A Study of the Present Status of Management of PCBs, and Development of a Preliminary Inventory for PCB contaminated Transformers in Sri Lanka

Submitted as a partial fulfillment of the requirement for the Degree of Masters of Science in Environmental Management, University of Moratuwa, Sri Lanka

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December, 2004

Declaration

This dissertation has not been previously presented in whole or part to any university or institute for a higher degree.

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I certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the university for the purpose of evaluation.

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2004.12.

Acknowledgment

I would like to express my heartfelt gratitude to my supervisor, Prof (Mrs) N. Rathnayaka, Head of the Civil Engineering Department, University of Moratuwa, Sri Lanka for her clear guidance and advice. I highly appreciate all her patients in correcting the reports and making this project a success.

I would also like to thank Mr. S. Pathinathar, Senior Lecturer, Dr. Mahesh Jayaweera, Senior Lecturer and other members of the staff of Postgraduate Course in Environmental Management, the University of Moratuwa, for their commitment in making for our course an advanced program.

I am grateful to the Ministry of Environment, for providing me with financial assistance for the whole program, especially Ms. L. P. Batuwitage, Director/Environment of the Ministry, who did not hesitate to grant permission to use the information collected as part of my official work. Also her guidance during the POPs project is very much appreciated.

The encouragement rendered by my husband is remembered here. Good wishes of my two little girls who wished me good luck whenever I leave home were also invaluable.

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Acronyms and Abbreviations

CP	Central Province
CEB	Ceylon Electricity Board
EP	Eastern Province
EU	European Union
GC	Gas chromatography
Gen	Generation
HS	Harmonized System
IARC	International Agency for Research on Cancer
ITI	Industrial Technology Institute
LECO	Lanka Electricity Company
LTL	Lanka Transformers Limited
NCP	North Central Province
NIOSH	National Institute for Occupational Safety and Health
NIP	National Implementation Plan
NWP	Northwestern Province
OECD	Organization for Economic Corporation and Development
PCB	Polychlorinated biphenyls
PCDD	Polychlorinated Dibenzo Dioxin
PCDF	Polychlorinated Dibenzo Furan
Sab P	Sabaragamuwa Province
SP	Southern Province
TEF	Toxic Equivalent Factor
UNEP	United Nations Environment Program
UP	Uva Province
US EPA	Environmental Protection Agency of United States
WHO	World Health Organization
WP	Western Province

Abstract

Polychlorinated biphenyls (PCBs) have wide applications and one of its main uses is as the dielectric fluid in electric equipment. During 1970s PCBs were identified as a substance dangerous to health and environment and was banned in most countries since 1980s. Assuming that 60% of its uses are as dielectric fluid in electrical equipment, this survey was concentrated on transformers.

In Sri Lanka, CEB, LECO, LTL are the main service sector stakeholder agencies that own and manage transformers and capacitors that could be contaminated with PCBs. Other than these institutions there are transformers owned by private sector users. Small scale recyclers also handle transformers for smelting of copper and recycling of waste oil.

The objective of this study is to estimate the extent to which there are PCB contaminated equipments in the country; to identify issues faced by stakeholders and to provide recommendations for the management of PCB contaminated equipment.

Questionnaires, surveys and field visits were undertaken for the collection of information. In the survey, information about transformers manufactured on or before 1986 were collected.

There are 14,354 transformers owned by CEB and 2700 owned by LECO. In the survey, 354 in-use transformers and 296 decommissioned transformers were investigated. 118 In-use transformers were tested with the Dexsil Field Test Kit and 52 decommissioned transformers were tested. Dexsil Field Test Kit was used to eliminate PCB negative transformers.

In Sri Lanka, there are a few pure PCB transformers, but a considerable potion of contaminated mineral oil transformers exist in the country. According to the findings of the study, with 95% confidence level, it can be stated that 73% to 56% of in-use transformers in the population are contaminated with PCBs, while at the same confidence level, 78% to 52% of decommissioned transformers are contaminated.

There are several HS codes under which PCB oils, contaminated material and waste oils could be imported to Sri Lanka. There is no legal requirement for a 'PCB free certificate'.

Possibility of informal recyclers being contaminated with PCBs is quite high because there are no controls over disposal of PCB contaminated transformers. Recyclers are completely unaware about the hazards of PCBs. Storage of contaminated transformers/material is not environmentally acceptable and there is a high possibility for environmental contamination.

Main recommendations of the study;

1. Establishment of a complete Inventory and a Database on contaminated transformers.
2. Identify all Pure PCB transformers and have a phasing out plan.
3. Establish procedure for Operation and maintenance of contaminated transformers to prevent further cross contamination.
4. Prevent new entry of contaminated capacitors, transformers and oils to Sri Lanka
5. Proper disposal of decommissioned transformers.
6. Establishment of proper storage; identification and remediation of contaminated sites.
7. Establishment of necessary regulations for the implementation of the above.