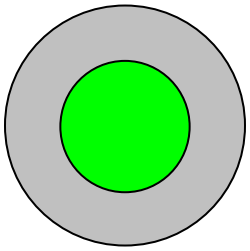
The International POPs Elimination Project (IPEP)

Fostering Active and Effective Civil Society Participation in Preparations for Implementation of the Stockholm Convention

Ghana POPs Situation Report

NGOs:

ENVIRONMENT YOUTH ACTION NETWORK (EYAN)



INTEGRATED COMMUNITY CARE (ICC)

Ghana
ANGLOPHONE AFRICA

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ABOUT THE INTERNATIONAL POPs ELIMINATION PROJECT

On May 1, 2004, the International POPs Elimination Network (IPEN http://www.ipen.org) began a global NGO project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;
- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;
- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see http://www.ipen.org

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This report is available in the following languages: English

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We gratefully acknowledge the help given to us by IPEN, UNIDO, UNEP and all other financiers for providing the necessary funds for the project.

We also wish to acknowledge the co-operation given to us by individuals we talked to and the institutions we visited in Ghana.

In the execution of the project we also reviewed work done by some institutions, notably the Environmental Protection Agency. We have duly acknowledged the various documents we used in our references.

Last but not the least we wish to thank Mr. Silvani Mng'anya of AGENDA in Tanzania, the Anglophone Africa Regional Hub for the IPEP for his encouragement, which resulted in the execution of this project.

ABBREVIATIONS AND ACRONYMS

AG	Attorney General
AGI	Association of Ghana Industries
BAT	Best Available Techniques
CBO	Community Based Organisation
CCMC	Chemicals Control and Management Centre
CEPS	Customs Excise and Preventive Service
CIEN	Chemical Information Exchange Network
COP	Conference of the Parties
COCOBOD	Ghana Cocoa Board
CRIG	Cocoa Research Institute of Ghana
CSIR	Council for Scientific and Industrial Research
DA	District Assembly
DANIDA	Danish International Development Agency
DDT	Dichlorodiphenyltrichloroethane
ECG	Electricity Company of Ghana
ECOG	Evergreen Club of Ghana
ECOLAB	Ecological Laboratory of University of Ghana
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EYAN	Environment Youth Action Network
FAO	Food and Agriculture Organization of the United Nations
FDB	Food and Drugs Board
FOE	Friends of the Earth – Ghana
GAEC	Ghana Atomic Energy Commission
GHAFF	Ghana National Association Farmers and Fishermen
GHANED	Ghana Environmental Database
GHS	Ghana Health Service
GSB	Ghana Standards Board
HCB	Hexachlorobenzene
ICC	Integrated Community Care
IPEP	International POPs Elimination Project

ISD	Information Services Department
I-TEQ	International Toxicity Equivalence
KATH	Komfo Anokye Teaching Hospital
KNUST	Kwame Nkrumah University of Science and Technology
LI	Legislative Instrument
MDAs	Ministries, Departments and Agencies
MEA	Multi-lateral Environmental Agreement
MES	Ministry of Environment and Science
MI	Ministry of Information
MLG	Ministry of Local Government
MSDS	Material Safety Data Sheet
MoFA	Ministry of Food and Agriculture
MOTI	Ministry of Trade and Industry
NRCD	National Redemption Council Decree
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-*p*-dioxins
PCDFs	Polychlorinated dibenzofurans
PCP	Pentachlorophenol
PIC	Prior Informed Consent
PNDCL	Provisional National Defence Council Law
POPs	Persistent Organic Pollutants
POPRC	Persistent Organic Pollutants Review Committee
PPM	Parts Per Million
PPRSD	Plant Protection and Regulatory Services Directorate
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-*p*-dioxins
PCDFs	Polychlorinated dibenzofurans
PCP	Pentachlorophenol
PIC	Prior Informed Consent
PNDCL	Provisional National Defence Council Law
PPRSD	Plant Protection and Regulatory Services Directorate
PSI	President’s Special Initiative
SES	Safe and Environmentally Sound

TCDD	Tetrachlorodibenzo-*p*-dioxin
TDI	Tolerable Daily Intake
TEQ	Toxicity Equivalents
TOR	Tema Oil Refinery
UG	University of Ghana
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation
UNITAR	United Nations Institute for Training and Research
USA	United States of America
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
VALCO	Volta Aluminium Company
VRA	Volta River Authority
WHO	World Health Organisation
WRI	Water Research Institute

EXECUTIVE SUMMARY

Introduction

As a response to the Global NGOs Project, the International POPs Elimination Project (IPEP), the Environment Youth Action Network (EYAN) in collaboration with Integrated Community Care (ICC) conducted an independent national persistent organic pollutants (POPs) inventory to reflect the POPs situation in Ghana. The project covered the 12 POPs banned under the Stockholm Convention and the newly proposed candidate POPs under review.

Sources of POPs

POPs pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex and toxaphene) were some of the sources of POPs in the country which were banned in 1985. However, reports of organochlorine pesticides poison from analysis of organs of human body and fluids reported by the Ghana Standards Board and the Ghana Medical School in 2002 indicated the presence of POPs pesticides.

Industrial compounds which consist of polychlorinated biphenyls (PCBs) and PCB containing equipment were identified from their use in electric utilities e.g. transformers and capacitors, industrial facilities, residential and commercial buildings. Workers in some industries also use empty transformer oil drums as water reservoirs. Furthermore some PCB oil finds its way into small-scale industries where they are used to produce pomade (hair cream) and sold in the local market.

The main sources of POPs by-products (unintentionally produced) include power generation and heating, mineral production, transport, uncontrolled combustion process, production and use of chemical and consumer goods, disposal of wastes, hotspots, and miscellaneous sources.

Level of POPs

It was difficult to obtain figures of the importation of POPs pesticides into the country before, they were banned. However deductions from alternate chemicals used to replace DDT were estimated. A total amount of 2,420,000 litres of Lindane and Unden (Propoxur an N-methyl carbamate pesticide) were imported into the country between 1992 and 1996. Although the amount of chemical used is a function of efficacy of the chemical, the size of the farms and many other factors, this implies that, if DDT were to be used between those periods a high quantity would have been used. For insecticides, herbicides and fungicides and other pesticides a total amount of 9,705,000 litres were imported into the country. It was also discovered that unofficial importation of hexachlorobenzene and DDT imported into the country amounted to 1,030 kg.

In all, 147 pieces of 33 KVA possible PCB-containing capacitors were identified. The levels of emissions of dioxins and furans to air, land and water and residues in 2002 were also estimated to be a total of 386g I-TEQ to air, 0.12g I –TEQ to water, 279g I –TEQ to land and 3 .04g I –TEQ as residues.

Damage Caused by POPs

The project revealed that between 1989 and 1997, 963 cases tested positive for chemical poisoning. Approximately 30% of these were directly related to the misuse of pesticides. From 1988-1987 there were 74 deaths due to organochlorine pesticides and 77 up to 2002.

Laws Currently Regulating POPs

Laws currently regulating POPs in Ghana were also identified. The project revealed that Ghana has a legal framework for the management of potentially bioaccumulative and toxic substances including POPs. However it was observed that these laws are under the control of different institutions. The laws are also inadequate and incapable of dealing with the specific requirements of the Stockholm Convention on POPs. International agreements were also identified. Notable among them are the Basel, Rotterdam and Stockholm Conventions, which Ghana has signed and ratified.

NGOs and other institutions working on POPs

Currently not many NGOs are working on POPs in the country. However Environment Youth Action Network (EYAN) and Integrated Community Care (ICC) are working in this area. Various institutions also undertake activities related to POPs management in Ghana. However the major institution is the Environmental Protection Agency that initiated a chemical monitoring programme as far back as 1985. Under the programme, it is mandatory for all importers of all types of chemicals to obtain clearance permits from the Agency before taking delivery of their consignment at the Ports. A centre to co-ordinate all issues concerning chemicals including POPs management in the country known as Chemicals Control and Management Centre (CCMC) has been established in the EPA.

Status of the Stockholm Convention in Ghana

Ghana signed and adapted the Convention on 23rd May 2001 and ratified it on May 30, 2003. Since then, Ghana has undertaken various activities within the provision of the Convention including preparation of a Draft National Implementation Plan.

Some of the challenges of the POPs issue observed in the country have to do with inadequate capacity to identify contaminated sites and insufficient expertise to conduct laboratory analysis of POPs-contaminated samples. Misuse of POPs chemicals was also observed.

Recommendations

As a way forward some recommendations have been made. These are:

- Stakeholder institutions including NGOs, government, private sector, industries, and research institutions are to make an effort to develop a national policy to tackle the issue of POPs contamination.
- The Ghana NIP has outlined a strategy for implementation of POPs source reduction and ultimate elimination. There is the need to organize both human and financial resources to implement the plan.
- Research into finding alternatives to POPs should be intensified.

It is also recommended that particular attention should be given to the PCB contamination point at the 'Makola' market in Accra.

1.0 INTRODUCTION

Environment Youth Action Network (EYAN) in collaboration with Integrated Community Network (ICC) conducted an independent national persistent organic pollutants (POPs) inventory to reflect the POPs situation in Ghana as a response to the Global NGOs Project, the International POPs Elimination Project (IPEP). The project covers the 12 POPs chemicals banned under the Stockholm Convention and the newly proposed candidate POPs during COP1 and the POPs Review Committee. In brief, the project aimed to prepare and build the capacity of NGOs to participate in the implementation of the Stockholm Convention on POPs.

The project involves reviewing of literature, identifying sources of POPs, determining their quantities, conditions of storage, exposure risks and population, the level of contamination caused, existing efforts for containment and remediation of contaminated sites. It also involves the dissemination of relevant information to specific stakeholders, recommendation of some remediation measures and activities to be undertaken for effective implementation of the Stockholm Convention in Ghana. This Report provides details of activities undertaken and information gathered with respect to the country situation project spanning December 2005 to March 2006.

2.0 METHODOLOGY FOR DATA AND INFORMATION GATHERING

In collaboration with ICC, EYAN designed questionnaires for data/ information gathering in the form of interviews with personnel of relevant institutions (governmental, academia, NGOs, CBOs etc., including the general public). The questionnaire touched on issues such as: sources of release/ emissions of POPs, use/ application, quantities, conditions of storage, exposure risks and population, the level of contamination caused, existing efforts for containment and remediation of contaminated sites as well as general public awareness and understanding of POPs and their effects. Relevant literature search was also done to collect and collate background information on the above issues in Ghana regarding the 12 listed POPs and the proposed candidate POPs, currently reviewed by the POPs Review Committee.

Field visits were undertaken to the identified sites and institutions with responsibility to manage POPs in the country. The study received maximum co-operation with a lot of interest in the subject matter. Institutions and sites visited are included in this report as Annex 1. A close collaboration was made with the Environmental Protection Agency (EPA), the Secretariat of the POPs Enabling Activities Project in connection with the preparation of the National Implementation Plan (NIP).

3.0 RESULTS OF FINDINGS

3.1 What are POPs?

Persistent Organic Pollutants (POPs) are chemicals that once released into the environment, cause toxic reactions, persist in the environment for years, travel thousands of kilometers from where they were used, and threaten long-term health and the ecological system. They are among the most dangerous pollutants produced through human activity. They are characterized by their high:

- toxicity, causing disease and death;
- persistence for years without getting destroyed;
- potential for long-term range environmental transport; They circulate globally through the air water, soils, and sediments through a process known as the “grasshopper effect;” and
- bioaccumulation; POPs concentrate in living organisms as you move up the food chain.

An initial list of 12 POPs identified for action by the Stockholm Convention adopted in May 2001 include aldrin, chlordane, dichlorodiphenyl–trichloromethane (DDT), dieldrin, dioxins, endrin, furans, hexachlorobenzene (HCB), heptachlor, mirex, polychlorinated biphenyls (PCBs) and toxaphene. These have been divided into 3 groups:

- pesticides;
- industrial compounds; and
- by-products.

These are further classified into 3 broad categories in light of the Stockholm Convention on POPs as follows:

- Annex A chemicals – those set for immediate elimination;
- Annex B chemicals – those set for use under high restriction; and
- Annex C chemicals – these are unintentionally produced POPs (U-POPs).

3.2 Sources of POPs in Ghana

The review of literature on source of POPs in Ghana revealed the following:

3.2.1 POPs Pesticides

The list of chemicals under this group includes: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, and toxaphene. These pesticides were mainly used as insecticides for agriculture and disease vector control in public health. The importation of the nine POPs pesticides was stopped in Ghana in 1985. The Pesticides Control and Management Act (Act 528) of 1996, also makes provisions for screening such pesticides. Information about stockpiles of POPs after the ban in 1985 is scanty. The results of inventories carried out by Plant Protection and Regulatory Services Department (PPRSD) as part of the FAO stockpiles of obsolete pesticides project in 2000 indicates that there are seventy-two metric tons of stockpiles of obsolete pesticides in Ghana, which might include POPs wastes and other pesticides wastes.

Despite these measures the result of an inventory carried out in the country and reported in the Ghana National Implementation Plan (NIP) revealed that there are presently no official records on POPs pesticides in the country. However reports of organochlorines pesticides poisoning from analysis of organs of human body and fluids conducted by the Ghana Standards Board (GSB) in collaboration with University of Ghana Medical School in 2002 indicated the presence of POPs pesticides in human bodies which may suggest existence of POPs pesticides in Ghana.

The source of POPs pesticides could possibly be from used pesticide containers as there are unconfirmed reports of volumes of pesticides containers used some years ago, buried at the premises of the Plant Protection and Regulatory Services Department (PPRSD) at Pokuase in the Ga District of the Greater Accra Region of the country, as well as the Tono and the Vea Irrigation Projects in the Upper East Region. The information gathered in the NIP report indicated that many containers were burned in the early 1970s. There is therefore further work to identify the exact location of these containers for further action.

The Government of Ghana has however mandated the Environmental Protection Agency through the EPA Act 490, and the Pesticide Control and Management Act (Act 528) of 1996 to regulate and manage the production, use of all pesticides including organochlorines as well as their stockpiles, waste and empty containers.

3.2.2 Industrial compounds

Results of an inventory carried out in Ghana on the production, export, import, use and distribution of polychlorinated biphenyls (PCBs) and PCB-containing equipment indicated that there is no production of PCBs in the country. However their use in electric utilities, industrial facilities, residential and commercial buildings in the country was established. PCB-containing applications at target locations were also found to be transformers and capacitors.

There is also enough evidence to suggest that workers in some industries have been exposed to PCBs through empty transformer oil drums used as water reservoirs. Furthermore some PCB oils find their way into small scale industries where they are used to produce pomade (hair cream) and sold in the local market.

3.2.3 By-product POPs (Unintentionally released)

These are polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs, /PCDFs) simply referred to as dioxins and furans, and some cases HCB and PCB. The main source of dioxins and furans (PCDDs/PCDF) in Ghana include among others:

- waste incineration
- ferrous and non-ferrous metal production
- power generation and heating
- mineral production
- transport (emissions)
- uncontrolled combustion process

- production and use of chemicals and consumer goods
- disposal of wastes
- hotspots
- miscellaneous

(a) **Waste incineration** - Types of waste incinerated include municipal, hazardous and medical; light fraction shredder, sewage sludge, wood waste and biomass; and animal carcasses. Apart from the medical waste, simple batch type incineration, takes place in the two major hospitals in the country, Korle Bu Teaching hospital in Accra and the Okomfo Anokye Teaching hospital in Kumasi. This unsupervised indiscriminate burning takes place in the form of refuse burning. There are no light fraction shredders waste, wood waste, animal carcass and sewage sludge incineration in the country.

(b) **Uncontrolled combustion processes** - Medical waste incineration, power generation and heating are the main sources of dioxins and furans in Ghana.

(c) **Waste dumps** are dotted all over the country. Leachate, runoff and seepage from such dumpsites are potential sources of dioxins and furans releases into surface and ground water.

(d) **The transport sector** is a source of air pollution in the urban areas where vehicular traffic with dioxins and furans among other pollutants is a problem.

(e) **Garages or local 'fitting' shops** as they are popularly called, undertake the repair of most automobiles in the country. These shops are sites potentially contaminated with various pollutants including furans and dioxins. At these workplaces or 'fitting shops' the oil discharges from the engines during servicing are spilled all over the place. Some flow to nearby streams and furthermore the workers (Masters and Apprentices) even take their meals at the shop, sometimes with hands contaminated with furans and dioxins.

(f) **Traditional kitchen and cooking where biomass are used** usually in the form of wood fuel are usually contaminated by massive aerial releases of pollutants, and forms one of the sources of POPs like dioxin and furans.

(g) **Industrial discharges of effluent containing water into open water** are also a source of discharge of dioxins and furans into the environment.

3.3 Levels of POPs in Ghana

An inventory carried out and documented in the NIP indicates the level of POPS in Ghana. Some results of the inventory are highlighted in this section.

3.3.1 POPs Pesticides

The results of the inventory shows that there are presently no official records on POPs pesticides in use in the country since their importation ceased since 1985 and existence of the Pesticides Control and Management Act (Act 528) of 1996, which mandates the EPA to screen such chemicals.

However, it is difficult to obtain figures on the importation of POPs pesticides into the country before they were banned. For example, concerning the importation of DDT in Ghana, estimations could be inferred from recent data on pesticides that were used to replace DDT after it was banned. Gammalin 20 EC (Lindane) and Unden EC 2000 (Propoxur) were largely used in place of DDT.

Table 1 below gives the available figures of Lindane and Propoxur imports. It must be noted that official importation of DDT was banned in 1985. However, one cannot rule out the possibility of the presence of some stocks in the system. This may be due to illegal imports in view of border checks not being very efficient as well as lack of proper monitoring by the existing regulatory institutions in the country.

Table 1: Pesticides used to replace DDT

Date/ Year of import	Area of Application	Pesticide (s)	Quantity/ Lt	Manufacturer
1992	Cocoa spraying by Ghana Cocoa Board	Unden EC	520,000	Bayer, Ag
1994	Cocoa	Unden EC 2000	400,000	Bayer, Ag Germany
1995	Cocoa	Lindane	300,000	International Agric Supplies, Holland
1996	Cocoa	Unden DSL	300,000	
1996	Cocoa	Lindane	300,000	Rhone-Poulenc Agrochem
1996	Cocoa	Lindane	300,000	Rhone-Poulenc Agrochem
1996	Cocoa	Lindane	300,000	Rhone-Poulenc Agrochem

Source: Ghana Cocoa Board

The pesticides in the table above total 2,420,000 litres. These estimates exclude the consignment that was imported for the health sector. From the above it could be deduced that the although amount of chemical used is a function of efficacy of the chemical, the size of the farms and many other factors, this implies that, if DDT were to be used between those periods large amounts would have been imported into the country for the cocoa industry alone in the past. Table 2 also indicates past pesticide imports.

Table 2: Pesticides imports

Pesticide Group	Year of Importation		
	1971-1980	1981 - 1990	1991
Insecticides	500,000 Lt	1,903,000 Lt	421,000 Lt
Herbicides	5,720 Lt	360,900 Lt	155,000 Lt
Fungicides	5,000 kg	150,000 kg	20,000 kg
Others	1,000 kg	10,000 kg	260,000 kg

Source: Plant Protection and Pesticide Regulatory Committee Report 1992

Since the time when the figures in the table above were recorded insecticides used in Ghana were organochlorines, it could be inferred that DDT was paramount.

Information gathered from the Ghana Statistical Service Department also indicated the level of hexachlorobenzene, and DDT through unofficial importation into the country in recent past. Table 3 indicates hexachlorobenzene and DDT importation.

Table 3: Hexachlorobenzene and DDT importation

Year of Import	Area of Application	Pesticides (s)	Quantity (kg)	Country of Origin
2001	Not Available	Hexachlorobenzene and DDT	20	Germany
2002	Not Available	Hexachlorobenzene and DDT	10 800 200	Italy Egypt USA

Source: Ghana Statistical Service

3.3.2 Industrial POPs (PCBs)

The sources of PCBs are transformers and capacitors. Evidence available indicates that the Electricity Company of Ghana as well as the Volta River Authority ceased importing PCB-containing transformers and capacitors for use in Ghana since 1972.

However it has been established that 455 pre-1972 possible PCB-containing transformers could be found countrywide. Of this number, 386 are housed in a concrete and roofed building which is securely locked. However when 40 of them were selected at random, a simple density test in 2003 indicated that the transformer oil might not contain PCBs. Further investigations have been recommended using state-of-the art analytical techniques such as HRGC-HRMS in order to ascertain the real levels.

In all 147 pieces of 33KV, possible PCB containing capacitors were found. Some of the compositor cans were broken at the insulator and whilst others had their cans bulging out. Most were badly leaking in a pool amidst a network of high-tension cables.

3.3.3 By-product POPs (Unintentionally released)

The emission levels of dioxins and furans from known sources to air, land and water and residue have been estimated using the UNEP Toolkit to be 386g I–TEQ of PCDDs/PCDFs in 2002. The sector of uncontrolled combustion processes released a total of 372g I–TEQ to air. Within this sector emission to air due to indiscriminate burning of forest, savannah grassland and waste dumps were 218.8g and 129.4g and 24.6g respectively.

Additionally, a total of 278.6g I-TEQ of PCDDS/PCDFs was released to land from uncontrolled combustion processes in 2002 – 175g I-TEQ from forest fires and 103g I-TEQ from savannah grassland fires.

Table 4: The potential levels of release of PCDDs/PCDFs

No	Main Source Categories	Annual Releases for 2002 (g. TEQ/a			
		Air	Water	Land	Residue
1	Waste Incineration	4.68	0.00	0.00	0.00
2	Ferrous and non-ferrous metal production	1.16	0.00	0.00	1.74
3	Power generation and heating	6.39	0.00	0.00	1.30
4	Mineral production	0.00	0.00	0.00	0.00
5	Transport	1.37	0.00	0.00	0.00
6	Uncontrolled combustion processes	372	0.00	279	0.00
7	Production and use of chemicals	0.00	0.00	0.00	0.00
8	Miscellaneous	0.03	0.00	0.00	0.00
9	Disposal / land filling	0.00	0.12	0.00	0.00
10	Potential hotspots	-	-	-	-
1-9	**Total**	**386**	**0.12**	**279**	**3.04**

Source: National Implementation Plan

This large proportion of dioxin releases attributed to forest fires etc. is a common result of using the UNEP Toolkit. The Toolkit contains emission factors primarily derived from processes and practices in developed countries and substitution of its factors with those derived from the scientific literature or other government agencies can alter the source priorities as well as the total dioxin emissions per year. The result is that using the Toolkit can overestimate releases from some sources and underestimate releases from others. (Costner P, RAPAM, 2005)

3.4 Damage caused by POPs

Apart from a few epidemiological studies among farmers to examine the extent of pesticides associated symptoms and a few case studies there are no countrywide statistics on the damages caused by POPs.

However, the monitoring result carried out by the Ghana Standard Board and the University of Ghana indicates the level of damage caused by POPs to the human body. Out of 1215 toxicological cases examined between 1989 and 1997, 963 cases tested positive for chemical poisoning 30% of which were directly related to the misuse of pesticides. From 1998 – 1997 there were 74 deaths due to organochlorine pesticides and 77 up to 2002.

3.5 Laws currently regulating POPs

The legal framework for the management of potentiality bioaccumulative and toxic substances including POPs in Ghana has been in existence long before the Stockholm Convention but under jurisdiction of different institutions. However, these laws are inadequate and incapable of dealing with the specific requirements of the

Stockholm Convention on POPs. The most important POPs-related laws in the country are:

- The Environmental Protection Agency Act, (Act 490) of 1994. This Act which established the Environmental Protection Agency, seeks among other things to control the volumes, types, constituents and effect of waste discharges, emissions, deposits or other sources of pollutants and/or substances which are hazardous or potentially dangerous to the quality of life, human health and the environment through the issuance of environmental permits and pollution abatement notices.

- The Pesticides Control and Management Act, 1996 (Act 528), provides rules for registration, manufacturing, use, and non-disclosure of information, classification, licensing, reporting, labelling and inspections of pesticides.

These laws are not specific to POPs, but do provide a framework for the management of all chemicals and pesticides, which includes POPs. Other chemical related laws in operation in the country include among others:

- The Food and Drugs Law 1992, (PNDCL 305B) which was enacted to control the manufacture, import, export, distribution, sale, use and advertisement of food, drugs, cosmetics, household chemicals and medical devices. Drugs, cosmetics and household chemicals are made from several chemical substances that may have a negative impact on human health and environment if the manufacture, distribution and disposal are not controlled and managed properly.
- The Factories, Offices and Shops Act (Act 328) 1970 which seeks to protect the health and safety of workers from the dangers posed by chemicals to employees in the working environment.
- The Draft Policy and Bill on occupational Safety and health, 2000 which seeks to ensure that measures are instituted to ensure the attainment of optimum health for workers in all occupations in Ghana.
- The Mercury law, 1989
- The Minerals (Off Shore) Regulations 1962 (as amended)
- The Oil in navigable Waters Act 1964
- The Standard Decree, 1973 (NRCD 173)
- Infectious Diseases Ordinance (Cap 78)
- The prevention and Control of Pests and Diseases of Plants Act 1965 (Act 307)
- Prevention of Damage by Pest Decree 1968 (NLCD 245)
- Cocoa Industry Regulations 1968 (NLCD 278)
- Merchants Shipping (dangerous goods) Rules, 1974 (LI 971)
- Customs, Excise and Preventive Service law,
- Local Government Act, 1992 (Act 458)
- Export and Import Act, 1995 (528)
- Environmental Assessment Regulations, 1999 (LI1652)

On the basis of the above laws, action has been instituted on POPs dating as far back as 1985, resulting in a ban of some and restricted the use of others as shown in Table 5 which depicts the current legal status of each of the POPs.

3.6 Relevant international commitments and obligation

The conference of Plenipotentiaries of the Stockholm Convention recognize existing Multi-lateral Environmental Agreement (MEAs) and programmes related to sound chemicals management with devastating effects on human health and the environment. These include:

- The Rotterdam Convention on Prior Informed Consent (PIC) Procedure of Certain Pesticides and Chemicals in International Trade (1998);
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)
- Bamako Convention on the Control of Transboundary Movements of Hazardous Wastes (1991)
- FAO International Code of Conduct for the Distribution and Use of Pesticides (as amended in 2002)
- ILO Convention on the Safety of Chemicals at the Workplace (1990)
- The UN Convention on Substances that Deplete the Ozone Layer (Vienna Convention) (1985)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
- London Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer (1990)
- UN Chemicals Weapons Convention (1993)
- The provisions of the Rio Declaration on Environment and Development and Agenda 21 (1992).

Ghana participated fully during the negotiations of the above Conventions and has ratified all except the Bamako Convention. Measures are being taking to address the obligations under them.

Table 5: Status of POPs in Ghana

Name of Chemical	Current status/ control action	Details e.g. reason for control action, remaining allowed uses etc.
Aldrin	Not in use; banned since 1985	Persistent. Safer alternative preferred
Chlordane	Not in use; banned since 1985	Persistent. Safer alternative preferred
Dieldrin	Not in use; banned since 1985	Persistent. Safer alternative preferred
DDT	Not in use; banned since 1985	Persistent. Other cheaper and safer alternative such as synthetic pyrethroids for insect control for public health and agriculture preferred
Heptachlor	Not in use; banned since 1985	Persistent. Safer alternative preferred
Hexachlorobenzene	Banned	Persistent. Safer alternative preferred
Mirex	Not in use: banned since 1985	Persistent. Safer alternative preferred
Dioxins & Furans (PCDDs/ PCDFs)	There is limited information on release into the environment	-
Polychlorinated Biphenyls (PCBs)	No action yet on importation and use. Still present in old transformers	-
Toxaphene	Not in use, banned since 1985	Persistent. Safer alternative preferred

Source: National Implementation Plan

Currently synthetic pyrethroids are some of the preferred chemical alternatives to the organochlorine pesticides.

3.7 NGOs and POPs

Throughout the developing world, opportunities are growing for NGOs to work together with government and intergovernmental institutions in helping people improve the quality of their lives. Governments in developing countries are becoming more aware of what NGOs can contribute to national development.

Over the past 10 years, there has been significant nationwide growth of NGOs with effort mainly concentrated in the area of tree planting and education and awareness creation with just a handful working on chemicals in general.

Currently the EPA has registered about 60 active NGOs working in the environment sector. They are in touch with the local people at the grassroots level and always easily get into contact with the community. The NGOs, who are in touch with the local people at the grassroots level, reach the people through various inter-personal contacts. Some have newsletters through which they reach the reading public, for example, the Green Dove of the Green Earth Organization and the FOE line for the Friends of the Earth and NKO for the wildlife society, Evergreen News by the

Evergreen Club of Ghana (ECOG). All NGOs have field officers in their project communities who raise awareness in their area.

However, of all NGOs registered with the EPA, Environment Youth Action Network (EYAN) and Integrated Community Care (ICC) are the only two working on POPs and related issues.

POPs hotspots identified so far include areas within the major cities, which are also close to some water bodies where vegetable farming take place. EYAN and ICC are currently collecting baseline information, which will form the basis for creating awareness for the general public and specific target groups such as vegetable growers about dangers of POPs.

3.7.1 Environment Youth Action Network (EYAN)

The objectives of EYAN are to:

- Create a general awareness among the youth on emerging environmental issues, ensuring a clean, safe and healthy environment for human existence;
- Utilize the potentials of the youth as a resource for promoting sound environmental practices.

The target groups of EYAN are students in second cycle institutions and youth associations (churches etc), with the operational/ programme areas as follows:

- capacity building programmes (training, workshops, seminars);
- environmental education programmes for the general public;
- organization of youth voluntary camps;
- tree planting;
- environmental sanitation (cleaning of beaches, streets, etc);
- development of educational materials (brochures, flyers, etc); and
- networking with active local and international NGOs.

3.7.2 Integrated Community Care (ICC)

Integrated Community Care (ICC) is an NGO that is involved in capacity building in communities to undertake development projects to ensure sustainability and ownership. ICC helps local communities, civil society organizations (CSO), schools and NGOs through awareness creation, training and research leading to sound environmental management, community development and poverty reduction. The objectives of ICC are to:

- Assist NGOs, educational and community based organizations to build their capacity in empowering the community in good governance and civic responsibility;
- Help communities develop their human resources;
- Assist communities to initiate and pursue school and out of school educational programmes;
- Assist the youth to develop psycho-social skills.

Currently ICC is developing a research proposal into the disposal of expired mobile phone batteries, and other high-density batteries in Ghana. The result of the study

will help in the sound disposal of these batteries before they start creating problems for the country.

3.8 Efforts to deal with POPs

Apart from legislative framework, there are also a number of institutions whose activities relate to POPs management; regulation and enforcement.

Table 6 below provides a summary of institutions and their responsibilities relevant to POPs management:

Table 6: Roles and responsibilities of relevant institutions

Institution	Statutory Function
Customs, Excise and preventive Service	Control of imports and exports, permitting and appropriate tax payment procedures
Minerals Commission	Regulates and monitors the mining industry especially small scale miners
Ministry of Mines	The supervisory Ministry of all mining activities. Develops policy and regulates mining activities. It also monitors the industry
Mines Department	A department in the Ministry of Mines that inspects mines to ensure that they are meeting the requires standard prescribed by law
Ministry of Education, Youth and Sports	A supervisory Ministry of all educational institutions. Develops educational policy and regulates educational activities
Ministry of Health/ Ghana Health Service	Supervises, develops policy and regulates activities related to health. Also monitors and evaluates the effects of chemicals on health
Ministry of Trade, Industry and Presidential Special Initiative	Supervises, develops policy, regulates, monitors and evaluates activities related to trade and industry
Ministry of Food and Agriculture	Supervises, develops, evaluates and monitors and evaluates to agriculture and food production. It is also a regulatory institution
Ministry of Energy	Supervises, develops, evaluates and monitors policy on activities related to energy production and use
Energy Commission	A statutory commission in charge of policy development and management of energy
Electricity of Ghana	A private retailer of electrical power in Ghana; with Ghana having majority shares
Department of Town and Country Planning	A regulatory institution in the mapping and siting of physical developments
Ghana National Petroleum Agency	Governmental institution in charge of petroleum exportation and drilling in Ghana
Environmental Protection Agency	It supervises, regulates and manages the environment. It also enforces environmental laws and develops and implements policies on the environment
Environmental Protection Agency	Supervisory Ministry of Environmental scientific and some research institutions. Develops, implements, monitors policies.

Source: National Implementation Plan

In 1985, Ghana initiated a chemical monitoring programme long before the concern of POPs. Under the programme, it was mandatory for all importers of all types of chemicals to obtain clearance permits from the Agency before taking delivery of their consignment at the ports. Currently, the Chemicals Control and Management Centre (CCMC) of the EPA co-ordinates all issues concerning POPs management in the country.

The CCMC has as its primary objectives to protect human health and the environment from the potential effects of chemicals. Chemicals clearance permits are still issued by the CCMC to importers of industrial chemicals as a means of regulating these chemicals especially the hazardous ones. It is mandatory for applicants to submit the Material Safety Data Sheets (MSDS) of every chemical they intend to import to the CCMC.

These applications are then screened based on the information provided on the MSDS and other alternative sources. Samples of some granular industrial raw materials such as fertilizer, polypropylene and high density polyethylene etc. are sent to the Ghana Standard Board (GSB) for analysis, to ensure they are the right chemicals before permits are issued for their clearance. The CCMC also supervises the disposal of obsolete chemicals in an environmentally sound manner.

Again the Pesticides Control and Management Act 1996 (Act 528) was enacted to improve on the management of pesticide, including persistent organic pollutants in the country. According to section 1 of Act 528, no person shall import, export, manufacturer, distribute, advertise or use any pesticides in Ghana unless the EPA in accordance with this Act has registered such pesticides.

The pesticides register is made available to industry and other stakeholders such as Customs Exercise and Preventive Service (CEPS) and Ministry of Food and Agriculture (MOFA). According section 38 of Act 528, every custom officer shall:

- Assist in the enforcement of the provision of the Act; and
- Prevent the importation into Ghana of any pesticides, where the importation is contrary to this Act. The Act also authorizes the appointment of Pesticides Inspectors.

A Chemical Information Exchange Network (CEIN) Project has also been initiated in Ghana as part of efforts to deal with POPs. The project among others is expected to result in the establishment of infrastructure and technical capabilities to access and exchange chemicals information.

3.9 State of Stockholm Convention's ratification and the National Implementation Plan

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted and opened for signature at a Conference of Plenipotentiaries held from 22nd to 23rd May 2001 in Stockholm, Sweden. Ghana signed and adopted the Convention on 23rd May 2001 in Stockholm and ratified on May 30th 2003. The Convention, which entered into force on 17th May 2004, has the objectives of protecting human health and the environment from persistent organic pollutants. Under the Convention each party including Ghana is obliged to:

- develop within two years after entry into force, plans for implementing the obligation of the treaty;
- designate a National Focal Point for exchange of information on production, use and released of POPs and their alternatives;

- promote and facilitate public awareness and participation, education, research development and monitoring of all aspects of POPs and their alternatives; and
- report to the Conference of the Parties (COP) on measures taken to implement the provision of the Convention and effectiveness of measures taken and quantities of POPs in Annex A, B and C that are traded or released and list of states involved.

Additionally article 3 of the Convention urges states to takes measures to reduce or eliminate releases from the intentional production and use of POPs. States are also to restrict production and use of chemicals listed in Annex B (dichloro-diphenyl-trichloroethane - DDT).

Article 5 requires parties to put measures in place to reduce or eliminate releases from unintentional production of some of the famed chemicals. There are also provisions for measures to reduce or eliminate releases from stockpiles and wastes containing or contaminated with POPs.

In line with the provision of the Stockholm Convention Ghana has done the following:

- developed in 1997 a National Profile for Sound Chemicals Management
- initiated in 1997 a National Action Programme for an Integrated Chemicals Management
- ratified the Stockholm Convention on 30th May 2003
- prepared a draft National Implementation Plan (NIP)
- designated the Environmental Protection Agency (EPA) as the National Focal Point
- participates in the chemicals information exchange network (CIEN) project;
- periodic training and organization of seminars and public awareness creation for stakeholders including NGOs
- banned importation and use of POPs pesticides in the country in 1985
- established a regulatory framework to eliminate POPs: Act 528 of 1996 and EPA Act 490 of 1994
- collaboration among EPA, CEPS and PPRSD in the importation, monitoring and application of pesticides
- introduction and promotion of a variety of gas fired stores and ovens to meet the cooking and heating needs of the people
- introduction of unleaded fuel to replace leaded fuel in 2004;
- the EPA has in place air and water quality monitoring programmes with a focus on the following:
    a) baseline environmental monitoring to establish the status of air and water quality;
    b) periodic monitoring of selected areas to establish trends in environmental quality;
    c) regular monitoring of affluent quality in industries;
    d) the Agency is also collaborating with other stakeholders on a pilot programme to monitor emissions from vehicles. This will be extended to emissions from Annex A and C chemicals (PCB, HCB and PCDDs/PCDFs). Development of strategies and action plans are detailed in the NIP.

3.10 Public awareness activities

The CCMC periodically organizes training workshops and seminars for stakeholders (including pesticides dealers and applicators) on the control and management of chemicals. Dealers in agrochemicals are also given refresher courses in pesticides management. The Plant Protection Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture (MoFA) also organizes training programs for pesticides dealers.

The Ghana National Association of Farmers and Fishermen (GNAFF) are also represented in most training workshops organized by the EPA and MoFA. The Agricultural extension staff of MoFA is also in direct contact with farmers and teaches them several things including the correct way to apply pesticides and fertilizers to their crops and also on the need to wear protective clothing when applying pesticides.

Training of farmers focuses on FAO guidelines on the distribution and use of pesticides. Handbooks (published in 2000) on management of pesticides have also been prepared by the Pesticides Management Division of the PPRSD, which serves as a basis for training. This handbook is available to the public.

In carrying out the public awareness activities on POPs, the major obstacles have to do with lack of funds and access to relevant information.

3.11 Identified contaminated sites

3.11.1 Physical description of site

Generally the nature of contaminated sites of concern includes the following:

- areas where spillages occurred during filling of such equipment with PCBs;
- locations where electrical equipment (particularly transformers and capacitors) were serviced;
- poorly designed and maintained storage sites;
- locations where POPs wastes were/ are dumped;
- waste discharges from chemical plants, where elemental chlorine is involved in the technology;
- sewage sludge treatment plants; and
- former organochlorine pesticides formulation plants.

The priority areas of concern identified from the preliminary inventories carried out as part of the Ghana NIP include the following:

- the immediate surrounding areas of the pre-1972 transformers countrywide;

- the Electricity Company of Ghana Accra Central Station G (Makola) and its environs;
- municipal waste dumps countrywide;
- open water dumping in main industrial cities and towns;
- pesticides contaminated sites including the premises of the PPRSD/ MoFA, Pokoase in the Greater Accra Region, Abuakwa Formulation Plant, Kumasi in the Ashanti Region as well as the Vea and Tono Irrigation sites in the Upper East Region;
- areas where obsolete stockpiles of pesticides and pesticides waste are being stored.

Most of the sites mentioned above are within important water basins (e.g. the Pokuase, Vea and the Tono sites), and the major cities close to water bodies.

3.11.2 History of site

Most of the contaminated lands identified above are government-owned. These were used as sites for storage purposes for both chemicals in use and expired ones.

3.11.4 Chemical characterization

Currently there is inadequate capacity to identify contaminated sites and inadequate technical expertise to conduct laboratory analysis of POPs-contaminated samples. There is therefore the urgent need for capacity building, institutional strengthening and training at all levels in the sound management of contaminated sites. Some of the obsolete stockpiles of pesticides and pesticides waste are in worn out containers, leaking with unpleasant smells.

3.11.5 Misuse of POPs chemicals in Ghana

Available evidence indicates that the dirty oil reservoir at the Accra Central Station G has never been full over the years to require emptying due to lack of proper monitoring. The contents, oil or possibly PCBs are unofficially and illegally sold out to:

- enterprising women who illegally use to formulate beauty creams for sale on the open market;
- welders for use in welding machines;
- people who apply them as lubricants in domestic sewing machines;
- other entrepreneurs who mix it with sawdust for industrial and domestic use as fuel.

The above situation is mainly due to lack of awareness, poverty and illiteracy among others.

3.11.6 Plans for cleanup

In Ghana the infrastructure and capability for the remediation of contaminated sites are underdeveloped. Some of the contaminated sites identified above require urgent attention. Relevant national stakeholder institutions including NGOs have a major

role to play in the development of capacity for contaminated sites management, including remediation. The roles that would be played by such institutions within the framework of NIP implementation would include:

- enhancement of their capabilities for the assessment of POPs contaminated sites and remediation;
- research on appropriate scientific methods for identification of contaminated sites and guidelines for remediation;
- provision of information on best available techniques (BAT) and best environmental practices (BEP) for POPs-contaminated sites remediation.

3.12 Recommendations on eliminating POPs

It is clear that no single Party to the Convention can act in isolation in tackling the POPs issue to achieve any desired results. This is also true at the country level. The Ghana NIP has outlined a very elaborate strategy for implementation for POPs source reduction and ultimate elimination, which was done through relevant national stakeholder collaboration. There is therefore a need to organize both human and financial resources at the national level with international support to address the problems of POPs as their effects go beyond borders. That is the way forward in order to fully implement the NIP and the realization of the objectives outlined therein.

3.13 Recommendations on inventories

The inventories were preliminary in scope. Additional work needs to be done which will also require funding for capacity building and infrastructure development.

3.14 Alternatives to POPs

Non-organochlorine pesticides have largely replaced the POPs pesticides. Currently the Environmental Protection Agency does not register any pesticides with POPs characteristics. The Ministry of Food and Agriculture is also promoting IPM programmes as an alternative method to ensure food security and safety with emphasis on use of less and safer chemicals. PCBs have been largely replaced by mineral oils. This is a requirement under the EIA procedures of the Environmental protection Agency. Environmental cleanliness and certain cultural practices are being promoted on the national scale for the control of mosquitoes in order to avoid reliance on as chemical pesticides including POPs.

3.15 New POPs

The POPs Review Committee (POPRC) is currently considering the addition of five substances, namely, Lindane, chlordecone, perfluorooctane sulfonate (PFOS), pentabromodiphenyl ether (penta BDE), and hexabromobiphenyl, to the existing list of 12 POPs chemicals. Other proposals from different stakeholders include endosulfan and paraquat.

There is a need for the government of Ghana to take necessary measures to the proposed chemicals with equal weight.

3.16 Resources on POPs

There is limited access to websites, databases, and reports on POPs. However through the UNEP-USEPA Chemical Information Exchange Network Project some success has been chalked. The use of the internet is becoming more popular with government policy on Information Communication Technology (ICT). Research into POPs is not encouraging at the moment due to several factors including lack of analytical laboratories capacity for POPs. The Ministry of Environment and the Environmental Protection Agency serve as the focal point of the Stockholm Convention the chemical-related Multilateral Environmental Agreements (MEAs) and IFCS. NGOs working in the area of the POPs operational of GEF are few. However, POPs is an element of the UNDP Small Grants Program.

Websites:
Stockholm Convention – www.pops.int
UNEP and UNEP Chemicals: www.unep.ch

4.0 CONCLUSION

The preparation of the country situation report has been very useful and has served as an eye-opener to a lot of issues on POPs. The document has also provided a lot of complementary data/ information to the NIP, though most data were sourced from the Ghana NIP. It is expected that an additional funding will be made available to support the awareness creation effort envisaged under the project.

Concerted efforts should be made by all national stakeholder institutions including government, private sector, industry, researchers and NGOs to develop a national policy to tackle the issue of POPs contamination head on. It is therefore strongly suggested that NGOs within the environment sector should initiate programmes to sensitize government and other national stakeholders to address the issue of POPs contamination to safeguard the health of the populations and the environment.

Particular attention should be given to the PCBs-contaminated site at the Makola market in Accra. Awareness educational programmes should involve users of the PCBs oils.

REFERENCES

1. National Profile to Assess the Chemicals Management Infrastructure in Ghana, July 1997
2. Draft Ghana National Implementation Plan, March 2006
3. Ghana Cocoa Board Annual Reviews
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5. Stockholm Convention on Persistent Organic Pollutants (Text and Annexes)
6. Regionally Based Assessment of Persistent Toxic Substances, Global Report 2003
7. Costner P, RAPAM, Estimating Releases and Prioritizing Sources in the Context of the Stockholm Convention: Dioxin Emission Factors for Forest Fires, Grassland and Moor Fires, Open Burning of Agricultural Residues, Open Burning of Domestic Waste, Landfill and Dump Fires; International POPs Elimination Project, December 2005

ANNEXES

ANNEX 1: Institutions and Sites Visited

1. Environmental Protection Agency
2. Chemicals Control and Management Centre
3. Customs Excise and Preventive Service
4. Ghana Cocoa Board
5. Cocoa Research Institute of Ghana
6. Council for Scientific and Industrial Research
7. Electricity Company of Ghana
8. Ministry of Environment and Science
9. Ministry of Food and Agriculture
10. Ministry of Trade, Industry
11. Volta River Authority
12. Plant Protection and Regulatory Services Directorate
13. Tono and the Vea Irrigation Projects Sites.

ANNEX 2: PLATES

Plate 1: Immediate environ of a transformer contaminated by spillage

Plate 2: Displayed reservoir for PCB/oil waste at the Accra Central Power Station G