

IDENTIFICATION OF PCBs IN TRANSFORMER OIL FROM SELECTED POTENTIAL PCB CONTAMINATED FACILITIES

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Introduction

Vietnam has never produced Polychlorinated biphenyls (PCBs) but estimateably imported 27,000 to 30,000 metric tons of PCBs-containing oils from the former USSR, China, Rumania, and Australia during 1960-1990 (Sinh et al. 1999; MONRE, 2006). Significant amounts of PCBs still exist in Vietnam, primarily in oils used in electrical transformers, capacitors, and some industrial equipment.

PCBs thresholds are regulated at 5 mg/kg under National Technical Regulation on Hazardous Waste Thresholds (QCVN 07:2009/BTNMT) issued by the Ministry of Natural Resources and Environment (MONRE). In order to have a quick view on the situation of the usage of PCBs containing oils and the storage of wasted transformer oils, the Vietnam Environment Administration (VEA) in cooperation with the Vietnam PCB Management Project (PCBs Project) funded by the Global Environment Facility (GEF) through the World Bank have conducted an inspection campaign in 2013 focusing on potential PCBs contaminated facilities. This report summarizes the inspection results of PCBs in 44 facilities those are potentially contaminated with PCBs.

Materials and methods

PCBs samples were collected complying with following criteria:

- For new oils: 1 to 2 samples in imported oils facilities will be randomly collected to identify PCBs concentration;
- For using oils: 1 to 3 samples will be taken typically in equipment, depending on current status of equipment in each facilities. Oil samples from equipment of the same type with the same produced time will be sampled randomly, sampling process will be selected based on a priority such as year of production;
- 01 sample of wasted oil, which is from an equipment or container will be taken representatively.

Total of 307 samples were collected from 44 facilities. Number of samples taken between facilities are different based on actual status of existing equipment, wasted oils, etc. Samples were analyzed for PCBs by using GC-ECD and GC-MS. The total concentration of PCBs was calculated based on sum of six indicator PCBs congeners (IUPAC No.: PCB 28, 52, 101, 138, 153, and 180) by multiplication with the corresponding factor, which is in line with the type of aroclors specified (Froescheis et al., 2000).

Results and discussion

It is recognized that the PCBs levels among 307 collected samples ranged from no detection to 125,095 mg/kg; 22 samples contain PCBs above 50 mg/kg, 32 samples contain PCBs ranging from 5 to 50 mg/kg, and 253 samples having PCBs levels lower than 5 mg/kg (Fig. 1).

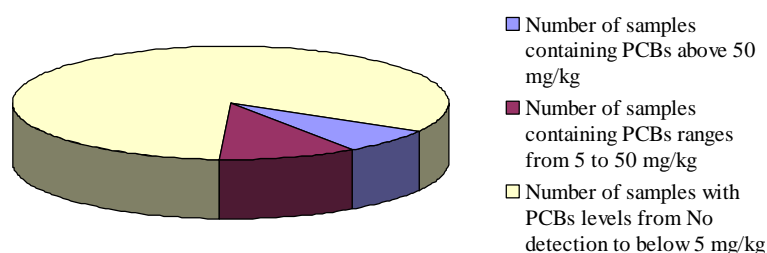


Figure1. Collected samples with different range of PCBs levels.

It is recognized that 18/44 facilities have been detected working with PCBs containing oils with PCBs concentration higher than 5 mg/kg, in which 10/18 facilities own PCBs containing oils with PCBs concentration higher than 50 mg/kg.

Based on PCBs analytical results, the amount of PCBs containing oils from the selected facilities was calculated. There have been around 83,000 kg of oils containing PCBs with PCBs concentration above than 5 mg/kg, in which 54,000 kg of oils with PCBs concentrations ranges from 5 mg/kg to 50 mg/kg and 29,000 kg of PCBs containing oils with PCBs concentrations above 50 mg/kg have been recognized (Fig. 2).

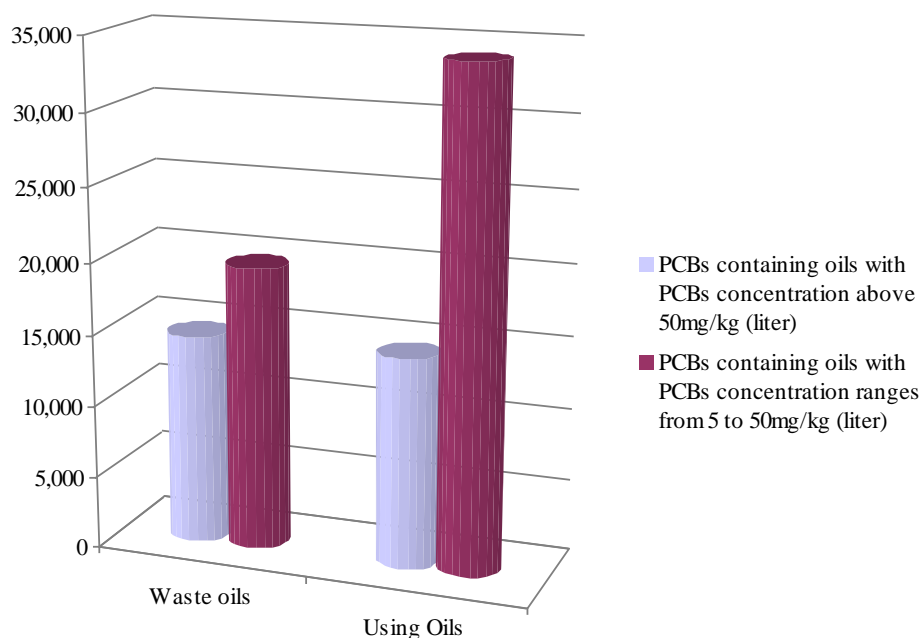


Figure 2. Summary results of PCBs concentration in collected samples

The inspection is not nationwide inventory of PCBs in Vietnam; however, significant amount of PCBs containing oils have been identified through this activity. It supports for the conclusion that significant amounts of PCBs containing oils still exist in Vietnam, in which PCBs containing oils with PCB concentrations above 5 mg/kg is predominant.

Vietnam has signed the Stockholm Convention on 23 May 2001, ratified it on 22 July 2002, and submitted its NIP to the Stockholm Convention in September 2007 (MONRE, 2006). The NIP requires eliminating the use of PCBs-containing equipment by 2020 and environmental sound disposal by 2028. At present, the VEA and the PCBs Project are conducted a nationwide inventory of PCBs in Vietnam. The findings of this activity provide valuable information for the environmental authorities of Vietnam to correctively select the sectors/facilities for PCBs inventory and further for safe management and disposal of PCBs via the national action plan.

Acknowledgements

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