of secondary surface contamination.

(2) Employees involved in PCB- related work activities shall not eat, drink, smoke, chew tobacco or gum or apply cosmetics in the work area.

(3) Activities shall collect and dispose of PCB-containing waste, scrap and debris, and PCB-contaminated clothing (consigned for disposal) in sealed impermeable bags or other impermeable containers labeled per applicable Federal, State or local environmental regulations. For guidance consult reference 25-2.

(4) Personnel shall not perform hot work in the immediate area when work is performed with PCB material.

b. Personal Protective Equipment

(1) Personnel engaged in handling PCB-contaminated or PCB-impregnated material (such as "rip out" or "stripping" operations), during which skin contact with PCBs is considered probable, shall wear the following PPE:

(a) Full-body, one-piece disposable coveralls constructed of Tyvek[®] material or comparable substitute material

(b) Nitrile or Viton[®] gloves

(c) Nitrile or neoprene foot coverings if the work involves the probability of foot contamination by any means

(d) Face shields and vented goggles or other appropriate eye protective equipment wherever the possibility of eye contact exists.

(2) If work situations exist where it is likely that workers' clothing will become saturated with PCB-containing liquids, personnel shall use protective clothing materials having "greater than 24 hours" breakthrough times against PCBs, as listed in reference 25-6. The following PPE is recommended if saturation is anticipated:

(a) Saranex[®]-coated Tyvek[®] coveralls for whole body protection

(b) Viton[®] rubber for gloves and foot coverings

(c) Face shields and chemical goggles for eye protection.

c. Respiratory Protection

(1) Under most conditions, activity OSH offices shall use air-sampling data to determine the necessity for wearing respiratory protection. The cognizant industrial hygienist shall determine the need to perform air sampling for PCBs.

(2) If air sampling results indicate that the PELs for PCBs have been exceeded, personnel shall use a supplied air respirator that has a full facepiece and is operated in the pressure-demand or other positive-pressure mode.

(3) Use of respirators shall comply with the requirements of chapter 15.

(4) When selecting respiratory protection for PCB decontamination, the cognizant industrial hygienist should give consideration to the solvent being used, the potential airborne concentration of the solvent and the possible presence of chlorinated dioxins and furans.

2505. Medical Surveillance Program

Activities shall include personnel who meet the exposure criteria outlined in reference 25-7, and as determined by an industrial hygienist, in the appropriate medical surveillance program.

2506. Environmental Contamination

PCBs are recognized environmental contaminants. The threat they pose to the environment is largely due to their chemical stability, lipid solubility and resistance to biodegradation.

Reference 25-8 provides Navy requirements that address Federal environmental regulations. Also, see references 25-9 and 25-10 for guidance. Refer to reference 25-2 for spill cleanup requirements.

Chapter 25

References

- 25-1. Title 29 Code of Federal Regulations (CFR) 1910.1000 Subpart Z, Table Z-1-A, of 1 Jul 96, Limits for Air Contaminants (NOTAL)
- 25-2. Title 40 CFR 761 of 1 Jul 96, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (NOTAL)
- 25-3. DHHS, National Institute for Occupational Safety and Health (NIOSH) Publication No. 77-225 of Sep 77, "Criteria for a recommended standard, Occupational Exposure to Polychlorinated Biphenyls" (NOTAL)
- 25-4. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) Publication No. TP-92/16 of 1993, Toxicological Profile for Selected PCBs (Arochlor-1260, 1254, 1248, 1242, 1232, 1221, and 1016) (NOTAL)
- 25-5. NEHC Technical Manual, Industrial Hygiene Field Operations Manual, "Poly-chlorinated Biphenyls (PCBs), Polychlorinated Dibenzofurans (PCDFs), and Polychlorinated Dioxins (PCDDs), latest edition (NOTAL)
- 25-6. ACGIH (American Conference of Governmental Industrial Hygienists) 3rd Edition, Guidelines for Selection of Chemical Protective Clothing (NOTAL)
- 25-7. NEHC Technical Manual, Industrial Hygiene Field Operations Manual, "Medical Surveillance Procedures Manual and Medical Matrix," latest edition (NOTAL)
- 25-8. OPNAVINST 5090.1B of 1 Nov 94, Environmental and Natural Resources Program Manual, Chapter 11, "PCB Management Ashore" (NOTAL)
- 25-9. NAVSEA S9593-A1-MAN-010, Shipboard Management Guide to PCBs, latest edition (NOTAL)
- 25-10. Naval Energy and Environmental Support Activity (NEESA) 20.2-028C, PCB Program Management Guide, latest edition (NOTAL)