

# **Final Report**

## **Promoting PCB Non-Combustion Facility for Waste Destruction in the Philippines**

A commissioned Study on Promoting Non-Combustion Techniques  
to Effectively Destroy PCB Stockpiles in the Philippines

Funding Organization: International POPs Elimination Network (IPEN)

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## **Acronyms and Abbreviations**

APCS	Air Pollution Control System
BAT	Best Available Techniques
BCD	Base Catalyzed Decomposition
BEP	Best Environmental Practices
CCO	Chemical Control Order
CBO	Community- based Organization
CTA	Chief Technical Adviser
DE	Destruction Efficiency
DENR	Department of Environment and Natural Resources
EIA	Environmental Impact Assessment
EHF	Environmental Health Fund
EMB	Environmental Management Bureau
ESM	Environmentally Sound Management
FAO	Food and Agriculture Organization
GAIA	Global Alliance for Incinerator Alternative
GEF	Global Environment Facility
GOP	Government of the Republic of the Philippines
GPCR	Gas Phase Chemical Reduction
HCWH	Health Care Without Harm
HydroDec	Hydrodechlorination
IEC	Information, Education, Communication
MC	Memorandum Circular

M&E	Monitoring and Evaluation
MEF	Mother Earth Foundation
MMT	Multipartite Monitoring Team
MOA	Memorandum of Agreement
NAPOCOR	National Power Corporation
NGO	Non-Governmental Organization
NIP	National Implementation Plan
NPM	National Project Manager
NRDC	National Resources Development Corporation
OP	Operational Program
PAC	Program Advisory Committee
PAFC	Philippine Alternative Fuel Corporation
PC	Program Coordinator
PCB	Polychlorinated Biphenyl
PMT	Project Management Team
PNOC	Philippine National Oil Company
POPs	Persistent Organic Pollutants
PSC	Project Steering Committee
SR	Sodium Reduction
TAG	Technical Advisory Group
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organization
WB	World Bank

## Definition of Terms

**Polychlorinated Biphenyls (PCBs)** - PCBs are hazardous chemicals, which are among the priority persistent organic pollutants (POPs) targeted for worldwide phase out under the Stockholm Convention on POPs, a global agreement where the Philippines is a Party. PCBs were first manufactured in the 1900's and became widely used as dielectric fluids in transformers and capacitors.

**Dielectric fluid** is an oily substance that is used to provide an insulating barrier in electrical equipment due to its excellent thermal stability and fire resistance.

**Capacitor** means a device for accumulating and holding a charge of electricity, and consisting of conducting surfaces separated by a dielectric fluid.

**Transformer** is a device that stabilizes or regulates the supply of electricity.

**PCB equipment** means any equipment that contain 500 ppm PCB or greater ( $PCB \geq 500$  ppm).

**PCB-contaminated equipment** means any equipment that contains 50 ppm PCB and higher but less than 500 ppm PCB ( $50 \text{ ppm} \leq PCB < 500$  ppm).

**Non-PCB equipment** means any equipment that contains PCB concentration of less than 50 ppm ( $PCB < 50$  ppm).

**PCB-free material** means any solid or liquid that does not contain any PCB.

**Non-Combustion Technologies** also known as alternative technologies include technologies based on the so-called reductive processes.

**Sodium Reduction Technology** is the non-combustion technology available in the Philippines. This technology effectively utilized the principle of reduction with sodium metal in the liquid phase.

## **Executive Summary**

### **1. Introduction**

In May 2004, the Global Environment Facility (GEF) Council approved the project brief for the Philippines. The specific project in the Philippines as part of the Global Program, aims at introducing and applying a non-combustion technology to destroy PCB wastes and helps in removing barriers to further adoption and effective implementation of the selected technology and meet the Stockholm Convention requirements to ensure the use of best available techniques (BAT) and best environmental practices (BEP). The said project served as a barriers reduction exercise that helped inform future activities mandated or encouraged under the provisions of the Stockholm Convention that entered into force on May 17, 2004.

The project was implemented from December 2007 to August 2015 by United Nations Industrial Development Organization (UNIDO) and nationally executed by the Department of Environmental and Natural Resources/ Environmental Management Bureau (DENR-EMB) with the following financing sources: GEF: \$4,108,500; co-financing (cash and in kind): \$7,662,380; for a Total of \$11,770,880.

The overall objective of the program is to demonstrate the viability to promote replication, at the global level, of available non-combustion technologies for use in the destruction of obsolete POPs, specifically PCB wastes, PCB-containing equipment and the cleanup of POPs, and specifically PCBs in different matrices including contaminated soils or sediments. For Philippines, the immediate project objective was to deploy a commercially available proven non-combustion technology to address 1,500 tons of PCBs containing transformers.

### **2. Highlights of the Study**

- The inventory of the transformer units from the CCO registration in 2010 indicated a total of 11,900 transformers against the 7,840 units from the initial inventory in the

NIP 2006. In the 2010 inventory, 98% (117,091 units) are PCB free and Non-PCB transformers while 2% (1,991 units) contained PCB oil.

- From the partial CCO registration in 2010, there were 249,710.36 kg of transformers with PCB oil and 249,710 kg of PCB wastes. It showed that the biggest contributors to PCBs come from electric distribution (64%), power plants (29%) and manufacturing sector (7%).
- The completion of the National Inventory of PCBs is being conducted under IPOPs Project. The target number of companies to be inventoried is 800. At present, there is an on-going updating of the database and the registration data are raw, as submitted by industry. Some of the data have yet to be validated by DENR Regional Offices.
- A non-burn technology PCB treatment facility was constructed in Mariveles, Bataan and available locally for disposal of PCB oil. The facility was constructed under the GEF/UNIDO/DENR-EMB/PNOC-AFC project, which was implemented from 2007-2015. Currently, it is under the management of Natural Resources Development Corporation (NRDC).
- The Sodium -based technology applied for destruction (sodium dechlorination) is capable for reducing the concentration of PCB oil down to 2 ppm concentration. The facility treated the following materials: a) 51.75 tons of low level PCBs (29 batches) ranging from (40-15,500 mg/kg) were treated to less than 2 ppm; b) 128 kg (1 batch) of high level PCBs (**Askarel**, 450,000 mg/kg **Aroclor 1260**) was treated to < 2 ppm; and c) 206.60 kg (2 batches) of pure PCBs were treated to <2 ppm.
- This project was funded by GEF (US \$ 4,108,500), UNIDO (US \$ 650,000 in kind), the Government of the Philippines (US \$ 500,000 in kind), private sector (US \$ 2,512,380 in cash), operating entity (US \$ 3,900,000 in kind/cash), and NGOs (US \$ 100,000 in kind) during the period of implementation. Total Project Costs is US \$ 11,770,880.
- The NGO/Civil Society served as the advocacy arm for the project in coordination with other stakeholders.

### **3. Conclusions**

- The Non-Com POPs Project is very relevant given that Philippines is party to the Stockholm Convention and it holds significant stockpiles of PCBs and PCB wastes. The project plays a significant role in supporting the Philippines to meet the objectives as set in its National Implementation Plan (NIP) and is helping in complying with the Stockholm Convention by building its capacity to soundly manage its stocks of PCBs and related wastes. The NIP favors and promotes the application of non-combustion technologies to effectively destroy POPs in the Philippines.
- The change of operating entity from PAFC to NRDC caused some delays for the commercial operation of the facility. However, sustainability of the facility is high because the Philippines is a party to the Stockholm Convention and is fully committed to its implementation. Also, the PCB owners have already signed MOAs with DENR to have their PCB stockpiles be treated by the facility in Bataan. Finally, confirmation from DENR-EMB that they would provide the necessary resources for the full operation of the facility starting 2019 is a good sign for the promotion and continuous operation of the Non-Com POPs treatment facility.

### **4. Recommendations**

- The government should provide a policy mandating all the PCB users to have their PCB wastes be treated in the facility and not to look for alternatives.
- DENR-EMB should ensure that treatment costs of PCB wastes must be competitive for the benefit of PCB users especially the small electrical cooperatives with financial constraints.
- To upgrade the facility and use it for treatment of other Persistent Organic Pollutants to make it still functional after all the PCB stockpiles in the country have been treated.
- Provide clear roles and responsibilities among all members and stakeholders in future inter-organizational projects in the country. Also, strengthen the role of civil society in all stages of project management especially in monitoring and evaluation stage of the project.

# Promoting PCB Non-Combustion Facility for Waste Destruction in the Philippines

## 1. Introduction

Today, most countries with developing economies and economies in transition lack adequate and appropriate technical capacity to destroy in an environmentally sound manner obsolete stockpiles and wastes of Persistent Organic Pollutants (POPs), more specifically Polychlorinated Biphenyl (PCB) wastes. In addition, in many, countries there are strong disagreements within civil society in the evaluation of technologies that have been proposed for use in the destruction of PCBs stockpiles and wastes. Because of these disagreements, efforts to acquire the technical capacity to destroy PCBs stockpiles and wastes have encountered strong resistance from influential sectors of civil society and this has often impeded or blocked progress.

Over the years, innovative, highly effective technologies for the environmentally sound disposal of POPs, that do not utilize combustion processes, have recently emerged and commercialized. Some of them have operating characteristics that make them far superior to incineration, as they possess much higher destruction efficiency (DE)<sup>1</sup> and operate in an essentially closed system and hence providing greater occupational health safety.

The Philippines is one of the countries with serious interest to adequately address POPs problems with strong public involvement. For several years, lack of adequate alternatives for destruction of POPs (mainly PCBs equipment and wastes) has resulted in problematic management in the country. Lack of proper solutions has led to a focus on export of POPs wastes at very high cost. Export prices are frequently more than US\$ 10 per kg of PCBs waste, with average prices for export running at over US\$ 5 per kg. It is clear that

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<sup>1</sup>DE is defined as the total mass of a chemical into a process, minus the mass of the chemical in all products, by products and environmental releases, divided by the input mass (to give a percentage). It differs significantly from the other common measure, destruction and removal efficiency (DRE), which only takes into account stack emissions, with no regard for other releases and residues. Only closed processes that achieve greater than 99.9999 percent DE and inherently safe was considered in the demonstration project.

only very dedicated and financially strong companies can pay such disposal costs. Successful demonstration and transfer of a non-combustion technology will significantly contribute to achieving these goals by the virtual elimination of all PCBs stockpiles and materials containing PCBs in the Philippines.

In May 2004, the Global Environment Facility (GEF) Council approved the project brief for the Philippines. The specific project in the Philippines as part of the Global Program, aims at introducing and applying a non-combustion technology to destroy PCB wastes and helps in removing barriers to further adoption and effective implementation of the selected technology and meet the Stockholm Convention requirements to ensure the use of best available techniques (BAT) and best environmental practices (BEP). The said project served as a barriers reduction exercise that helped inform future activities mandated or encouraged under the provisions of the Stockholm Convention that entered into force on May 17, 2004.

The project was implemented from December 2007 to August 2015 by UNIDO and nationally executed by the Department of Environmental and Natural Resources/ Environmental Management Bureau (DENR-EMB) with the following financing sources: GEF: \$4,108,500; co-financing (cash and in kind): \$7,662,380; for a Total of \$11,770,880<sup>2</sup>.

This project is part of a non-combustion program that is being implemented by UNIDO. The project is very relevant given that Philippines is party to the Stockholm Convention and it holds significant stockpiles of PCBs and PCB wastes. The project plays a significant role in supporting Philippines to meet the objectives as set in its National Implementation Plan (NIP)<sup>3</sup> and is helping in complying with the Stockholm Convention by building its capacity to soundly manage its stocks of PCBs and related wastes. The NIP favors and promotes the application of non-combustion technologies to destroy POPS in the Philippines.

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<sup>2</sup> Information taken from Independent Terminal Report, December 2015.

<sup>3</sup> The NIP of the Philippines was prepared with support of UNEP

The overall objective of the program is to demonstrate the viability to promote replication, at the global level, of available non-combustion technologies for use in the destruction of obsolete POPs, specifically PCBs wastes, PCB-containing equipment and the cleanup of POPs, and specifically PCBs in different matrices including contaminated soils or sediments. For Philippines, the immediate project objective was to deploy a commercially available proven non-combustion technology to address 1,500 tons of PCBs containing transformers.

Despite the construction of a fully operational treatment facility, the planned objective of treating 1,500 tons of PCB equipment was not achieved during the project time due to the pulling out of the Philippine Alternative Fuel Corporation (PAFC), the operating entity, from the project. However, the Natural Resources Development Corporation (NRDC), an attached organization to the DENR, took over as the operating entity of the facility. The Philippine Government being a party to the Stockholm Convention is fully committed for the sustainability of the project as well as in promoting non-combustion techniques to effectively destroy PCB stockpiles in the Philippines, hence, the reason for this study.

This report has 12 sections. First section is the background of the study, followed by scope and objectives of the study. Third part is its methodological remarks and limitations. Fourth and fifth sections discuss all about PCBs and the present status of PCBs in the Philippines. Sixth, describes the non-combustion technology available in the country and other non-combustion technologies commercially available in other countries. Seventh and eighth, highlights the rationale for GEF intervention in the Philippine government project, role of stakeholders in project implementation, respectively. Ninth and tenth sections, explain how the project was funded in the Philippines and the plans of the Philippine government to eliminate PCB wastes. Finally, last parts of the report are conclusions and recommendations.

## **2. Scope and Objectives of the Study**

This study aims to promote non-combustion facility to effectively destroy PCB wastes and to serve as a benchmark for developing countries like the Philippines. Specifically, this study will answer the following questions: a) What is the present status of PCBs in the Philippines?; b) Why did the Philippines choose non-combustion facility?; c) What are the roles of different stakeholders in the Non-Com POPs Project, particularly the NGOs involvement in monitoring and evaluation of the project?; d) How the Non-Com POPs Project is being funded in the Philippines?; and e)What are the country's plans to meet the goal of environmentally sound management of PCB wastes by 2028?

This study intends to provide significant contributions to other developing countries in terms of utilizing non-combustion techniques in destroying PCB wastes. The research is very relevant given that Philippines is party to the Stockholm Convention and it holds a significant stockpile of PCBs; it will showcase how the country soundly manages its stocks of PCBs and related wastes. The implementation of cost-effective and clean, environmentally sound technologies demonstrated in this project for the destruction of obsolete stockpiles of PCBs and materials containing PCBs would, if replicated, support environmentally sustainable economic and industrial development in many regions particularly in countries with developing economies and economies in transition. The findings will also highlight the advantages and benefits of using non-combustion facility in treating PCB stockpiles. This study utilized a qualitative analysis in examining data and other relevant information needed.

## **3. Methodological Remarks and Limitations**

In order to answer the research questions, this study utilized descriptive qualitative method, using interviews and document analysis/review. The study took place during the period of February 20-April 28, 2019 and included field works. Document review was done last week of February and interviews to stakeholders (e.g. DENR-EMB, UNIDO, Eco-Waste

Coalition, and community members) were done first week of March 2019. The activities took place as scheduled and were successfully completed.

On March 6, 2019, a site visit was also undertaken at the Non Com POPs facility and some barangays (small towns) in Mariveles, Bataan. The researcher conducted interviews with local stakeholders to assess their involvement during the implementation of the project. Specifically, to know their participation in monitoring and evaluating the adverse effect of the facility in the environment (See Annex A for list of key informants).

Due to time constraints and short period of the study, the researcher was not able to interview more community members and other stakeholders. Some documents were not available during time of visits like multipartite monitoring team (MMT) reports and results of sampling activities done in the community. Documents given by Eco-Waste Coalition and reports accessed from the websites of DENR, UNIDO, and GEF were all useful for data gathering. Other data were gathered through interviews during field visits.

#### **4. Facts about Polychlorinated Biphenyls(PCBs)**

PCBs are either oily liquids or solids and are colorless to light yellow in color. They have no known smell or taste. There are no known natural sources of PCBs. Some commercial PCB mixtures are known in the United States by their industrial trade names, such as Aroclor and Askarel. PCBs don't burn easily and are good electricity insulating material. They have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Products containing PCBs are old fluorescent lighting fixtures, electrical appliances containing PCB capacitors, old microscope oil, and hydraulic fluids.

PCBs can be released into the environment from hazardous waste sites that contain PCBs, illegal or improper dumping of PCB wastes, and leaks from electrical transformers containing PCBs. PCBs may be carried long distances in the air and they remain in the air for

approximately 10 days. In water, a small amount of the PCBs may remain dissolved, but most sticks to organic particles and sediments. PCBs in water build up in fish and marine mammals and can reach levels thousands of times higher than the levels in water. One might get exposed to PCBs by using old fluorescent lighting fixtures and old appliances such as television sets and refrigerators; from the leak, small amounts of PCBs into the air when they get hot during operation; eating food, including fish, meat and dairy products containing PCBs; breathing air near hazardous waste sites that contain PCBs; drinking PCB-contaminated well water; repairing or maintaining PCB transformers.

Animal experiments have shown that PCB mixtures produce adverse health effects that include liver damage, skin irritations, reproductive and developmental effects, and cancer. People exposed to PCBs in the air for a long time have experienced irritation of the nose and lungs, and skin irritations, such as acne and rashes. It is not known whether PCBs may cause birth defects or reproductive problems in people. Some studies have shown that babies born to women who consumed PCB-contaminated fish had problems with their nervous systems at birth. However, it is not known whether these problems were definitely due to PCBs or other chemicals<sup>4</sup>.

## **5. Present Status of PCBs in the Philippines**

### **5.1. Regulatory Enforcement**

PCBs are hazardous chemicals, which are among the priority persistent organic pollutants (POPs) targeted for worldwide phase out and destruction under the Stockholm Convention on POPs, a global agreement where the Philippines is a Party. PCBs were first manufactured in the 1900's and became widely used as dielectric fluids in transformers and capacitors. In the Philippines, the phase out of PCBs as dielectric fluid and ban on its importation started in 2004.

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<sup>4</sup> ICS-UNIDO Publications "Proceedings of Expert Group Meetings on POPs and Pesticides Contamination: Remediation Technologies and on Clean Technologies for the Reduction and Elimination of POPs", Published in November 2000.

The Chemical Control Order (CCO) is the main regulatory enforcement framework to comply with the country's obligation to PCBs in the Stockholm Convention. The DENR, through EMB issued an Administrative Order DAO 2013-22, "*Revised Procedures and Standards for the Management of Hazardous Waste (Revising DAO 2004-36)*". This procedural manual applies to management of PCB wastes. The "*Code of Practice on Management of PCBs*", was published in November 2008 by DENR as part of the support component of the Non-Com POPs Project to serve as a guide to the identification, removal, handling, storage, treatment and disposal of PCB wastes, including tools and strategies to manage the environmental and health impacts associated with these wastes<sup>5</sup>.

A Memorandum Circular for PCBs, Supplemental Guidelines for the Chemical Control Order (CCO) for PCBs was also approved in 2014. This Memorandum Circular was issued to provide guidance and to facilitate registration of laboratories performing analysis of PCBs in transformer oil, waste oil, and non-porous surface materials<sup>6</sup>. Another Memorandum Circular was released in 2015 to provide clarification for the CCO for PCBs, its congeners, and wastes<sup>7</sup>.

In addition, Memorandum Circular on Technical Guidance Document on PCBs Management was signed in 2015. This was issued to serve as a guide for the identification, inventory, handling, storage and transport, environmentally sound treatment and disposal, health and safety, emergency preparedness and responses, personnel training and preparation of PCB Management Plan. The intended users

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<sup>5</sup> Text taken from the National Implementation Plan (NIP) for Stockholm Convention on Persistent Organic Pollutants (POPs), 2014.

<sup>6</sup> Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2014-007.

<sup>7</sup> Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2015-004.

include anyone who will handle PCB containing equipment, PCB owners and the EMB staff in the enforcement of the CCO for PCBs<sup>8</sup>.

The DENR-EMB implemented the World Bank (WB)-assisted Integrated POPs Management Project to achieve the country's goal for PCBs. The goals of the project are: to speed up the completion of the national inventory of PCBs, assist the PCB owners in the environmentally sound management (ESM) and disposal of PCBs, and strengthen EMB's capability to validate the reports submitted by the PCB owners and enforce the CCO. The target number of companies to be inventoried is 800. At present, there is an on-going updating of the database and the registration data are raw, as submitted by industry. Some of the data have yet to be validated by DENR Regional Offices. In relation to the country's obligation to the Stockholm Convention on POPs, the Philippine government through the DENR-EMB, with assistance from GEF and UNIDO, and co-financing support from the Philippine government and various stakeholders is presently implementing the Safe PCB and E-Waste Management Project<sup>9</sup>.

## **5.2. Stockpiles**

Based on the partial registration of PCB owners submitted as compliance to CCO, the inventory of PCBs in 2010 showed that the biggest contributors to PCBs come from electric sector (64%), followed by the power plants (29%), and the manufacturing sector (7%). The inventory of the transformer units from the CCO registration in 2010 indicated a total of 11,900 transformers against the 7,840 units from the initial inventory in the NIP 2006. In the 2010 inventory, 98% (117,091 units) are PCB free and Non-PCB transformers while 2% (1,991 units) are contaminated with PCB oil.

The information in the registration for CCO compliance is being updated to reflect the classification of the transformer equipment according to its PCB content;

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<sup>8</sup> Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2015-007.

<sup>9</sup> Information was based on interview with DENR Staff.

whether it is a PCB equipment (PCB >500 ppm), PCB containing equipment (50 ppm < PCB < 500 ppm), non PCB equipment (2 ppm = PCB < 50 ppm), or PCB-free equipment (PCB < 2 ppm) determined by testing. From the partial CCO registration in 2010, there were 249,710.36 kg of transformers with PCB oil and 249,710 kg of PCB wastes. The low registration of equipment may be due to the following reasons: a) suspected PCB equipment were not considered; b) not all transformers or equipment were disclosed by industry due to lack of awareness; and c) some of the old transformers could not be accounted for<sup>10</sup>.

## 6. Non-Combustion Technology in the Philippines

Over the last 15 years, a number of non-combustion technologies also known as alternative technologies have been demonstrated to effectively treat POPs wastes in countries such as Canada, USA, Australia, and Japan. The alternative technologies include technologies based on the so-called reductive processes. These are usually low temperature processes that involve the reduction of organochlorine compound with hydrogen, hydrogen transfer agents, or other reductants. The advantage of such processes is that dioxins and furans are not formed in the reductive atmosphere<sup>11</sup>.

In the Philippines, a non-combustion technology PCB treatment facility is now available for disposal of PCB oil. The facility was constructed in Mariveles, Bataan under GEF/UNIDO/DENR-EMB/PNOC-AFC cooperation. The commissioning of the treatment plant was undertaken from November 2011 to February 2014 by Kinectrics, the technology vendor located in Canada<sup>12</sup>. It utilized chemical destruction of extracted POPs using **Kinectrics' Sodium-based technology**<sup>13</sup>.

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<sup>10</sup> Data taken from the National Implementation Plan (NIP) 2014, pp.22-23.

<sup>11</sup> Non-combustion technologies for POPs Destruction, Review and Evaluation, UNIDO, 2007. Accessed from <http://institute.unido.org/wp-content/uploads/2014/11/23.-Non-combustion-Technologies-for-POPs-Destruct>

<sup>12</sup> Data taken from NIP for the Stockholm Convention on POPs 2014

<sup>13</sup> Description of technology was taken from hand-out of Technology Vendor's Seminar, September 9, 2008 held at Shangri-la Plaza, Philippines

The Philippines chose sodium reduction technology because this technology applied for destruction (sodium dechlorination) is capable of reducing PCB oil down to 2 ppm concentration as required by local regulation.<sup>14</sup> Based on reports from November 2011-February 2014 the facility treated the following materials: a) 51.75 tons of low level PCBs (29 batches) ranging from (40-15,500 mg/kg) were treated to <2 ppm; b) 128 kg (1 batch) of high level PCBs (**Askarel**, 450,000 mg/kg **Aroclor1260**) was treated to < 2 ppm; and c) 206.60 –kg (2 batches) of pure PCBs were treated to <2ppm. There was also the decontamination of 5.4 tons of PCBs-containing equipment to less than 10µg/100 cm<sup>2</sup>.<sup>15</sup>

In addition, based on an interview with DENR Staff, the facility had treated 4,000 kg of low-level PCBs as part of demo treatment last January –February 2018. The PCB oil was treated to <2 ppm. The technology applied for destruction is an effective solution, able to meet or exceed project’s requirements, DE exceeds 99.9999%.The facility itself has the capacity to destroy around 300 tons of POPs per year<sup>16</sup>.

The facility is a closed system that controls PCB/POP destruction process without chances of uncontrolled emissions and contamination. The technology has on-site solution to reduce transportation costs and therefore potential for spills/accidents and can treat all identified waste streams for the project. In addition, it is an economical alternative, as by products are recyclable or re-usable commodities (metals, oil, petroleum-based sludge). It is environmentally friendly, without PCB emissions or creation of more toxic materials such as dioxins and furans, the reason why the Philippines chose this non-combustion technology.

### **6.1. Sodium Reduction Technology**

Sodium Reduction (SR) is represented by a vast family of options for the treatment of PCBs in a number of countries, namely France, Germany, UK, Netherlands, South Africa, Australia, USA, Saudi Arabia, Japan, Italy, New Zealand, etc. This technology effectively utilized the principle of reduction with sodium metal in the liquid phase. Application of SR

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<sup>14</sup>See footnote 11

<sup>15</sup> Data taken from Quarterly Progress Report for the Period of July 1, 2011-June 30, 2015

<sup>16</sup> Information came from DENR Staff during interview held last February 27, 2019

technologies for PCB treatment started nearly almost 20 years ago. Now, the SR technology has a very firm experience of PCB treatment worldwide. Being very simple in operation, requiring almost no infrastructure, and easy to transport and install on site the SR was practically the first widely adopted alternative solution of PCB treatment. In particular, in North America, France, Canada, Japan, and in Germany most of the PCB oil above 50 ppm has been treated by the SR technology.

In most SR processes, organic liquids (better low vapor pressure ones), containing the contaminant, e.g. PCB oil is mixed with a fine sodium dispersion in hydrocarbon oil. Typically, the reaction is run in a standard batch stirred reaction vessel, unless in situ treatment is applied. The technology operates at atmospheric pressure, moderate temperatures (normally between 80 and 180°C, depending also on the substance treated). Nitrogen blanketing may be used for safety. Other process streams, besides mentioned basic reaction products also include sodium hydroxide, water, and solidified polymers. After the treatment is complete the oil fraction is separated from salts and polymerized product. SR processes can be mobile or can be easily made such. For the in-situ treatment the sodium dispersion is placed directly in the transformer containing oil. SR can also be coupled with other technologies for post-/pre-treatment, such as solvent extraction (to extract contaminants from matrices and electrical equipment). For example, Shinko Pantec, Japan uses bio-treatment of liquid SR effluents.

For pre-treatment PCB oils may need to be extracted from equipment and the latter washed with organic solvents. Similarly, the POPs which are solid or in the adsorbed state would need to be dissolved to the required concentration or extracted from matrices. Water should be removed by phase separation, evaporation, or other method. For post-treatment no or minimal post-treatment is required. Depending on technology such can include off-gas treatment and neutralization or conservation of residuals. The excess of sodium, if not neutralized, may need to be recovered.

The advantages of Sodium Reduction technology are: equipment is simple in operation, reductive environment and low temperature prevents dioxin formation, very low emissions and low cost. However, this technology has its limitations and disadvantages namely, it is limited to PCBs and liquid organic waste, can treat efficiently only diluted POP solutions in order to reach high DE, waste should be dewatered, as dispersed metallic sodium reacts violently with water and other substances to produce explosive hydrogen gas. Increased safety precautions should be taken for sodium handling during storage, transportation, and process operation<sup>17</sup>.

Based on an interview with the Facility Engineer during the site visit, the Sodium-based Reduction (SR) technology destroys PCBs with dispersed metallic sodium in mineral oil. The technology has been used for removal of PCBs from active transformers. The throughput is about 12,000-15,000 litres/day(2 batches)of PCB-contaminated oils. Oils with a PCB content of <10,000 ppm can be treated with this technology while high level PCBs with >10,000 ppm are allowed by the government for export. Decontaminated mineral oil can be re-used in electrical transformers and washing of metals.<sup>18</sup>

## **6.2 Non-Combustion Technologies in Other Countries**

It is recognized that the combustion approach has a series of drawbacks and difficulties, first of all connected to the formation of toxic secondary combustion products or the measures to avoid this. This is of special concern to the developing world where uncontrolled POP combustion is practiced. It is therefore very important to promote development and spin-off of alternative non-combustion technologies as they can represent an alternative environmentally safe way to treat PCB waste.

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<sup>17</sup>Non-combustion technologies for POPs Destruction, Review and Evaluation, UNIDO, 2007, pp. 82-84. Accessed from <http://institute.unido.org/wp-content/uploads/2014/11/23.-Non-combustion-Technologies-for-POPs-Destruct>

<sup>18</sup>Data gathered from interview with Non Com POPs Facility Engineer held last March 6, 2019

### 6.2.1 Base Catalyzed Decomposition (BCD)

The BCD technology or “Base Catalyzed Decomposition” process has been licensed in USA, Australia, New Zealand, Mexico, Japan, Spain, and Czech Republic. The applications of BCD technology range from treatment of PCB liquids to organochlorine pesticides. In the typical direct BCD application for treating pure or high level liquid PCB, the PCB material is pumped into the reactor heated to 350°C, called also Stirred Tank Reactor (STR), containing high boiling point hydrocarbon oil, a base (alkali or alkaline earth metal carbonate, bicarbonate, or hydroxide; sodium hydroxide is more often used), and a proprietary BCD catalyst. The hydrocarbon oil acts as solvent and hydrogen donor at the same time. Other donors of hydrogen, such as aliphatic alcohols, amines, or other compounds can also be used, in addition to the oil, as well as other reactants.

For its advantages, the technology is robust, contained, and environmentally safe as it does not involve oxidation processes leading to the formation of dioxins/furans. Mobile concepts and different capacities are available to satisfy different scale and on-site projects, so hazardous wastes do not need to be transported. The technology can address a wide class of waste types, including PCBs, chlorinated dioxins, pesticides in soil, organic solutions, aqueous waste, etc. The technology has a long history of operation in different countries like Guam and Australia<sup>19</sup>. In Guam, the system has operated at rates of more than two tons per hour. The concentrations of PCBs that have been treated are reported to be as high as 45,000 ppm. Concentrations were reduced to less than 2 ppm per individual PCB congener. The air pollution control system (APCS) rated with high performance, since the PCBs removal was 99.999 percent and levels of the other organics in the stack were very low.

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<sup>19</sup> “Non-combustion Technologies for POPs Destruction: Review and Evaluation”, ICS-UNIDO Publications, 2007.

Like other non-combustion technologies, the BCD process has its own limitations and disadvantages as well. Factors limiting throughput can be high contents of water, clay, other organics, and increased acidity. Therefore, costs are higher for organic solutions and aqueous waste treatment. Also not cost effective for very high volumes of contaminated soils. Salt, carbonaceous residuals, solid organics and used oils and carbon filters should be disposed of. Such residuals can potentially contain chlorinated hydrocarbons and PAH. The process is complex and labor intensive, qualified and trained personnel are required. High temperatures and flammable liquids present a potential danger of ignition; however, it this risk was reduced in the modern plant designs.

### **6.2.2 Gas Phase Chemical Reduction (GPCR)**

The Gas Phase Chemical Reduction (GPCR) technology, previously known as ELI Eco Logic process, is one of the vanguard commercial non-combustion technologies for POP destruction. The technology was developed and commercialized by ELI Eco Logic International Inc. in Canada. The full-scale plant operated for more than five years in Kwinana, Australia (now shut down) as it had run out of PCB to treat and moved offshore. Other full and pilot scale plants and demonstration projects ran in Canada, USA, and Japan. The GPCR technology is now provided by the original developer Hallett Environmental & Technology Group Inc. of Ontario, Canada.

The Eco Logic's GPCR technology is based on the gas-phase thermo chemical reduction of organic compounds by hydrogen at temperatures of 875°C and low (atmospheric) pressures. The process can treat all types of chlorinated waste in different forms, namely bulk organic solids and liquids, high-strength PCB oils and mixed solid materials, aqueous waste, contaminated soils and sediments. The reaction between waste and hydrogen occurs only in the gaseous phase, therefore solid and liquid materials need to be pretreated. Pure organic liquid waste streams,

as well as organic gases (if oxygen free) can be fed directly to the reactor through atomizing nozzles, where the recirculation product gas is used to atomize the liquid waste. The reducing power is enhanced by the presence of water, which acts as a heat transfer agent as well as a source of hydrogen. Therefore, the process requires electricity, hydrogen, water, and caustic for scrubbing.

The strengths of this technology include excellent destruction efficiencies and generally low environmental impact. Long and documented history of commercial operation, including POPs and relatively low amounts of solid residuals produced. Product gases can be reused. The technology can handle practically all types of wastes and different scale fixed, mobile, and semi-mobile units are available. The limitations of GPCR technology are the following: a) use of hydrogen raises a safety issue, both related to its transportation and handling; b) liquor from caustic scrubber needs to be treated and disposed; c) power consuming as the waste needs to be evaporated at heated to high temperatures; d) the process is complex and labor intensive, highly qualified and trained personnel is required; and e) the process may appear not cost-effective for low concentrated waste or small scale applications<sup>20</sup>.

### **6.2.3 HydroDec**

The HydroDec technology (named as “catalytic hydrogenation”<sup>21</sup> or “catalytic treatment” processes before commercialization) is a technology for the refurbishment of dielectric fluids (in particular used transformer oil) through dechlorination of chlorinated hydrocarbons. In 2002 HydroDec has entered into an exclusive global license with CSIRO for the marketing and distribution of the HydroDec Technology. Another catalytic hydrodechlorination technology (CHD technology) was developed by

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<sup>20</sup> “Non-combustion Technologies for POPs Destruction: Review and Evaluation”, ICS-UNIDO Publications, 2007, pp.41-45.

<sup>21</sup> The technology former name “catalytic hydrogenation” was not accurate chemically if referred to the treatment of PCB or other POPs.

Japanese Kansai Electric Power Co and Kanden-Engineering Co., which started to treat capacitors containing or contaminated with PCBs in 2004. A commercial scale CHD plant with capacity of 2 t PCB per day was designed and operates in Japan.

The HydroDec (hydrodechlorination) process is based on substitution of the organic chlorine with hydrogen. The reaction of a chlorinated chemical with hydrogen gas occurs in the liquid phase on the surface of a heterogeneous catalyst. It gives rise to hydrogen chloride and reduced hydrocarbon. Destruction of chlorinated wastes via reductive catalytic dechlorination with hydrogen over a metal catalyst has been known for many years. This reaction is probably the most alluring possibility of sustainable disposal of polyhalogenated waste and is at present the focus of many scientific findings.

The treatment involves the following steps: 1) Feedstock is pumped into the process at the system operating pressure; 2) The acid scavenger and top up hydrogen is pumped into the process at system operating pressure; 3) The combined feed is heated to the reaction temperature; 4) The feed is gravity fed across a catalyst bed; 5) The gas component of the product is separated and captured for recycling into the process; 6) The product oil is collected and washed; 7) The wash water is collected and separated from the product oil; and 8) The product oil is recovered for recycling into the process or for sale as a refined product. Following the treatment of PCBs the resulting dechlorinated oil, free of other oxidation products can be used as a dielectric fluid.

The advantages of HydroDec are the following: the process by its nature excludes the risk of formation of dioxins and furans; low emissions (high containment), the primary reaction occurs in a closed loop; the process allows to reuse the treated material (PCBs); catalytic nature: potential of improvement; and high DE demonstrated. For its disadvantages, HydroDec is limited to liquid and low

concentrated POP solutions (solid and pure POPs require dilution in organic solvent). It is relatively high cost, especially for other POPs than PCB. The use of hydrogen gas requires adequate controls and safeguards to ensure that explosive air-hydrogen mixtures are not formed. Catalysts are poisoned/deactivated with time, especially if the wastes contain impurities<sup>22</sup>.

## **7 Rationale for Global Environment Facility (GEF) Intervention**

The GEF is the designated interim financial mechanism for the Stockholm Convention. In October 2002, the GEF Assembly approved POPs as new GEF focal area-OP#14. The objective of the GEF Operational Program on POPs is to provide assistance, on the basis of incremental costs, to developing countries and countries with economies in transition to reduce and eliminate releases of POPs into the environment. This objective is consistent with that of the Stockholm Convention, which aimed at protecting human health and the environment from POPs<sup>23</sup>.

In May 2004, the GEF Council approved the Project Brief for the Global Program whose overall objective is to develop a program and an initial project, which will demonstrate the viability of available non-combustion technologies for use in the destruction of obsolete POPs stockpiles and wastes. The GEF allocated \$4,108,500 for the full implementation of the project in the country.

In general, the project has been designed in full conformity with GEF policies and program guidelines. It is built upon a partnership between and among the Implementing and Executing Agencies, the Government, the Private Sector, and enjoys the strong support of Civil Society at local, national, regional, and international levels.

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<sup>22</sup> "Non-combustion Technologies for POPs Destruction: Review and Evaluation", ICS-UNIDO Publications, 2007, pp.47-50.

<sup>23</sup> Text taken from 1<sup>st</sup> Project Steering Committee Meeting, February 19, 2008 at Crown Plaza, Galleria Manila, Ortigas Avenue, Philippines

The project is consistent with the Operational Program #14 of the GEF and is aligned with POPs strategic priority No. 3: “Demonstration and promotion of replication of innovative and cost-effective technologies and practices”. This program emphasizes the need to develop and strengthen country capacity to fulfill its Stockholm Convention obligations through the provision of on-the-ground interventions to implement specific phase-out and disposal measures at national and/or regional level, and includes provision for capacity building. The Non-Combustion POPs Project in the Philippines responds to the Proposed OP#14 with emphasis on strengthening capacity and infrastructure and institutions at different levels, monitoring, strengthening of enforcement capacity and facilitation of technology transfer<sup>24</sup>.

The project is also consistent with the GEF Operational Strategy of April 1997, especially as described Operational Program #10 – Contaminant-Based Operational Program. Philippines, the second participating country, is eligible under Section 9(a) of the GEF Instrument and has ratified the Stockholm Convention. More specifically, a stated objective of the GEF Contaminant-Based Operational Program is to overcome existing barriers to the adoption of best practices. An additional aim of the Contaminants-Based OP is to identify new technologies that could be used to assess and reduce contaminant loading and to prevent the releases of globally significant POPs. Another important emphasis in any GEF project is to secure full *civil society involvement* in the work associated with GEF projects – affected communities, NGOs, CBOs, the scientific community, and all affected stakeholders.

The GEF promotes the full participation of civil society and other stakeholders in preparation and full implementation of the project. Also, the project describes clearly the strong level of partnership between and among the stakeholders including the GEF, the Government of the Philippines, the private sector through the investment at the PPDC/PNOC site, and civil society.

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<sup>24</sup> Text taken from Product Document accessed from the GEF website

## **8 Stakeholders and Their Role in Project Implementation**

UNIDO was the implementing agency of the project. UNIDO has been involved in the GEF POPs program from the beginning. It directly accessed PDF-B funds consistent with its role as a GEF Executing Agency with expanded opportunities in the POPs focal area.

The Philippine Government through the Department of Environment and Natural Resources (DENR) had the overall responsibility for environmental management including regulatory, monitoring, permitting and licensing functions on all matters related to protection and conservation of the environment. The DENR also serves as the GEF operational focal point as well as the POPs focal point. The Environmental Management Bureau (EMB) of the DENR implements regulations on Environmental Impact Assessment (EIA), toxic and hazardous waste management and air quality management. As such, the DENR-EMB had the lead responsibilities in coordinating all other institutions in the Philippines participating in the project.

DENR had selected the Philippine Alternative Fuel Corporation (PAFC) as operating entity, which is a subsidiary company of the Philippine National Oil Company (PNOC). It should however be noted that no other stakeholder has shown interest to bid and become the operating entity<sup>25</sup>. The operating entity was responsible for all of the activities concerning site preparation, installation of the unit and destruction activities in the site, as well as control and compliance with the license or permits issued by the national and local authorities.

The Environmental Health Fund (EHF) served as principal cooperating agency for the specific elements of the project and program. In this role, the EHF served as the clearing-house and coordinating mechanism for involvement of the NGO community.

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<sup>25</sup> See details on the selection process in the UNIDO project document

The NGO, particularly the Eco-Waste Coalition served as the advocacy arm for the project in coordination with other stakeholders. They prepared reports on project implementation progress and participated in project monitoring and evaluation (M&E). During the initial phase of the project Eco-Waste Coalition prepared all Information, Education, and Communication (IEC) materials, was responsible for education awareness campaigns, and dissemination of information gathered through project activities (PIR 2014, p.4)<sup>26</sup>.

Other partners (licensed service providers) was responsible for continuous and adequate supply of PCB to the operations through collection, transport and storage of PCB waste and PCB-containing equipment from all over the Philippines. The owners of PCB wastes and PCB-containing equipment (MERALCO, a private and Transco, NAPOCOR, and other public sector entities) paid for the services.

The program received oversight and policy direction from a Program Advisory Committee (PAC). The Program Coordinator (PC) served on the PAC ex-officio, as well as the NPM who was to take the responsibility of a Chief Technical Adviser (CTA). The PAC was initially composed of ten (10) members.<sup>27</sup>

There was also a Project Steering Committee (PSC) that met at least once annually. The PSC was convened as necessary at the call of the PC in consultation with UNIDO and the NP. The PSC was initially composed of eight (8) members<sup>28</sup>.

Finally, there was a Technical Advisory Group (TAG). The TAG served as an advisory role in service of the work of the program and project, most specifically as an advisory body to the PAC and the PSC. The TAG was composed of one member of the Implementing

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<sup>26</sup> Text taken from Terminal Evaluation Review form, APR 2016 accessed from DENR website

<sup>27</sup> Including: Philippine Government, Gov't of Slovakia, UNIDO, EHF, FAO UNEP, UNDP, World Bank, Basel Convention

<sup>28</sup> Including: Philippine Government, public sector consortium, operating entity, UNIDO, EHF, Civil Society

Agency (IA), UNIDO, one member from the GEF STAP, one member from the EHF and scientific and technical expertise deem necessary and representative of DENR and the operating entity, drawing from resources as the GEF STAP, FAO, UNEP, UNDP and the WB.

### **8.1 Involvement of NGO/Civil Society in Non-Com POPs Project**

In most countries, generally NGOs do not have good relations with authorities, especially when it comes to environmental issues. However, in the context of this GEF-funded project, civil society involvement was a hallmark and one of the strengths of this project. A very good line of communication has been established between DENR-EMB and an NGO Work Group (WG) composed of six major Philippines NGOs namely, BAN Toxics, Eco-Waste Coalition, Global Alliance for Incinerator Alternative (GAIA), Greenpeace Southeast Asia, Health Care Without Harm (HCWH), and Mother Earth Foundation (MEF) – that advocate zero waste, chemical safety, and health and environmental justice. This NGO WG was nominated as a member of the PSC and according to report; it was the first time that an NGO became a member of a PSC for a national GEF-funded project in the Philippines<sup>29</sup>.

Zero waste being one of its advocacies, this NGO WG is promoting recycling of wastes and the treatment of wastes by non-combustion technologies. In particular, they advocate for non-combustion technologies for the treatment of POPs and other hazardous wastes including PCBs. The implementation of the Non Com Project created opportunities for these NGOs to further advocate non-combustion technologies in the country. They were responsible in the development of IEC plan of the project targeting the general public and more specifically local communities (barangays) living near the treatment facility in Bataan province. This IEC was proven to be particularly successful as the Bataan Governor, Enrique T. Garcia, Jr's who had an initial negative stance on the project, finally gave his approval for the construction of the treatment facility in his province. The construction

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<sup>29</sup> Taken from Terminal Report of Non Com POPs Project accessed from UNIDO website

permit was finally delivered in February 2010 by the Bataan Municipality to PAFC, the operating entity<sup>30</sup>.

As part of the involvement of NGOs, in October 2008, during the initial stage of the project, EMB designated Eco-Waste Coalition in collaboration with GAIA and Greenpeace Southeast Asia to undertake public awareness activities for the non-combustion POPs project, especially on the positive economic and environmental impacts of the project<sup>31</sup>. In that respect, Eco-Waste Coalition developed an IEC plan that was submitted to the PSC in early 2007 targeting general public and local communities living near the treatment facility in Bataan province.

In the context of the IEC awareness campaign during the initial phase of the project, numerous activities, including seminars, press releases and development of leaflets and flyers, have been undertaken. According to the minutes recorded for seminars/meetings and reported to PSC, it can be concluded that the local communities living near the treatment facility were all aware of the dangers of PCBs and the need to properly manage these chemicals. They were also aware about the activities of the project because awareness-raising activities targeting the general public have also been carried out. Activities like press releases, flyers, leaflets or participation on radio and TV programs were generally undertaken in English language, Tagalog and Visayan, two local languages<sup>32</sup>.

The awareness campaign targeting the general public has been quite effective in terms of number of activities undertaken by Eco-Waste Coalition. According to their report<sup>33</sup>, there have been 28 monitored media hits (12 newspapers, 11 web-based media, 4 TV, and 1 radio hits).

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<sup>30</sup> Information taken from 1<sup>st</sup> Progress Report of 2010.

<sup>31</sup> Information taken from 4<sup>th</sup> Progress Report of 2008.

<sup>32</sup> Information taken from Terminal Report of Non-Com POPs Project.

<sup>33</sup> Report submitted by Eco-Waste Coalition to PSC.

## 8.2 Environmental Monitoring of Non-Com POPs facility

Extensive civil society involvement was significant during implementation of this Non Com POPS Project, including their participation in project monitoring and evaluation. The 2011-2012 environmental monitoring of the communities around the PCB Non Combustion treatment facility showed that PCBs were not detected in soil, surface water and groundwater in all the sampling sites. DENR-EMB measured the concentration of PCBs in marine sediments at 0.2 ug/g, 0.36 ug/g, 1.08 ug/g, and 0.30 ug/g for the Jetty area, mouth of Lamao River, PNOC outfall and the resettlement area respectively. (Ref: Report on Environmental Baseline sampling for the Non Combustion Facility)<sup>34</sup>.

During field visits held last March 6-7, 2019 some of the interviewees are local NGOs like Kaizen Cooperative and barangay officials. Based on interviews, they attended the quarterly meetings of the Multipartite Monitoring Team (MMT) and participated during testing and sampling activities done in their communities. These activities were undertaken to ensure that the operation of Non Com POPs treatment facility has no adverse effects to the environment (soil, water, and air). However, some key informants who belong to original members of MMT were disappointed because they were not invited anymore to meetings and other activities related to the project. They said they were not informed about the changes in the composition of members of MMT and there was no proper turned over of the membership. Currently, the existing MMT is responsible for monitoring not only the Non Com POPs treatment facility but for the whole PNOC Park<sup>35</sup>.

## 9 Budget Information

This project was funded by GEF, the Government of the Philippines, private sector, and NGOs during the period of implementation. See table for the breakdown of project costs.

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<sup>34</sup> Information taken from NIP 2014, p. 24.

<sup>35</sup> Information taken from interviews held last March 6-7, 2019.

a. Total Project Costs

<b>Financing:</b>		
<b>GEF</b>	US \$ 4,108,500	<b>34.91%</b>
UNIDO inputs	US \$ 650,000 (in-kind)	<b>5.52%</b>
<b>Counterpart:</b>		
Philippine Government	US \$ 500,000 (in-kind)	<b>4.25%</b>
<b>Other Donors:</b>		
Operating entity	US \$ 3,900,000(in-kind/in cash)	<b>33.13%</b>
Private sector	US \$ 2,512,380 (in cash)	<b>21.34%</b>
NGOs	US \$ 100,000 (in kind)	<b>.85%</b>
<b>Total Project Costs</b>	<b>US \$ 11,770,880</b>	<b>100%</b>

**Baseline**

The total baseline of US\$ 4,000,000 is comprised of the baseline activities, which currently involve exports of PCB equipment for incineration in Europe at an average cost of US\$ 5000 per tonne. On average 200 tonnes are exported each year and over the project period, some 800 tonnes would have been exported without this GEF intervention.

**The GEF Alternative**

The GEF alternative very likely provides the only possibility that very promising and already available and demonstrated alternative technologies to incineration can be sustainably deployed. For this Global Demonstration Program and associated Project, a substitutional (vs. complementary) Incremental Cost approach has been used. Rather than spend the US\$ 4,000,000 on exports for incineration, the Philippines substituted the use of the selected Non-Combustion technology for this purpose, and thus this amount becomes Project co-finance.

In reality, the Philippines contributed in excess of its legal liability of approximately US\$ 4 million; the total amount of Philippines co-finance is about US \$6.9 million. It should be noted however that the GEF alternative allowed for a significant acceleration of the

plans to destroy PCBs that would not be possible under the past situation, as the Government would not have been in a position to declare it a priority to eliminate all PCBs-containing equipment and wastes by 2014, were it not for the opportunity created by the GEF alternative.

Under the GEF funded alternative the environmentally sound destruction of the stockpile by using a non-combustion technology was the dominant Program and Project objective. Extensive local, national, regional and global civil society participation also received considerable GEF funding. There was also the GEF support and co-finance for Program and Project Coordination, Capital Equipment Purchase and associated expenditures, Effective and Specific Actions to ensure successful Project Replication and Sustainability.

More specifically, the GEF Alternative (GEF contributions and co-finance) provided US\$ 655,800 for selection of technology and purchase through contractual arrangements; US\$ 4,805,880 for site preparation and environmental compliance; US\$ 4,733,000 for purchase and installation of equipment for PCBs disposal; US\$ 671,000 for destruction facility in operation, PCBs destruction, monitoring and public involvement and US\$ 905,200 for lessons learning, dissemination and adaptive management system in place<sup>36</sup>.

b. Overall cost and financing (including co-financing)

Summary incremental cost table (in US \$)

<b>Component</b>	<b>Baseline</b>	<b>Alternative</b>	<b>GEF</b>	<b>Co-finance</b>
Selection of technology and purchase through contractual agreements	0	655,800	355,800	300,000
Site preparation and environmental compliance	0	4,805,880	253,500	4,552,380
Purchase and installation of equipment for PCBs disposal	4,000,000	4,733,000	2,423,000	2,310,000

<sup>36</sup> Data taken from UNIDO Project Document

Destruction facility in operation, PCBs destruction, monitoring and evaluation and public involvement	0	671,000	501,000	170,000
Lessons learning, dissemination and adaptive management system in place	0	905,200	575,200	330,000
<b>Total</b>	<b>4,000,000</b>	<b>11,770,880</b>	<b>4,108,500</b>	<b>7,662,380</b>

Source: UNIDO Project Document

c. UNIDO budget snapshot (GEF funding excluding agency support cost):

	<b>Total allotment (US \$)</b>	<b>Disbursement (US\$) and unliquidated obligation (US\$)</b>	<b>Uncommitted balance (US\$)</b>
Personnel	600,570	472,082	128,488
Contracts	3,165,510	3,135,508	30,002
Training	248,318	80,691	167,627
Equipment	50,000	14,350	35,650
Miscellaneous	44,102	30,751	13,351
<b>Total</b>	<b>4,108,500</b>	<b>3,733,382</b>	<b>375,118</b>

Source: UNIDO Project Document

## 10. Plans of the Philippine Government to Eliminate PCB Wastes

To meet the goal of environmentally sound management of PCB wastes by 2028 the Government through the DENR is presently preparing the National Implementation Plan (NIP) for the Stockholm Convention on Persistent Organic Pollutants (POPs) for 2018. They are also preparing a comprehensive and complete national inventory of PCBs, PCB containing materials, and PCB wastes. There is also an updating of database being used for

the inventory of PCBs. DENR Regional staff will undergo training to validate raw data given by PCB users<sup>37</sup>.

Also, in relation to the country's obligation to the Stockholm Convention on Persistent Organic Pollutants (POPs) to reduce or eliminate releases of POPs, the Philippine Government through the DENR-EMB with assistance from the Global Environment Facility (GEF) and United Nations Industrial Development Organization (UNIDO), and co-financing support from the Philippine government and various stakeholders is implementing the project entitled "Implementation of PCB Management Plan for Electric Cooperatives and Safe E-waste Management" Project. The overall project objective is the protection of people's health and the environment through sound management of PCBs and PBDEs in E-waste<sup>38</sup>.

For the sustainability of the Non-Com POPs facility, the Philippine government will continue to promote the commercial utilization of the facility and will encourage all PCB users in the country to have their PCB stockpiles be treated in Mariveles, Bataan. Four major PCB owners (PSALM, NPC, Transco and Meralco) have already signed Memorandum of Agreements (MOAs) with DENR to have their PCBs treated by the facility<sup>39</sup>. DENR is committed to allocate budget for the continuous operation of the Non-Com POPs facility and will also charge a competitive cost to the PCB users (Meralco, NPC, PSALM, electric cooperatives.) for the treatment of their PCB wastes. During the time of site visit, there is an on-going reconditioning of the facility because it is the goal of the government to commercially operate this year and hopefully to be PCB-free within five years<sup>40</sup>.

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<sup>37</sup>Data gathered through interview with DENR Staff

<sup>38</sup>Information taken from flyer of Safe PCB & E-waste Management Project

<sup>39</sup>Taken from Terminal Report of Non-Com Project

<sup>40</sup>Interview carried out on March 6, 2019.

## 11. Conclusions

The Non-Com POPs Project is very relevant given that Philippines is party to the Stockholm Convention and it holds significant stockpiles of PCBs and PCB wastes. The project plays a significant role in supporting the Philippines to meet the objectives as set in its National Implementation Plan (NIP)<sup>41</sup> and is helping in complying with the Stockholm Convention by building its capacity to soundly manage its stocks of PCBs and related wastes. The NIP favors and promotes the application of non-combustion technologies to effectively destroy POPs in the Philippines.

To comply with the country's obligation to PCBs in the Stockholm Convention, the Chemical Control Order (CCO), the main regulatory enforcement framework was implemented in the country. And to strengthen the CCO several policies relevant to the phase out of PCBs in the Philippines were signed namely, DAO 2013-22 (Revised Procedures and Standards for the Management of Hazardous Wastes, Memorandum Circular No. 2014-007 (Supplemental Guidelines for the CCO), Memorandum Circular No. 2015-004 (Clarification to the CCO for PCBs), and Memorandum Circular No. 2015-007 (Technical Guidance Document on PCB Management).

In relation to the country's goal, a non-burn technology PCB treatment facility constructed in Mariveles, Bataan was funded by GEF, UNIDO, the government of the Philippines, private sector, and NGOs. The facility is capable for reducing the concentration of PCB oil to < 2 ppm concentration. The facility treated both low level PCBs (ranging from 40-15,500 mg/kg) and high level PCBs (450,000 mg/kg). The change of operating entity from PAFC to NRDC caused some delays for the commercial operation of the facility. However, sustainability of the facility is high because of the following reasons: Philippines is a party to the Stockholm Convention and is fully committed to its implementation. The PCB owners have already signed MOAs with DENR to have their PCB stockpiles be treated by the facility in Bataan. Also, DENR-EMB has confirmed that it would provide the necessary resources

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<sup>41</sup> The NIP of the Philippines was prepared with support of UNEP

and facilitate procedures for the full operation of the facility starting 2019 and hopefully to be PCB-free within five years.

## **12. Recommendations**

The following recommendations look ahead for the promotion and full operation of PCB Non-Com facility for waste destruction in the Philippines.

- Issuance of policy mandating all the PCB users to have their PCB wastes be treated in the facility and not to look for alternatives. Enforcement of laws related to PCBs should be ensured by the Philippine government.
- It is recommended for DENR-EMB to ensure rapid procedures and provide all resources needed to make the facility in full operation at the earliest possible time.
- DENR-EMB should ensure that treatment costs of PCB wastes must be competitive for the benefit of PCB users especially the small electrical cooperatives with financial constraints.
- If all PCB stockpiles in the country will be treated and destroyed within five years, it is recommended to upgrade the facility and use it for treatment of other Persistent Organic Pollutants to make it functional.
- Some local NGOs have signified their disappointment because of the MMT turned over. It is recommended in the future government projects to make it clear for all members and stakeholders their roles and responsibilities. Also, strengthen the role of civil society in all stages of project management especially in monitoring and evaluation stage of the project.

## **ANNEX A**

### **References**

- Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2014-007.
- Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2015-004.
- Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) Memorandum Circular No. 2015-007.
- Hand-out of Technology Vendor's Seminar, September 9, 2008 held at Shangri-la Plaza, Philippines.
- First Project Steering Committee Meeting, February 19, 2008 at Crown Plaza, Galleria Manila, Ortigas Avenue, Philippines.
- Flyer of Safe PCB & E-waste Management Project
- Independent Terminal Evaluation Report of Non-Com POPs Project, December 2015.
- Inventory of Worldwide PCB Destruction Capacity, UNEP, September 2004.
- National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants, 2014. Prepared by DENR.
- Non-combustion technologies for POPs Destruction, Review and Evaluation, UNIDO, 2007. Accessed from <http://institute.unido.org/wp-content/uploads/2014/11/23.-Non-combustion-Technologies-for-POPs-Destruct>
- Proceedings of Expert Group Meetings on POPs and Pesticides Contamination: Remediation Technologies and on Clean Technologies for the Reduction and Elimination of POPs", Published by ICS-UNIDO, November 2000.
- Quarterly Progress Report for the Period of July 1, 2011-June 30, 2015.
- Rahuman, M., et al., "Destruction Technologies for Polychlorinated Biphenyls (PCBs)", 2000, p.22.
- Terminal Evaluation Review form, Apr 2016 accessed from DENR website
- UNIDO Product Document accessed from the GEF website

## ANNEX B

Republic of the Philippines  
Department of Environment and Natural Resources  
Visayas Ave., Diliman, Quezon City 1110  
Tel. Nos. (632) 929-66-26 to 29, (632) 929-65-52 929-66-20, 929-66-33 to 35  
929-70-41 to 43

Feb 16, 2004

**DENR Administrative Order No.01  
Series of 2004**

**Subject: Chemical Control Order (CCO) for Polychlorinated Biphenyls (PCBs)**

Pursuant to the provisions of Republic Act No. 6969, otherwise known as the "Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990" ("RA 6969"), DENR Administrative Order No. 29, Series of 1992, otherwise known as the "Implementing Rules, and Regulations of RA 6969" ("IRR"), and other applicable laws, rules and regulations, the following Chemical Control Order ("CCO") for Polychlorinated Biphenyls ("PCBs"), is hereby promulgated;

**Section 1. Policy Objectives.** It is the policy of the State to accomplish the following objectives:

1. Reduce and eliminate the importation, manufacture, sale, transfer, distribution and use of PCBs, PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and PCB packaging, and to regulate the transport, treatment and disposal of PCBs and PCB wastes, to protect human health and the environment.
2. Reduce the hazards and unreasonable risks posed to human health and the environment from improper use and management of PCBs, PCB equipment, PCB contaminated equipment, non-PCB-, equipment, PCB articles and ~PCB packaging, and the subsequent release of PCBs and PCB wastes.
3. Establish responsibilities for the management and handling of PCBs, PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and PCB packaging, and the subsequent release of PCBs and PCB wastes.
4. Establish requirements, procedures and limitations for the importation, manufacture, use, and proper treatment, storage and disposal of PCBs, PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and PCB packaging, and subsequent release of PCBs and PCB wastes.
5. Establish a compliance monitoring program to enforce the provisions of this CCO.
6. Increase public awareness and education on the effects of PCBs to human health and the environment.

**Section II. Definition of Terms.** For purposes of this CCO, unless inconsistent with the context or subject matter, the following definitions shall apply:

1. **IRR** means DENR DAO 92-29, which is the Implementing Rules and Regulations of RA 6969:
2. **Department** means the Department of Environment and Natural Resources.
3. **Bureau** means the central office, of the Environmental Management Bureau.
4. **Polychlorinated Biphenyls (PCBs)** means aromatic compounds formed in such a manner that the hydrogen atoms on the biphenyl molecule (two benzene rings bonded together by a single carbon bond) may be replaced by up to ten chlorine atoms. The compound has the CAS Number 1336-36-3 and the DENR Hazardous number L 406. The term includes, but is not limited to all the synonyms as listed in Annex A of this CC4.
5. **Dielectric fluid** is an oily substance that is used to provide an insulating barrier in electrical equipment due to its excellent thermal stability and fire resistance.
6. **Capacitor** means a device for accumulating and holding a charge of electricity, and consisting of conducting surfaces separated by a dielectric fluid.
7. **Transformer** is a device that stabilizes or regulates the supply of electricity.
8. **PCB equipment** means any equipment that contain 500 ppm PCB or greater ( $PCB \geq 500$  ppm).
9. **PCB-contaminated equipment** means any equipment that contain 50 ppm PCB and higher but less than 500 ppm PCB ( $50 \text{ ppm} \leq PCB < 500$  ppm).
10. **Non-PCB equipment** means any equipment that contains PCB concentration of less than 50 ppm ( $PCB < 50$  ppm)
11. **PCB-Free material** means any solid or liquid that does not contain any PCB.
12. **PCB wastes means discarded materials** that contain PCBs or have been contaminated with PCBs that are without any safe commercial, industrial, agricultural or economic usage.
13. **PCB article** means any material, other than PCB wastes, whose surface has been in direct contact with PCBs.
14. **PCB packaging** means any container or pressurized receptacle such as can, bottle, bag, barrel, drum, tank, or other device that contains and secures PCB articles and PCB wastes, respectively.
15. **Name-plated** means any equipment, article or packaging that has - an, attached manufacturer's plate, label or plaque that bears information not limited to the following; name of manufacturer, date of manufacture, serial number, brand or model, origin, contents and dimension.

16. **Non-plated** means any equipment, article or packaging that has no attached manufacturer's plate, label or plaque.
17. **Commercial Building** means a more or less enclosed structure that is open to the public and which includes, but is not limited to malls, restaurants, schools, hotels, offices, including government buildings and the like.
18. **Industrial Facilities** means facilities such as, but not limited to, factories, power generation or distribution stations or sub-stations, assembly plants, feed milts and other buildings and structures used in general industrial assembly.
19. **Retro-fill** means the replacement or substitution of PCB fluids in transformers with mineral oils or any other suitable dielectric fluid:
20. **Storage Facility** means the facility 'where supply or stock is stored for future use, safekeeping or disposal.
21. **Disposal** means the collection, sorting, transport and treatment of wastes, as well as its storage.
22. **Retirement** means removal or decommissioning from service of any equipment for the purpose of disposing, without any intention of reuse.

**Section III. Scope and Coverage.** This CCO applies to the importation, manufacture, sale, transfer, distribution and the use of PCBs, PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB articles and PCB packaging in commercial buildings and industrial facilities, including the use and possession by electric utilities and suppliers, in accordance with the terms hereof. For this CCO, use includes those for enclosed applications, partially enclosed applications, and open-ended applications. This CCO also applies to the generation, storage, transport, treatment and disposal of PCB wastes, including those done by contractors, transporters and disposers.

1. **The following Enclosed Applications are covered:**
  - a. Transformers
  - b. Capacitors
  - c. Voltage regulators
  - d. Liquid filled circuit breakers
  - e. Other electrical equipment containing dielectric fluids
2. **The following Partially Enclosed Applications are covered:**
  - a. Hydraulic fluids
  - b. Heat transfer fluids
3. **The following Open- Ended Applications are covered:**
  - a. Lubricants
  - b. Casting waxes
  - c. Surface coatings
  - d. Adhesives
  - e. Plasticizers
  - f. Inks

g. Other uses

4. **The following PCB Wastes are covered:**

- a. Contaminated solvents/waters
- b. Used oil and waste oil
- c. Sludge's and slurries
- d. Dredged spoils
- e. Contaminated soils/sediments
- f. By products
- g. Scraps
- h. Ballasts and capacitors
- i. Other materials contaminated with PCBs as a result of spills, decommissioning and other demolition activities.

**Section IV. Requirements and Procedures**

**1. Registration**

1.1 The following persons/entities shall register with the Bureau-by submitting a duly accomplished Registration Form (Annex B) within three months after the effective date of this order:

- a. Owners or operators of industrial facilities/installations, electric utilities and suppliers who are in possession or involved in the use of any PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB wastes, PCB article or PCB packaging.
- b. Owners of commercial buildings installed with or containing any PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB wastes, PCB article, or PCB packaging.
- c. Electric utilities, suppliers and waste service providers involved in the treatment and disposal of PCB wastes.
- d. Owners of industrial facilities and commercial buildings containing suspected PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB wastes, PCB article, or PCB packaging.
- e. Owners or possessors of storage facilities containing PCBs, PCB wastes, PCB articles, or PCB packaging.

1.2 The PCB registration certificate(s) and all permit(s) issued by the Bureau, along with applications and attachments, shall be retained at the premises of the registrant for at least five (5) years and be available for inspection at any time by proper officials of the Department and/or the Bureau.

1.3 The Department may generate listings of lands or buildings containing PCB articles, PCB wastes or PCB packaging, as may be established through proper inspection, whether or not said PCB articles, PCB wastes or PCB packaging are being properly managed,

including those lands or buildings which had history of containing PCB articles, PCB wastes or PCB packaging, in order to safeguard human health and the environment.

## **2. Annual Reports and Inventory Reports**

2.1 All persons/entities required to be registered must - submit to the Bureau a duly accomplished Annual Report Form (Annex C) provided by the Bureau, which must contain the following information:

- a. General Information
  - i. Type of business activity (manufacturer, industrial user, importer, exporter, waste treater, waste transporter);
  - ii. Name, address and location of commercial building, industrial facility, storage facility or location of treatment and/or disposal activity;
  - iii. Name, address and telephone number of contact person
- b. Management Information
  - i. Number and category of employees directly and indirectly responsible for the management of PCBs, PCB equipment, PCB-contaminated equipment, non-PCB equipment and PCB articles in service, and PCB wastes, PCB articles and PCB packaging in storage, and their respective qualifications and training for the job;
  - ii. Number of persons with potential risk of exposure to PCBs, and exposure duration;
  - iii. Program for storage, if any, including operators and location of storage facilities; and
  - iv. Program for treatment and disposal, including schedule, contractor, disposal method and facilities, their premises and locations, and such other information, which the Bureau may require.
- c. The first Annual Report shall be submitted within six months after registration, and subsequent Annual Reports shall be submitted at the end of December of every calendar year.
- d. The registrant must also retain records of manufacture, distribution, and use, in accordance with this CCO.

2.2 All registrants shall submit an Inventory Report of all PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and PCB packaging stored and used, and

PCB wastes generated and/or stored, in their buildings/facilities/possession, in accordance with the following:

- a: For name-plated PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB articles and labeled PCB packaging:
  - i. Registrants shall conduct a survey of PCB equipment, PCB contaminated equipment, non-PCB equipment, and PCB articles in service; idle or unserviceable, including those PCB wastes and PCB packaging in storage, and submit an Inventory Report as part of the First Annual Report due within six months after registration; and
  - ii. Power generation or distribution companies that operate more than twenty (20) industrial facilities shall be given one (1) year to complete the inventory. However, partial inventory reports should be submitted within six months after registration.
  
- b. For non-plated PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB articles and suspected PCB packaging:
  - i. Registrants are required to undertake testing and analysis of nonplated PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and suspected PCB packaging and submit an inventory Report within one (1) year from effective date hereof, provided that a partial inventory shall be submitted within six months after registration. Provided further that anything which is not proven by the registrant to be non-PCB material shall be deemed to contain PCB and is subject to the regulatory measures provided in this CCO.
  - ii. PCB analysis shall be carried out by laboratories duly recognized by the Bureau for the purpose of specifying the analytical method that will be applied.
  
- c. For both a. and b., the Inventory Report, which must be signed under oath, shall include the following information:
  - i. Volume and concentration of PCBs, and the weight and volume of PCB packaging in the possession of the registrant;
  - ii. Detailed identification which includes specific model (label codes), type of equipment, serial number, name of manufacturer, date of manufacture, electrical/industrial rating; projected retirement period, capacity, and dimensions of each unit of PCB equipment, PCB-contaminated equipment, non-PCB equipment, and PCB articles in use, storage, or intended for disposal;

- iii. The historical movement of a PCB equipment, PCB-contaminated equipment, non-PCB equipment or PCB article, prior to its present location whether serviceable or unserviceable shall be indicated, including the activities conducted (i.e. retro-filled, repaired, replaced or decommissioned, among others).
  - iv. Quantity of PCB wastes generated (fluids, sludge, slurry, scraps, contaminated equipment, soil, and others) per unit time, and the total quantity at the time of the inventory; and v. Dates of inventory, testing label codes, and type of materials and methods used. The Certificate of Analysis must be attached to the Inventory Report.
- d. An updated Inventory Report shall be submitted as part of the subsequent annual reports.

### **3. Handling Requirements**

The commercial and industrial owners and operators must comply with the requirements for transport, storage and disposal specified under Title III of the IRR for transportation, storage and disposal of PCB wastes.

### **4. Labeling Requirements**

- 4.1 All PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB articles and PCB packaging, such as the following, are required to have clear, visible and readable markings in the English language:
- a. Transformers and capacitors using PCBs;
  - b. Electric motors using PCB-containing coolants and hydraulic systems using PCB containing hydraulic fluid;
  - c. Other heat transfer systems using PCBs; and 4K d. PCB packaging that are stored for treatment and disposal.
- 4.2 Information on the label should include: a hazard warning or symbol, name of the company, serial number of the unit, other identifying information, contact person, address and telephone number.
- 4.3 Installations and storage facilities for PCBs, PCB equipment; PCB contaminated equipment, non-PCB equipment, PCB wastes, PCB articles, PCB packaging, must have a signage with the following information:
- a. "Contains PCBs" in large letters including total volume and total weight of PCBs, total volume and total weight of PCB waste, total volume and total number of PCB packaging, the number and type of PCB equipment, PCB contaminated equipment, non-PCB equipment and PCB articles;

- b. Warning that it contains toxic chemical and that it must be handled by authorized personnel only; and
- c. Contact person, including address and telephone number.

## **5. Storage Requirements**

5.1 Storage facility for PCBs, PCB wastes, PCB articles and PCB packaging, must meet the following minimum conditions:

- a. The storage facility must be marked clearly, by putting fences, posts or walls in order to limit access to the storage area;
- b. The storage facility must be inspected at 30-day intervals. Observations must be recorded in a logbook, indicating the name of the inspector and the date of inspection. Inspection records must be retained;
- c. The date when stored items are placed in the storage facility must be recorded;
- d. Roof and walls must be adequate to prevent rainwater from reaching stored items;
- e. Floors of the storage facilities must be constructed from impervious materials such as concrete or steel to prevent the PCBs and PCB wastes from leaching into the ground;
- f. A spill containment system, such as a continuous curbing with adequate height to accommodate at least twice the volume of the stored PCBs and PCB wastes, must be constructed along the perimeter of the storage facility to prevent any spilled material from flowing out;
- g. The storage facility must be accessible to material handling equipment such as forklift and drum lifters;
- h. There should be no cracks or openings of any kind in the containment floor or walls that could allow the flow of PCBs or PCB wastes outside the area;
- i. Adequate ventilation must be provided to safeguard the health of workers and handlers.
- j. The storage facility must be located far from residential communities, storm drains, bodies of water, flood-prone areas and other environmentally critical areas.

## **5.2 Storage Period**

- a. Maximum of three (3) years from effective date of this Order:

- i. Decommissioned PCB equipment, PCB contaminated equipment and non-PCB equipment that have been drained of PCB fluids;
  - ii. Decommissioned PCB equipment, PCB contaminated equipment and non-PCB equipment that are sealed and with absolutely no leaks; and
  - iii. PCB articles and PCB wastes placed in a leak-proof PCB packaging.
- b. Maximum of two (2) years after the end of the retirement period or date of determination that the equipment must be disposed of, but not later than the phase out period as provided for in this CCO:
  - i. PCBs or PCB-contaminated liquids that are in PCB packaging held as reserve, or which have been drained from PCB equipment, PCB-contaminated equipment, or non-PCB equipment.
  - ii. Leaking PCB equipment, PCB-contaminated equipment, non-PCB equipment, and PCB articles, provided that leaking capacitors must immediately and adequately be packed during storage.
  - iii. Other PCB equipment, PCB-contaminated equipment, non-PCB equipment and PCB articles that are not sealed.
- c. Notwithstanding the foregoing, the Department may direct the owner or possessor to immediately dispose PCBs, PCB equipment, PCB-contaminated equipment; non-PCB equipment, PCB wastes, PCB articles and PCB packaging, to undertake clean up of contaminated sites, to safeguard public health and the environment.

## **6. Treatment and Disposal Requirements**

- 6.1. The general requirements for treatment, storage; and disposal of PCBs and PCB wastes are as follows:
  - a. Preparatory and remedial work plan (i.e. PCB packaging, isolation draining, and treatment of PCB equipment, PCB-contaminated equipment, non PCB equipment and PCB articles, prior to disposal) that must be submitted to the Bureau along with the transport/treatment permit requirements in accordance with RA 6969 and Title 111 of its IRR not later than six months prior to the planned transport/treatment schedule;
  - b. All treatments and disposals must be approved by the Bureau and should be in conformance with RA 8749 otherwise known as the "Clean Air Act of the Philippines" and other applicable environmental laws and regulations; and

- 6.2 If necessary, wastes containing high levels of PCBs must be exported in accordance with the provisions of Section IV Item 6.1b of this Order and must meet the requirements for trans-boundary movement of wastes under the Basel Convention.

### 13. PCB Spill Prevention and Clean-up Plan

Registrants must prepare and retain in an accessible location at the premises, a spill prevention and clean-up plan. The plan must contain detailed descriptions of all of the following and a copy of which must be submitted to the Bureau along with the PCB Management Plan: -

- a. Personnel Training Plan;
- b. Markings and Labeling;
- c. Assignments of Responsibilities of Response Team;
- d. Emergency Plans;
- e. Decontamination Procedures;
- f. Disposal of contaminated debris and materials;
- g. Reporting and Record keeping; and
- h. Persons/Institutions to Contact in case of Emergency.

### 14. PCB Storage Facility Closure Plan

Each owner and operator of a PCB storage facility must prepare and retain in an accessible location at the premises a PCB storage facility closure plan. The plan must contain detailed descriptions of all of the following and a copy of which must be submitted to the Bureau along with the PCB Management Plan:

- a. Certification of financial liability approved by the Bureau;
- b. Steps and procedures for closure;
- c. Post closure conditions and monitoring; and
- d. Cost estimates approved by the Bureau.

### 15. PCB Management Plan Requirement

A PCB Management Plan must be submitted to the Department within six (6) months after registration to ensure that PCBs are managed in a manner that will eliminate or minimize its release to the environment. The registrant shall be responsible for all costs of managing PCBs including storage, disposal and clean-ups. The details of the management plan will vary depending on the type of premises and the type of activity that is being conducted with a timetable for completion of particular actions. Review and revisions of the management plan should be done at least once every five (5) years.

Below is a general outline for the PCB Management Plan:

- a. **General Description**
  - i. Name of owner and operator;

- ii. Location of the facility or the PCBs, PCB equipment, PCBcontaminated equipment, non PCB equipment, PCB article, PCB packaging or PCB wastes (site specific);
- iii. Industrial activities at the premises; and
- iv. Number of employees.

**b. Uses of PCBs at the Premise**

- i. Description of the uses of PCBs at the premises;
- ii. Listing of PCB equipment, PCB contaminated equipment, nonPCB equipment and PCB articles;
- iii. Listing of PCB wastes generated at the premises;
- iv. Mass balance of PCBs through the premises;
- v. Description of pollution control devices in use at the premises;
- vi. Description of compliance with the environmental laws and regulations; and
- vii. Description of emergency procedures and contingency plan in case of accidents.

**c. Pollution Prevention Program**

- i. Pollution prevention/control devices;
- ii. Inspection schedule and checklist; and
- iii. Equipment and/or materials to be used during spills and/or emergencies.

**d. Training Program**

- i. Scope or coverage of training or a copy of the Training Manual.
- ii. List of personnel trained, particularly those workers in contact with PCBs; PCB equipment, PCB contaminated equipment, non-PCB equipment, PCB wastes, PCB articles or PCB packaging

**e. A copy of the PCB Spill Prevention and Clean-up Plan as described in Section IV - 7.**

**f. A copy of the PCB Storage Facility Closure Plan as described in Section IV – 8**

**16. Insurance and Surety Bond Requirements**

All entities required to be registered under the provisions of this CCCJ are required to provide pollution liability insurance coverage separate from any existing general or public liability insurance to guarantee payment for clean-up, damage claims and other environmental liabilities that may arise in case of accidents (i.e. PCB spills, fires), in an amount determined as sufficient by the Department, and post an annual surety bond equivalent to 150% of the current cost of proper PCB disposal 'to guarantee payment of the same in case of untimely closure and abandonment. The insurance and the surety bond shall be submitted yearly, together with the annual report.

## **Section V. Ban and Phase-out on Importation, Sale, Transfer and Use of PCBs**

1. Upon the effective date of this Order:
  - a. The local/domestic manufacture or production of PCBs, PCB equipment, PCB contaminated equipment and non-PCB equipment, or the use of such, including PCB articles and PCB wastes, as raw materials, shall be strictly prohibited.
  - b. All importation, sale, transfer or distribution of PCBs, PCB equipment, PCB-contaminated equipment, PCB wastes, PCB articles, or PCB packaging shall no longer be allowed.
  - c. The use of PCBs in open-ended applications and partially enclosed applications shall no longer be allowed.
  - d. All existing PCBs, PCB equipment, PCB-contaminated equipment, non-PCB equipment, PCB packaging, PCB articles and PCB wastes other than in a totally enclosed, intact, non-leaking and serviceable system shall be considered as hazardous wastes and shall be handled, stored and treated in accordance with Title III of the IRR.
  - e. A PCB equipment, PCB-contaminated equipment or non-PCB equipment may only be replaced with equipment that contains and uses only, PCB-Free materials, as certified by the manufacturer.
2. Three (3) years after the effective date of this Order, the importation, sale, transfer or distribution of non-PCB equipment as defined, under this CCO shall no longer be permitted.
3. Ten (10) years after the effective date of this Order the use or storage for reuse of any PCBs, PCB equipment, PCB - contaminated equipment, or PCB article, including those in totally enclosed applications, shall no longer be allowed. Likewise, on the same date, the storage of PCB packaging and PCB wastes shall no longer be allowed.
4. Notwithstanding the foregoing, however, PCBs may, for an indefinite period; be imported, sold, transferred or used in small quantities, for research and development, in a manner other than totally enclosed, provided proper authorization is obtained from the Department. Authorized research and development activities<sup>o</sup> include, but are not limited to: the chemical analysis of PCBs; determination of the physical properties of PCBs; studies of environmental transport properties; studies of biochemical transport processes; studies of the effects of PCBs on the environment; and studies on the effects of PCBs on human health.

**Section VI. Information, Education, Communication and Training Requirements.** The Department, through the Bureau, in collaboration with the industry, concerned government agencies, the academe and the non-government organizations, will promote industry and public awareness of the CCO requirements and its compliance and the hazards posed by the use and release of PCBs in the workplace and into the environment.

**Section VII. Public Access to Records**The Public shall have access to records, reports or information obtained by the Department pursuant to this CCO, in accordance with Section 12 of RA 6969.

**Section VIII. Compliance Monitoring Procedure.** Compliance with the requirements established in this CCO will be monitored by the Department, through the Bureau, through review of reports' and registration information submitted, as required by this CCO, and on-site inspection by authorized personnel of the Bureau.

**Section IX. Revision of Requirements.** The Department may amend, modify, and/or supplement the requirements and standards in this CCO after prior consultation with stakeholders and after proper notice and hearing to the public on matters to be revised. The EMB Director shall hereby issue clarification guidelines.

**Section X. Penalty Provision.** Any violation of the requirements specified in this CCO will subject the person or persons responsible thereof to the applicable administrative and criminal sanctions as provided for under RA 6969 and other applicable laws and regulations.

**Section XI. Separability Clause.** Should any provision or portion of this CCO be declared unconstitutional or invalid, all other provisions of this CCO shall remain valid and enforceable.

**Section XII. Effectivity.** This CCO shall take effect one (1) month after publication in the Official Gazette or two (2) newspapers of general circulation.

**(SGD) ELISEA G. GOZUM**  
Secretary

**ANNEX C**

**Schedule of Interview and List of Key Informants**

<b>Date</b>	<b>Name</b>	<b>Office/Address</b>
February 27, 2019	Ms. Elizabeth Carino Senior Environmental Specialist	DENR – Quezon City
	Mr. Joel Malleon SEMS, Chemical Management Section	DENR- Quezon City Chemical Management Section
March 5, 2019	Mr. Romeo Saklolo Batangas Fisherman’s Association (BAFA)	Mariveles, Bataan
March 6-7, 2019	Engr. Edwin Punongbayan Non-Com POPs Facility Engineer	Non-Com POPs Facility PNOC Park, Mariveles, Bataan
	Ms. Lea Manaligan Non-Com POPs Staff	Non-Com POPs Facility PNOC Park, Mariveles, Bataan
	Ms. Lyn Sampang Secretary Pastoral Council of Immaculate Conception	Immaculate Conception Parish Barangay Alion Mariveles, Bataan
	Ms. Evelyn Dimaandal Manager, Kaizen Cooperative	Kaizen Cooperative Mariveles, Bataan
	Mr. Edilberto Cruz Administrative Assistant	Barangay Lamao Limay, Bataan