The International POPs Elimination Project

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

Identification and Control of POPs Contaminated Sites in Lagos, South western Nigeria

Nigerian Environmental Society (NES)

Nigeria - 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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The views expressed in this report are those of the authors and not necessarily the views of the institutions providing management and/or financial support.

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Ane Leslie Adogame, *Fellow LEAD, FIAMN*
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1 Introduction

1.1 Preamble

At the first truly global environmental summit held in Rio de Janeiro, Brazil in 1992, the problem of the increasing pollution by a group of chemicals known as persistent organic pollutants (POPs) was among the vital issues on the front burner. The need for long term planning and resolution of the unique threats posed by this group of chemicals was agreed upon and that began a process, which involved international negotiations and consultations. Today, that process has culminated in the development of an International Convention on Persistent Organic Pollutants, better known as the Stockholm Convention on POPs. The Convention was adopted in May 2001 in Stockholm Sweden.

The Stockholm Convention entered into force in May 2004, ninety days after the 50th country deposited its instrument of ratification at the UN. Section 1e of Article 6 of the Stockholm Convention states that parties would "endeavour to develop appropriate strategies for identifying sites contaminated by chemicals listed in Annexes A, B or C, if remediation of those sites is undertaken, it should be done in an environmentally sound manner".

Article 3 of the Convention urges States to take measures to reduce or eliminate releases from the intentional production and use of POPs. It requires States, among others, to prohibit and/or take legal and administrative measures to eliminate the production, use, importation and exportation of chemicals listed in Annex A (aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls or PCBs). States are also required to restrict production and use (for malaria vector control only) of chemicals listed in Annex B (dichlorodiphenyltrichloroethane or DDT). However, there are special provisions for PCBs and DDT.

1.2 Background Information

The International POPs Elimination Network (IPEN) is a network of public interest non governmental organisations with a commitment to work jointly towards the elimination of POPs and other persistent toxic substances (PTS) from the world's environment. On May 22, 2001, the body came up with a list of commitments on POPs elimination, known as the Stockholm Declaration to which all Participating Organisations (POs) are enlisted. The Nigerian Environmental Society (NES), Nigeria's premier environmental NGO and officially recognized watchdog of the environment of the Federal Republic of Nigeria, is a Participating Organisation having endorsed the IPEN Stockholm Declaration and other policy documents.

In 2004, the IPEN initiated a global project known as *International POPs Elimination Project (IPEP)* through its POs with the support of the Global Environment Facility (GEF). In Nigeria, three NGOs, the Nigerian Environmental Society (NES), the Friends of the Environment (FOTE) and the Nigeria

Environmental Study/Action Team (NEST) were incorporated into the IPEP initiative but with different project modules.

The involvement of **NES** in the **IPEP** initiative started with the submission of a Project Activity Memorandum (PAM)**.** Specific title of the IPEP NES Module is ***Identification and Control of POPs Contaminated Sites (Hotspots) in Lagos, South western, Nigeria.***

1.3 Aim / Objectives

The aim of the IPEP NES Module is to identify POPs contaminated sites in Lagos, wit a view to proffering necessary control measures towards the protection of the environment and safeguarding of public health.

Specific Objectives

- ✓ to provide information on existing contaminated sites (hotspots) in Lagos Nigeria;
- ✓ to propose environmentally sound remediation or benign ways of cleaning up identified contaminated sites and environmental reservoirs containing POPs and other PTS;
- ✓ to assess the awareness level of major stakeholders and the public on POPs and POPs contaminated sites in Lagos;
- ✓ to assist in building stakeholders capacity on the reporting and management of contaminated sites in Lagos;
- ✓ to produce a project report which will assist in the development of the implementation framework for the National Implementation Plan (NIP) of the Stockholm Convention in Nigeria.

1.4 Project Scope

The geographic area covered by this study is Lagos State of Nigeria. The State is a good reflection of the industrialization profile in Nigeria, characterized by a variety of human activities, which range from industrial, commercial, municipal, domestic, educational and agricultural activities. The thematic study area is limited to POPs-related contaminated sites (hotspots) in Lagos State. This covers the industrial layouts, isolated farmlands, and the built up areas.

1.5 Project Duration

The project was executed between January and March 2006.

2 Literature Review

2.1 Introduction

The global community is becoming increasingly aware of the values of an ecosystem, as well as the implications of man's activities on sustainable development; an advocate of a balanced and quality environment. A balanced and quality environment in-turn sustains biodiversity, healthy biophysical domain, promotes socio-economic and public health sectors. What is yet to be fully known by a generality of the society particularly in the developing world are the ecological and toxicological implications of increased releases and discharges of organic pollutants into the environment.

At the Earth Summit in Rio de Janerio (1992) governments and organizations jointly resolved to confront environmental problems, which are now global in nature. Governments and agencies in attendance identified POPs as a specific environmental problem capable of changing human existence (WFPHA 2000). POPs were then selected for a long term strategic planning and action. In 1998, about hundred and three (103) governments began negotiations to establish a global legally binding treaty to reduce or eliminate the health and environmental threats posed by POPs, with target completion date of 2000. Today, Nigeria and indeed the sub-Saharan Africa are consciously responding to this call, which has provided the impetus for this project.

POPs are organic carbon-based chemical compounds and mixtures that are highly toxic, persistent in the environment, bio-accumulate in fatty tissues of living organisms, travel long distances in air and water and tend to migrate from warmer to colder region of the world (Oris *et al* 2002, Ezemonye, 2003).

2.2 Origin and Occurrence of POPs

POPs are essentially products and by-products of human industry that are relatively recent in origin, with no known natural sources (Ezemonye 2003). Before the mid-twentieth century, pollutants with these harmful characteristics were virtually non-existent. Their origin and actual production is traced to after the World War II. This era witnessed increased production of chemicals and their by-products. POPs defy natural boundaries and when released in one part of the world can travel to remote areas (regions) far from the source.

2.3 Sources of POPs in the Environment

Primary Sources

Primary sources of some POPs (dioxins, furans, hexachlorobenzene or PCB) include combustion and high temperature processes such as metallurgical industries. Burning of organic matter in the presence of chlorine is one of the main causes of formation of a range of organic pollutants. Atmospheric emission from waste incineration plants is also one of the biggest sources of dioxins. Landfill fires can result in the formation or release of various POPs.

Hazardous waste incineration also releases high levels of POPs. Large scale burning of biomass fuel releases POPs. Small scale burning of wood has also been implicated in the production of POPs. Domestic burning of wood or fuel pellets may also be a source of release of dioxin to air. This includes backyard burning of waste, building fires i.e. household fitting or furnishings that often contain a range of chlorinated compounds which in the event of a fire can give rise to organochlorine pollutants.

Chemical industries, refineries or cement industries in their activities produce POPs unintentionally. Similarly the forest product industry such as saw mills, pulp or paper mills for many years uses chemicals that introduce dioxins or PCBs in the environment. Emissions of dioxins, PCBs or HCB from ships have also been documented. Land-based transport has been reported to contribute to the release of POPs through vehicular emissions.

Secondary Sources

Secondary sources refers to the sites, accumulations of processes in which POPs after they have been formed may occur in elevated concentration or quantities. Contaminated sites (soils or sediments) are examples of secondary sources. These include landfills, sewage treatment plants, sludge, and dumpsites.

2.4 Major Sources of POPs in Africa

The main categories of sources identified in the region were production and imports, use of PTS/POPs pesticides, issue of stocks of and reservoirs of obsolete, discarded and banned PTS/POPs pesticides and PCBs (120,000 MT FAO Estimate), industrial sources (manufacture, mining and electricity), PCBs and dioxins/furans from open/uncontrolled burning of waste (Osibanjo 2006).

Up to 50,000 metric tones of disused obsolete pesticides or toxic products are lying unprotected around the Africa continent. The stockpiles are spread across the continent's 53 countries. Contamination from obsolete pesticides is threatening the health of communities throughout Africa. The stockpiles according to a WWF study include some extremely toxic pesticides, which may be up to 40yrs old. Many of these chemicals and their contaminants are in poor conditions and threaten local and regional environments through the contamination of soil, water and air.

2.5 POPs Situation in Nigeria

POPs are not manufactured in Nigeria but imported mostly from developed countries such as France, United Kingdom and Japan. Formulation plants for POPs pesticides, owned by multinational companies, which existed in Lagos, Kaduna and Port Harcourt were shut down in the late 1980s and early 1990s. The Federal Environmental Protection Agency Regulations in 1990 banned the importation of POPs pesticides in response to international concern about POPs and their effects.

Anthropogenic activities in agriculture, industrial manufacturing, waste burning, energy production and use are identifiable sources of POPs release into the environment. POPs pesticides were used for pest control until the 1980s/1990s in food crops and export crops as well as malaria vector control. POPs pesticides are still available for sale in the informal market "under cover''. The Nigerian Federal Ministry of Health indicated that aldrin, dieldrin, chlordane, DDT and endrin are POPs pesticides used for control of arthropods of medical and veterinary

importance and their use was stopped in 2002. The use of DDT continues on a continual basis for malaria control on as needed basis. Data is generally lacking on POPs imports and consumption. Inadequate funding is claimed to be responsible for the low levels of obsolete stocks of POPs as chemicals were consumed as soon as they were purchased.

Potentially POPs-contaminated sites with variable levels of contamination could include but are not limited to manufacturing facilities for POPs chemicals, storage and distribution facilities for POPs and places where POPs chemicals have been used (agricultural lands, electric power stations, etc.). No studies have been undertaken to identify the hazards of these sites to humans and the environment

The Nigerian experience from available research shows that major POPs contamination of air, soil and water arises basically from the use of pesticides. Over 95% of all pesticides are imported as finished pre-packed products. Pesticides use in Nigeria includes certain chemicals that for environmental reasons have been partially or completely banned in developed countries. However such chemicals continue to find their way into Nigeria for pest control mainly through illegal traffic.

The most commonly used pesticide is Lindane (Gamma BHC) on Kola-nuts (*cola nitida*) for protection against kola-nut weevils (*Balanogastris Kolae*). It is also widely used by fishermen to kill fish for commercial purposes in Nigeria. Fenthion (an organophosphate insecticide) is an effective avicide and is used mostly in northern part of Nigeria against bird pest. DDT and Gammalin-20 (1,2,3,4,5,6-hexachlorocyclohexane), a rodenticide that has been outlawed, are both still illegally used in some parts of Nigeria.

Until recently, the adverse effects of pesticides and their residues on non-target organisms have not been seriously considered in Nigeria. For example information on lethal limits of pesticide on Nigeria fish or food crops scarcely exists. (Ezemonye and Ilechie are currently, (April 2006) working on a battery of biomalces and Atrazine toxicity to amphibian tadpoles; Ezemonye and Ohofosa are working on site-specific Gammalin 20 bioaccumulation in fish from Niger Delta waters). PCBs have also been identified in the waters sediments and fish in Niger Delta water namely Ethiope, Benin, and Warri Rivers (Ezemonye 2005). This environmental alarm calls for regular monitoring of the water bodies. Earlier studies by Osibanjo and Bamgbose (1990) revealed the presence of PCBs in the Nigerian Environment. Risk associated with drinking PCBs contaminated surface and underground water supplies were highlighted.

Some experts have reported traces of PCBs at the massive Oshodi-Oworonshoki expressway dumpsite and Adeniji Adele areas of Lagos. Akingbade in his book "Nigeria, on the Trail of Environment" has reported uncommon ailments associated with PCB contamination to include:

- lack of brain coverage in children
- microcephaly (cases of small brains)
- macrocephaly (cases of extra large brain)
- congenital heat disease
- blocked anus in children
- urogenital disorder.

2.6 Description of Study Area

2.6.1 History

Lagos State Nigeria was created on May 27, 1967 by virtue of the State (Creation and Transitional Provision) Decree No 14 of 1967, which restructured Nigeria's Federation into 12 states. Prior to this, the Federal Government through the Federal Ministry of Lagos Affairs as the regional authority administered Lagos Municipality, while the Lagos City Council (LCC) governed the City of Lagos. Similarly, the Western Region administered the metropolitan areas (Colony Province) of Ikeja, Agege, Mushin, Ikorodu, Epe and Badagry.

With the creation of the Federal Capital Territory of Abuja in 1976, Lagos ceased to be the capital of the State, which was moved to Ikeja. Equally, with the formal relocation of the seat of the Federal Government to Abuja on 12th December 1991, Lagos ceased to be Nigeria's political capital. Nevertheless, Lagos remains the nation's economic and commercial capital. According to extant political records, "Lagos is to the people of Nigeria, what the head is to the body of an individual."

2.6.2 Geographical Location and Size

Lagos city in south western Nigeria is located on the Bight of Benin (an arm of the Atlantic Ocean). Lagos is Nigeria's largest city, chief port, and principal economic and commercial center of the Nigerian State. It is located in the south western corner of the country and borders Ogun State in the north and east, the Republic of Benin in the west, and the Atlantic Ocean in the south. The metropolitan area of Lagos, one of Africa's largest, is located in the state. It is however the smallest State in Nigeria in terms of geographical spread; it occupies an area of 3,577 sq km., 22% or 787sq. km of which consists of lagoons and creeks

Lagos State is divided into multiple local government areas, with Ọjọ being the largest, followed by Musiṇ, Osọdi/Isọlọ, Mainland and Surulere. On the whole there are twenty (20) Local Government Areas (LGAs) in Lagos State with the capital being Ikeja.

2.6.3 Industrial Development and Potentials

Lagos State has always led other States of Nigeria in industrial production. Being a major subset of industrial enterprises in Nigeria, the assemblage of manufacturing establishments in Lagos State features such characteristics as structural imbalance, sluggish investment in recent years, and dominance of consumer goods over capital and intermediate goods production, high proportions of imported inputs and low capacity utilization. Further mirroring the national pattern, the spatial distribution of industrial activities among the component LGAs in the State is highly uneven.

Lagos is Nigeria's leading port, particularly for imports of consumer goods, foodstuffs, motor vehicles, machinery, and industrial raw materials. Its export trade in timber and agricultural products such as cocoa and groundnuts has declined since the early 1970's. More than half of Nigeria's industrial capacity is located in Lagos's mainland suburbs, particularly in the Ikeja industrial estate. A

wide range of manufactures are produced in the city, including machinery, motor vehicles, electronic equipment, chemicals, beer, processed food, and textiles.

3 Methodology

3.1 Introduction

The project involved the use of different, but complementary data collection methods. These are: desktop study, questionnaire administration, physical (site) inspection, photo documentation (pictorial illustration), focus group discussion, consultation, stakeholders' sensitization workshop. These methods are briefly described in this section of the report.

3.2 Desktop Study

Existing data on the POPs contamination status of Nigeria with specific emphasis on Lagos State was obtained from related literature and previous works from different sources.

3.3 Consultations

Primary focus was on gathering existing data on awareness status, inventory, and sources of POPs in Lagos State, Nigeria. This was done by means of consultations with different units of the Federal Ministry of Environment, Lagos State Ministry of Environment, African Regional Center for Basel Convention in Nigeria, and UNIDO - Nigeria, among other relevant organisations.

3.4 Questionnaire Administration

The questionnaire data were important in obtaining the perception and awareness status of POPs and compatibility to international intervention programmes. The questionnaire sorts information from respondents (individual and corporate) on levels of awareness, sources of POPs, perceived POPs hotspots, health impacts, contaminated sites and control measures.

Three structured questionnaire types were designed to target information from the three main identified classes of respondents as it relates to POPs issues in Lagos State.

The *Type A Questionnaire* was designed for relevant public authorities and their officers. It was basically to examine their awareness status on POPs contamination in Lagos State and to provide useful information that could aid the identification of such sites.

The Type B Questionnaire was designed for another class of referral respondents made up of major stakeholders (corporate and individual) that engage in activities that relate to the distribution, use and discharge of POPs and POPs products.

The Type C Questionnaire was designed to investigate the awareness level of the general members of the public – students, market women, professionals, representing the different socio-economic strata. The questionnaires were distributed among different respondents, reflecting urban-rural differential, chorological stratification, sex variation, and educational background.

The questionnaires were administered on a minimum of one thousand respondents. In order to obtain representative samples, only POPs hotspots enumeration areas were selected in the Local Government Areas. A minimum of fifty (50) respondents was interviewed in each enumeration area.

3.5 Focus Group Discussion

For a successful study it was imperative to have an in-depth knowledge about the various levels of awareness of POPs among the urban and rural communities within the catchments area. The perception of the community leaders, men, women, employers, entrepreneur, corporate, government and private organized sector were studied. The focus group discussion provided the background information on the people's perceptions of POPs hotspots, environmental impact, health hazards and control measures.

3.6 Site Visits -Physical Inspection

Visits were scheduled to suspected POPs-contaminated sites for physical inspection. By this, there was interaction with some of the identified POPs contaminated sites to ascertain the status. The sites visited included landfill sites, open dumpsites, abattoir sites, chemical dealers/marketers shops, sawmills, industrial layouts etc.

3.7 Photo-Documentation (Pictorial Illustration)

Photo shots of relevant sites were taken during the site visits for pictorial illustration. Some of the photo shots are presented in the next section.

3.8 Sensitization Workshop

A media/stakeholders' sensitization workshop was held on February 28, 2006 to provide an interactive forum between the project team and other stakeholders on POPs issues. The workshop had participants from different segments of the society including the media (both print and electronic), public institutions, private practitioners, civil society members, students, etc. A detailed report of the workshop events is presented in the next section.

4 Result Presentation and Workshop Report

4.1 POPs awareness Status in Lagos State

As presented in the previous section, preliminary POPs awareness status was conducted in Lagos State as a pilot programme for POPs inventory mapping and status update. A structured questionnaire method was employed to randomly cover the sampling regime (Lagos metropolis). The sample size was limited to one thousand (1000) respondents.

Out of the total number of respondents, only 18.4% have heard of POPs (as chemicals used for fishing, crop protection and pest destruction). Of the entire number sampled only 6.4% know that their sources are man made. About 6.4% know that they persist in their environment i.e. their effects last for a long time and that they degrade very slowly. Also 4.8% believe that they accumulate over time in animals and humans. Accordingly 12% have heard and read that they cause injury and defects. The implication of the observation is that the awareness status of most of the people interviewed is low and a massive awareness and enlightenment programme is imperative.

4.2 Identified Major POPs Sources in Lagos State

The survey showed that the under listed are possible POPs sources in the Lagos metropolis.

Agriculture (plantation): - use of pesticides, forest fires, sawmills, abattoir, and sewage pesticide stockpiles.

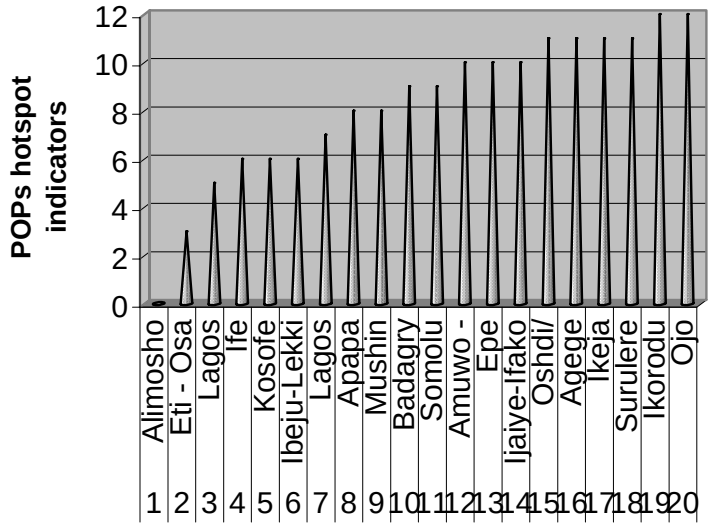
Energy Production: Electrical power station (PHCN), energy production, and fossil fuel production.

Municipal Solid Waste: Dump sites, municipal solid waste, automobile workshops.

Atmospheric Emission: Industrial, vehicular, open burning, bush burning, medical waste incineration, municipal solid waste incineration.

Manufacturing: Industrial chemicals, mining, textile, paper, chemical stockpiles.

Fig. 4.1: Representation of POPs Hotspots in Lagos State



From the above figures, POPs hotspots in the local government areas identified are namely: **Ojo, Ikorodu, Ikeja, Oshodi/Isolo, Surulere, Ikeja, Agege, Amuwo-Odofrin, Ijaju-Lekki, Somolu, Badagry, Apapa, Mushin, Epe and Lagoon.**

Specifically, the following areas were identified as contaminated sites based on sixteen POPs hotspot indicators namely, Ojo, Ikorodu, Ikeja, Oshodi, Isolo, Surulere, Epe, Ifako, Ojota, Iddo, Lagoon and Odofin. These areas had 10-12 of the sixteen (16) POPs hotspot indicators (see matrix below).

4.3 Identified Health Hazards of POPs in Lagos State

Available literature, hospital records and information from this study showed that POPs-related diseases such as the under listed are likely to occur in Lagos State if POPs hotspots are not eliminated.

- Cancer
- Disabilities
- Discomfort
- Cough
- Bacterial infection
- Damage to liver
- Birth deformation
- Lung infection
- Impotency
- Brain deformity
- Diarrhea
- Death
- Skin infection
- Nervous system disorder
- Kidney problems
- Heart diseases
- Catarrh
- Irritation respiratory tract
- Irritation to the eye
- Headache and dizziness
- Shortens life span
- Loss of memory
- Liver cirrhosis

4.4 Identified POPs Control Measures in Lagos

Respondents also proposed the following control measures

- Proper regulations
- Education
- Awareness campaign
- Regulate the use of pesticides
- Seminars
- Workshops
- Monitoring of industrial activities
- Ban of POPs
- Media campaign
- Improved agriculture
- Use of other substitutes
- Alternative technology
- Enlightenment
- Encouraging environment friendly products
- Proper disposal of containers
- Stop refuse burning
- Scientific method
- Recycling of POPs substances
- Investment

POPs contamination in Lagos was rated high and **industrial chemicals** were considered to be the predominant type. The locations in Lagos State where respondents think POPs concentrations are highest have been reported in this study. It was considered to be on the increase in the last five (5) years. Industrial activities and open waste burning were believed to contribute most to POPs contamination in Lagos. The likely reasons for the increasing POPs contamination in Lagos State are presented below:

- establishment and increase of industries and industrial activities without consideration of sound technologies
- nonchalant attitude towards industrial hygiene
- continuous use of POP chemicals in manufacturing
- excess waste production
- inadequate/unsound refuse disposal
- indiscriminate release of used oil in water bodies
- increase in population hence human activities.

POPs contamination in Lagos can effectively be managed or controlled through the following strategies.

- Awareness campaign
- Monitoring of industrial activities
- Legislation review
- Policies review
- Law enforcement
- Reduced use of POPs-derived products
- Alternative technologies
- Use of alternative chemicals in power production
- Practicing IPM and organic farming
- Environmentally sound waste treatment
- Penalty for contravention
- Allocation of funds to obtain cleaner technology facilities
- Training environmental personnel
- Effective and environmentally friendly effluent disposal method

Some of the respondents engaged in activities that produce POPs such as PVC production, manufacture and use of pesticides and incineration of wastes. These products are usually stored in warehouses and stores while obsolete ones are stockpiled. Usage is normally through manufacturer instructions and informal guide. Disposal of POPs containing waste are usually through open dumping, open burning, rivers/ocean dumping, landfill and incineration.

Table 4.1: Identified Major POPs Sources in Lagos State

STATE: LAGOS	POPs HOTSPOTS INDICATORS															
Local Government Area	Agriculture				Energy Production		Municipal solid Waste			Atmospheric Emission				Manufacturing		
	Agriculture (Plantation)	Forest Fires	Sawmills	Abattoir	Energy Power Station (PHCN)	Energy Production	Dump Sites	MS Waste	Automobile Workshop	Industrial	Vehicular	Open Burning	MSW Incinerator	Industrial Chemical	Mining, Textile Paper	Chemicals Stock Pile
1. Agege	X	X	X	X	X		X	X	X	X	X	X				
2. Ajeromi / Ifelodun					X		X	X	X		X	X				
3. Alimosho																
4. Amuwo - Odofin			X	X			X	X	X	X	X	X		X	X	
5. Apapa					X		X	X	X	X	X	X		X		
6. Badagry	X	X		X	X		X	X	X		X	X				
7. Eti– Osa								X	X		X					
8. Epe	X	X	X	X	X		X	X	X		X	X				
9. Ibeju –Lekki	X	X			X			X	X		X					
10. Ijaiye – Ifako	X	X	X	X	X		X	X	X		X	X				
11. Ikeja					X		X	X	X	X	X	X	X	X	X	X
12. Ikorodu	X	X	X	X	X	X	X	X	X	X	X	X			X	
13. Kosofe				X			X	X	X		X	X				
14. Lagos (Mainland			X				X	X	X		X	X				X
15. Lagos (Island)					X		X	X			X	X				
16. Mushin				X	X		X	X	X	X	X	X				
17. Ojo	X	X	X	X	X		X	X	X	X	X	X		X		
18. Oshodi / Isolo				X	X		X	X	X	X	X	X		X	X	X
19 Somolu			X	X	X		X	X	X		X	X	X			
20. Surulere			X	X	X		X	X	X	X	X	X		X	X	

4.5 Report of Sensitization Workshop

The workshop was held on Tuesday February 28, 2006

Venue of the workshop: Was held at the Main Hall, Chevron Quarters, Gbagada, Lagos.

Participation: Over one hundred participants drawn from the public, private and civil society sectors attended the workshop. The participation groups list included the following:

1. Representatives of the Federal Ministry of Environment
2. Representatives of the Lagos State Environmental Protection Agency
3. Representatives of the National Maritime Authority (NMA)
4. Representatives of Power Holding Company of Nigeria (PHCN)
5. Members of the Nigerian Environmental Society (NES)
6. Representatives of Friends Of The Environment (FOTE)
7. Environmental Management Consultants
8. Secondary school students (Members of NES Environmental Protection and Awareness Club – EPAC)
9. Representatives of the Media both print and electronic
10. Other members of the public.

Workshop Events

The main events at the workshop included technical presentations which had the themes:

- Introduction and General Overview of the *Dirty Dozens* and NES/IPEP Project module
- Global and National POPs Situation - Efforts and Challenges
- Assessment and Selection of Low Cost Environmentally Sound Technologies for POPs Sites Remediation in Nigeria
- Identification (inventory) and Control of POPs-contaminated sites (Hotspots) in Lagos (POPs Justification for Restriction or Outright Ban in Nigeria).

"There was a technical interactive/ discussion session, which was also attended by the media houses, most of which were present to give the workshop a wider coverage".

Goodwill messages were also sent in by local and international organizations such as International POPs Elimination Project (IPEP) Hub for the Anglophone Africa (AGENDA Tanzania); Pesticides Action Network (PAN) UK; and the Friends Of The Environment (FOTE).

Highlights of the Workshop Papers

Four main papers were presented at the workshop. The titles, presenters and highlights are presented below:

1. **NES – IPEP PROJECT MODULE** (Appendix VII) by Ane Leslie Adogame, presented an overview of the NES involvement in IPEP project, as a participating organization (PO) of the IPEN. The presentation highlighted the scope of the NES POPs project module (*Identification and Control of POPs contaminated sites (hotspots) in Lagos, South western, Nigeria), the aims/objectives of the project.*

2. **Global and National POPs Situation – Efforts and Challenges** (Appendix V) by Prof. Oladele Osibanjo Director, Basel Convention Regional Coordinating Centre for Africa for Training and Technology Transfer, FMENV-U.I Linkage Centre for Cleaner Production Technology and Hazardous Waste Management, University of Ibadan.

The paper was specifically on the following:

1. a general background to the origin of the POPs problem and global response
2. a definition of what POPs are
3. description of the characteristics of POPs
4. identification of sources of POPs
5. the environmental and health impacts of POPs
6. the environmental levels – nationally and globally
7. the efforts and challenges.

The paper had sufficient pictorial illustrations especially on the sources and the health implications of POPs contamination. The audience, part of which was hearing about POPs for the very first time, was well educated on POPs and POPs related impacts.

3. **Identification and Control of POPs contaminated Sites (Hotspots) in Lagos, South western Nigeria** (Appendix IV) by Dr. Lawrence Ezenmoye, The Project Expert. The paper was mainly to present the fieldwork report to the stakeholders for their awareness and contribution. The paper therefore focused mainly on the project methodologies and results as also presented in this report.

4. Remediation Technologies for POPs Contaminated Sites (Appendix V). The paper was presented by Prof Babajide ALO, FNES, FIPAN, FCSN, Professor of Chemistry & Director, FMENV/University of Lagos Linkage Centre for Environmental Human Resources Development, Nigeria. It focused on the different remediation methods applicable for the remediation of POPs contaminated sites. The paper thus touched on issues as:

- ✓ general introduction to remediation technologies
- ✓ framework for remediation selection
- ✓ contaminated land remediation technologies
- ✓ POPs-contaminated land remediation technologies.

With this paper, most of the participants certainly got more awareness and understanding of the POPs and remediation measures that will guide them in their future undertakings.

5 Conclusions and Recommendations

5.1 Conclusion

Environmentally sound management of hazardous wastes including POPs requires taking all practicable steps that will ensure that human health and the environment are protected against their adverse effects. The unique environmental and health implications of POPs make cross-cutting strategies and efforts inevitable for the prevention, control and mitigation of POPs contamination. The Nigerian Environmental Society participated in the IPEP, an international effort on POPs elimination. Part of the priority issues on POPs that have been brought to the fore are:

1. the existence of POPs pesticide stocks in the country that need immediate action;
2. the abuse and misuse of agrochemicals including POPs which is rampant due to inadequate legislative control, safety guidelines and public information on awareness of the harmful effect of these substances;
3. the continual contamination and pollution facing the Nigerian Coastal and Marine environment from pesticides run-offs with resultant fish kills and human diseases and deaths;
4. the cases of off-label use involving illegal importation of banned, adulterated and obsolete pesticides into the country;
5. the inadequate technical and financial capacity to determine/identify sources and location of illegal and adulterated stocks in the country. Large stocks of these POPs pesticides are sold at cheap prices compared to officially imported chemicals.

This project has also clearly identified the fact that POPs contaminated sites or potentially contaminated sites abound in Lagos State, Nigeria as in many other parts of the world. In addition to the enough threat that this group of organic pollutants poses, the level of awareness is low about POPs and POPs issues, even among the supposedly major stakeholders.

The outcome of this project is expected to provide necessary information for the Nigerian National Implementation Plan (NIP) on POPs in line with the Stockholm Convention. The NIP shall address several issues including the need to:

1. have waste minimization / recovery / recycling procedures;
2. have an appropriate operational monitoring and reporting programme;
3. have an operational inspection and recording programme for all input and output materials (life-cycle monitoring);
4. have appropriate in-house record keeping;
5. have an appropriate and verified emergency plan;
6. have an appropriate and operative training programme for its personnel; and
7. have an adequate financial guarantee for emergency situations and closure.

5.2 Recommendations

The findings from this preliminary investigation of inventory of POPs hotspots in Lagos State have necessitated the following recommendations:

1. **Need for intensive** sensitization of the populace as regards the sources, spread and health hazards associated with POPs;
2. **The introduction** of new and sound technologies to replace the old combustion technologies currently being uses in most establishments;
3. **A sound** waste management system for the entire metropolis, that will take cognizance of effective collection and disposal processes;
4. **Avoidance** of open burning of waste as a way to reduce POPs releases from primary sources;
5. **Legislative provision** and enforcement regime for a proper management of POPs containing waste;
6. **An** out-right ban of the use of pesticides and chemicals listed among the **dirty dozen**;
7. **An integrated** approach that includes multi-stakeholder and inter-governmental cooperation as a measure in the elimination of POPs hotspot in Lagos State;
8. **Development of an environmental** monitoring programme on POPs focusing on critical matrixes (soil and sediments), and Continuous monitoring and evaluation of contaminated sites.
9. **Auditing** of the quality of sewage sludge and waste waters to be regularly conducted;
10. **Regular** monitoring of atmospheric quality in industrial areas and dumpsite to be carried out;
11. **Toxicological** studies to determine the ecological and public health hazards in designated hot spot areas;
12. **Monitoring** that focuses on concentration of POPs in foodstuff and in particular fish, and concentration in humans resulting from exposure to be measured in breast milk and in blood; and
13. **Devote greater** resources to supervising and advisory initiatives.

Proposal for Future Work

NES considers the most important aim for subsequent work in this area is to obtain a better database as the basis for determining the scale of the problem and their component elements. There is a need to obtain a measurement base data and develop models that will furnish more information about emissions, transport, retention, degradation and delineation of POPs-contaminated sites in Nigeria as whole.

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APPENDICES

APPENDIX I: Sample Catchment Areas

CAPL -Ikeja Industrial Estate
Lagos State Waste Management Authority (LAWMA) -Ikeja
Lagos State Environmental Protection Agency (LASEPA)
Nigeria Maritime Authority (NMA)
Domestic Detergent Manufacturer
Power Holding Company Nigeria (PHCN)- Opebi, Lagos
Distributor / Marketers PVC/ Plumbing Materials- Ejigbo & Jakande Rd
Lagos State Ministry of Environment
Private Sector Operators (PSP)- Ikeja Industrial Estate
Pesticides/Insecticide Manufacturers
Shifa Plastics- Ejigbo
Paint /Plastic (PVC) Manufacturer (Banex Nig. Ltd) Isolo Industrial Estate
KGM Plastic Industry- Isolo
Niger/Germ Chemicals
Hire Chemical Complex Marketers
Pesticide Fumigation Company- Isolo
Auto Mobile Worship- Isolo
Lawma- Olusosun
Domestic Detergent Manufacturer
Poultry Farm – Ikotu Lagos Poultry Farm – Ejigbo
PHCN- Central Workshop – Oshodi
PVC Importers
Kelwarams Nig Ltd (Auto Tyres Workshop- Isolo Industrial Estate
Pesticide Manufacturer Industrial Gongoni Nig. Ltd Ikeja Industrial Estate
Fumigation Company –Klean Pest Control International- Isolo
Farm Settlement Odogunyan, Ikodoru, Lagos State.
National Agency For Food, Drugs Administration Commission(Nafdac) Lagos
PHCN Gbagada

APPENDIX II: Plates

Plate 1: Gas flaring and bush burning
(Courtesy: Osibanjo 2006)

Plate 2: Electrical Energy distribution installation at Maryland, Ikeja
(Such installations are distributed across Lagos State)

Plate 3: Olusoshun Waste Dump
A scavengers' colony where open burning is practiced continuously

Plate 4: A POP-chemical store at Ojota, Lagos

Plate 5: An Abattoir where burning of tyres is prevalent
Such sites are available all through Lagos
(Courtesy: Osibanjo, 2006)

Plate 6: Participants at the workshop

APPENDIX III: Goodwill Messages

THE INTERNATIONAL POPs ELIMINATION PROJECT (IPEP) NES AWARENESS-RAISING WORKSHOP 28 FEBRUARY 2006

GOODWILL MESSAGE FROM THE IPEP ANGLOPHONE AFRICA HUB – AGENDA

It's my pleasure to pass my message to you at the very important workshop you are organizing to raise public awareness and get them involved in the elimination of persistent organic pollutants (POPs) and their by-products hence their effects to human health and the environment.

The Stockholm Convention was adopted in May 2001, its objective is to protect human health and the environment from POPs in reference to the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development. This Convention entered into force in May 2004, hence parties required to implement the treaty to achieve its objective.

The Parties are required to develop, transmit, review and update the National Implementation Plan (NIP) to eliminate POPs (Article 7). Where appropriate, the parties shall cooperate directly or through global, regional and subregional organizations, and consult their national stakeholders to facilitate the development, implementation and updating of their NIP.

Article 10 is about public information, awareness and education. Each Party shall, within its capabilities, promote and facilitate awareness among its policy and decision makers with regard to POPs; provision to the public of all available information on POPs; development and implementation, especially for women, children and the least educated, of educational and public awareness programmes on POPs, as well as on their health and environmental effects and on their alternatives;

The article insists on public participation in addressing POPs and their health and environmental effects and in developing adequate responses, including opportunities for providing input at the national level regarding implementation of the Convention. Other important issues are development and implementation and exchange of training, educational and public awareness materials at the national and international levels.

It is within this context that the International POPs Elimination Project (IPEP) was established by the International Elimination Network (IPEN[i]) as a means to address its mission that is to *facilitate effective involvement by its Participating Organizations in local, national and international activities to promote the elimination of POPs and other persistent toxic substances.* IPEN is a global network comprises of more than 400 public health, environmental,

[i] IPEN: www.ipen.org

consumer, and other non-governmental organisations in more than 70 countries.

It was envisaged that IPEN Participating Organizations and allied groups could play an important role in building national support for the Stockholm Convention and its effective national implementation.

The IPEP as a global NGO project began on May 1, 2004, 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 supports preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities supported by IPEP are participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

IPEP Coordination

The Project is coordinated in eight regions by organizations selected as Regional Hubs working in five of the six UN languages (Arabic, English, French, Russian and Spanish). The regions hubs are: Latin America (working in Spanish), Francophone Africa (working in French), Anglophone Africa (working in English), Middle East (working in Arabic), Central Europe (working in English), Eastern Europe and NIS countries (working in Russian), South Asia (working in English) and Southeast and East Asia and the Pacific (working in English). Each hub is coordinating NGOs working on chemical safety issues within its country and at least four other countries in its region. AGENDA for Environment and Responsible Development (AGENDA)[ii] coordinates the Anglophone Africa Hub. The Global Coordination is done by the Environmental Health Fund (EHF) based in the USA.

[ii] AGENDA – Tanzania Bureau of Standards (TBS) Complex, Ubungo, P.O. Box 77266 Dar es Salaam, TANZANIA Tel: +255 22 2450 213, Fax: +255 22 2450 836, E-mail: agenda@bol.co.tz , Web: www.agenda-tz.org

The roles of the Regional Hub are among others:

- ✧ To identify NGOs in the respective regions that have interest and ability to work on the IPEP activities at various levels in the selected countries;
- ✧ To work with individual selected NGOs and prepare Project Activity Memorandum (PAM) that describes the IPEP activity the NGO is interested to work on, including well identified outputs, indicators, deadline and payment schedule, advice in the execution of project activities and preparation of the reports;
- ✧ To prepare the regional reports on the project findings;
- ✧ To facilitate communications between NGOs in the region and disseminate relevant information to stakeholders and the public.

Project Management and Structure

There are three levels of the project management, UN agencies, Global Project Management and Regional Hubs.

The UN agencies include UNEP and UNIDO. UNEP (in Nairobi) is the Project Implementing Agency with final responsibility for project oversight, monitoring and evaluation. UNIDO (in Vienna) has a closer management relationship to the project. UNIDO holds the IPEP GEF funds, and disburses money to various NGOs around the world who are working on the project activities.

The Environmental Health Fund (EHF) has a lead responsibility for global aspects of Project Management. As Executing Agency, EHF is legally responsible to UNEP and UNIDO for successful project execution in conformity with the terms of the approved Project Brief. At the same time, EHF remains politically responsible to IPEN Steering Committee in its execution of IPEP Global management functions. The main roles of EHF in Global Project Management are:

- to coordinate the work of the Regional Hubs;
- to assure the Hubs, the Expert Teams, the Project website and other elements of the IPEP are functioning and performing properly;
- to coordinate with other NGOs who have been funded to provide IPEP co-financed project services or support;
- to assure IPEN Steering Committee oversight and involvement in the project; and
- to manage project interface with UNIDO and UNEP.

Project Reports

IPEP supports preparation of reports on:

- **Country Situation Reports** which describe the POPs situation in the country, including some information about known levels of POPs and

measures planned or underway to address them. The reports will be aimed at NGOs, academics, and others with a public policy interest.

- **Hotspot Reports** identifies specific POPs-related problems in a country with the intent of raising both public and government awareness. They may include reports on one or more POPs contaminated sites within a country, a country specific pattern of activities or practices that release POPs into the environment, or an existing or proposed facility that could be a significant source of POPs releases. They will also make initial recommendations on how to address the problem. The reports will target public audiences, but will also provide a framework for NGO involvement in government processes.

- **Policy Brief Reports** identify a specific POPs-related issue of importance in the country, and propose public policies and other solutions. Some possible topics that may be addressed are: approaches to effective malaria vector control that avoid DDT; strategies for national POPs stockpile cleanups and destruction; non-POPs strategies for crop protection and/or termite control; strategies to end illegal trade in POPs; national application of Best Available Techniques to eliminate sources of by-product POPs; proposals for national approaches for identifying and controlling PCBs in use and in wastes; community monitoring or other strategies to identify POPs exposures, etc.

- **Regional Reports** summarizes POPs information in the region based on information contained in the Country Situation Reports, POPs Hotspot Reports, POPs Policy Briefs prepared by NGOs in the region; and may also include other available POPs-related regional information.

The project focus on the current list of 12 POPs as identified by the Stockholm Convention (aldrin, chlordane, DDT, dieldrin, dioxins, endrin, furans, heptachlor, hexachlorobenzene (HCB), mirex, polychlorinated biphenyls (PCBs) and toxaphene, as well as the list of newly proposed POPs.

In the effort to identify new POPs, several substances widely used and known to have POPs characteristics which are now being nominated for early consideration by the POPs Review Committee (POPRC) to be listed in addition to the first 12 are: Chlordecone, Lindane, Pentabromodiphenyl ether (a brominated flame retardant), Hexabromobiphenyl (a brominated flame retardant), and perfluorooctansulfonate (PFOS).

The Anglophone Africa countries participating in the IPEP are the Gambia, Ghana, Kenya, Nigeria, South Africa, Tanzania and Uganda.

The NGOs participating in Nigeria are Friends Of The Environment (FOTE), Nigerian Environmental Society (NES) and Nigerian Environmental Study/Action Team (NEST). There are four on going projects as follows:

1. Stakeholders' Reflection on the Nigerian POPs Situation – FOTE
2. Assessment of the Lagos Lagoon for POPs Sources, Types and Impacts – FOTE
3. Identification and Control of POPs Contaminated Sites in Lagos, South Western Nigeria – NES
4. Awareness Raising on Socio-economic Effects of POPs in Nigeria - NEST

Given the importance of different stakeholders' involvement in the implementation of the Convention and in the achievement of sound chemicals management, we encourage and wish for best collaboration of the government, private sector, civil society and others. Since POPs travel long distances and affect even the areas where they have never been used and their persistence that affect different generations; commitment among governments and other stakeholders in all countries are inevitable. This project has initiated NGOs collaboration in individual countries, regions and globally and call for further collaboration of wider stakeholders to achieve the objective of the Stockholm Convention.

We call upon all participants in the workshop to cooperate as the deliberations would be important input to the implementation of the Convention in Nigeria and elsewhere. Successful process can be initiated by an individual, therefore, your ideas and actual participation is most important.

Best wishes and have a fruitful workshop.

Silvani Mng'anya (Hub Coordinator)

GOODWILL MESSAGE: from PESTICIDE ACTION NETWORK (PAN) UK

Dear participants and collaborators for the NES/IPEP sensitisation workshop on POPs Contaminated sites (Hotspots) in Lagos.

Greetings from the UK!

I am very pleased to have been invited to present a message of support and goodwill at this important meeting. As you will be hearing today, the problem of POPs is a very serious one, since they are among the most dangerous chemicals, and cause enormous health and environmental problems, afflicting the whole of the continent of Africa. The problems associated with POPs are so severe that they are the subject of an international "Stockholm Convention", which aims at a global phase-out of the worst POPs. For years,

PAN UK and PAN Africa have been campaigning to raise awareness about the problem of POPs in obsolete pesticide stockpiles, which have already been identified in inventories of out of date and unwanted pesticides in many African countries.

In 2005, a number of international donors, including the Global Environment Facility (GEF), committed themselves to supporting the removal of obsolete pesticide stockpiles from the whole of Africa. Working with the World Bank, FAO, WWF, and others, PAN UK, PAN Africa and AGENDA for Environment and Development, are participating in the AFRICA STOCKPILES PROGRAMME, which was launched in 2005. Starting in 7 countries, including Nigeria, the ASP will support governments in identifying and removing existing stockpiles, and preventing future toxic pesticide wastes.

NGOs in particular have an important role to play in working with governments, international agencies, journalists and communities, to ensure people are aware of the problem of stockpiles of POPs and other pesticides, and united in action to deal with them. Preventing the same problem in the future is a vital part of the ASP – and this relies on educating and changing the attitudes and behaviour of pesticide users and buyers. PAN and Agenda have already begun to establish contacts with NGOs in Nigeria, to inform them about the programme, and to encourage them to get involved with this important initiative. We hope to increase our collaboration and exchanges with Nigerian organisations and public in 2006. With AGENDA from Tanzania, we will be holding a separate meeting about the problem of obsolete pesticides later on this year – and we hope to see many of the same faces attending and taking an interest in a closely related topic.

We fully support all initiatives like this workshop, which aim to highlight the issue of dangerous chemicals in our lives and in our environments. For too long, uncontrolled use and handling of these chemicals, and in particular pesticides, has meant that poisoning, contamination, and even death accompany any benefits they may have brought. The existence of obsolete pesticides and other POPs wastes is a sobering, and very tangible proof of the failure of all stakeholders to control these lethal substances. We hope that the different initiatives that are being put into place, including the IPEN and ASP projects, will result in a better record than what has been seen in the past. And we are certain that this will not happen without the combined effort and collaboration of a lot of different people and organisations. So thank you to everyone who is present today, and best wishes for any activity that will help rid Nigeria of the scourge of POPs.

APPENDIX IV: POPs Justification for Restriction or Outright Ban in Nigeria

INTERNATIONAL POPS ELIMINATION PROJECT
(IPEP)
NIGERIAN ENVIRONMENTAL SOCIETY (NES)

Theme: Identification and Control of POPs Contaminated sites (Hotspots) in Lagos, South Western Nigeria.

Title: Persistent Organic Pollutant (POPs): Justification for Restriction or Outright Ban in Nigeria

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INTRODUCTION

At the earth summit in Rio de Janerio (1992) government and organizations jointly resolved to confront environmental problems, which are now global in nature. Government and agencies in attendance identified POPs as a specific environmental problem capable of changing human existence (WFPHA 2000). POPs were then selected for a long term strategic planning and action. In 1998, about hundred and three (103) government began negotiations to establish a global legally binding treaty to reduce or eliminate the health and environmental threat posed by POPs, with target completion date of 2000. Today Nigeria and indeed the sub-Saharan Africa are consciously responding to this call, which has provided the impetus for this paper.

WHAT ARE POPs?

POPs are organic carbon-based chemical compounds and mixtures that are highly toxic, persistent in the environment, bio-accumulate in fatty tissues of living organisms, travel long distances in air and water and tend to migrate from warmer to colder region of the world (Oris *et al* 2002, Ezemonye, 2003).

ORIGIN AND OCCURRENCE

POPs are essentially products and by-products of human industry that are relatively recent in origin, with no known natural sources (Ezemonye 2003). Before the mid-twentieth century, pollutants with these harmful characteristics were virtually non-existent. Their origin and actual production is traced to after the World War II. This era witnessed increased production of chemicals and their by-products. POPs defy natural boundaries and when released in one part of the world can travel to remote areas (regions) far from the source.

BASIC FEATURES OF POPs

- POPs are persistent in the environment- they resist degradation through physical, chemical, or biological processes
- POPs generally are semi-volatile – they evaporate relatively slowly. Persistent substances with this property tend to enter the air, travel a long distance on air currents, and then return to earth. The colder the climate the less POPs tend to evaporate, resulting in their accumulation in regions such as the Arctic, thousands of kilometers away from their original sources;
- POPs generally have low water solubility (they do not dissolve readily in water) and high lipid (fat) solubility (they do dissolve easily in fats and oils). Persistent substances with these properties bio-accumulate in fatty tissues of living organisms. In the environment, concentrations of these substances can increase by factors of many thousands or millions as they move up the food chain;
- POPs have the potential to injure humans and other organisms even at the very low concentrations at which they are now found in the environment, wildlife and humans. Some POPs in extraordinarily small

amounts can disrupt normal biological functions, including the activity of natural hormones and other chemical messengers, triggering a cascade of potentially harmful effects (UNO 2002).

TARGET POPs

The Stockholm convention of POPs, in 2001, identified 12POPs, the so-called "Dirty Dozen" for immediate action. The twelve POPs designated as targets for early global action are composed of pesticides (08) industrial chemicals (02) and unintended by-products (02) (Table 1)

Table 1: POP substances presently being negotiated at the global level

Pesticides	Industrial chemicals	Unintended by-products
Aldrin	Hexachlorobenzene	Dioxins
Chlordane	Polychlorinated biphenyls	Furans
DDT		
Dieldrin		
Endrin		
Heptachlor		
Hexachlorobenzene		
Mirex		
Toxaphene		

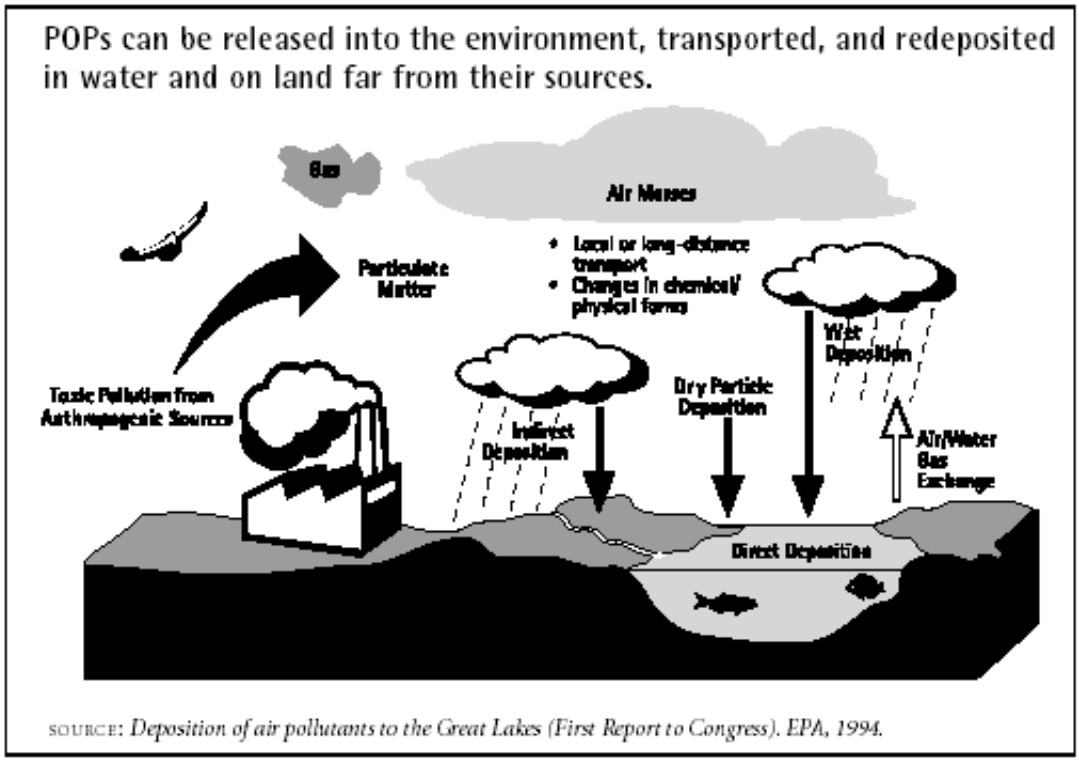
Table 2 History Description and Toxicity of Target POPs, Sources of POPs in the Environment

S/N	NAME	TRADE NAME	TYPE	USES	TARGET	EXPOSURE PATHWAY	IMPACT
1.	Aldrin (1950 – 1970) * metabolizes readily to dieldrin	Aldrex, Aldrec etc	Insecticides	Control of insects, termites, corn root worm, wireworm, rice water weevil, beetle, grasshopper	Corn, banana cotton, potatoes	Eating contaminated food- root crops, fish, diary products and animal meal.	Liver damage in animals, reproductive effect, carcinogenic potential. Neurobehavioral effects.
2.	Chlordane	Aspon, Belt, Niran etc	Broad spectrum insecticides	Control of fire ant, termites, wood destroying insects and non-agricultural product	Soil, lawns, wood products, crops, livestock vegetable, grains, maize oilseed, potatoes, cotton, juice, nuts sugar cane, fruits	Eating products grown on contaminated soil such as root-crops, cereals, citrus food. Contaminated meat, fish, shellfish, shellfish. handing Contaminated soil.	Ecological and human health effects-dizziness headache, weakness, immune system changes.
3.	Dieldrin	Alvity, Uloxol, Dieldrex quintox etc.	Insecticides	Control of agricultural pest, public health disease vectors, (mosquitoes,	Soil and seed treatment mosquitoes, tsetse fly, sheep-dip wood	Diet man sources of exposure (air, soil, fish, birds and animals)	Health and environmental impact

				tsetse fly) vet nary purposes (sheep dip)	treatment moth proofing for molten products.		
4.	Endrin (1950)	Compd 269, Endrex, Isodrin etc	Insecticides	Rodenticides to control mice, roles, and insecticides to control field crop insects.	Field, orchards maize, sugarcane, rice, cereals apples, ornamental plants.	Residues taken in from food	Public health concerns
5.	Heptachlor	Basicalor, Drinox Agroceres etc	Insecticides	Control of crop pests, insects (grasshoppers , termites)	Cotton fields	Residue in crop, soil, fish, diary products, inhalation from homes, drinking contaminated water, dermal contact, breast milk	Human health impact (alteration of hormonal system, damage to nervous system, bird decline, ecological impact.
6	Mirex	GC1283 Dechlorane etc	Insecticides	Control fire ants, leaf cutters, termites, mealy bug, wasps as flame retardant	Pineapple farm, Plastic rubber, Paint, paper Electric goods fire retardants.	Recline in food	Ecological and human impact. (carcinogenic)
7.	Toxaphene (1946 manufactured replaced by DDT in 1960 USA)	Alletx, Attac 6, vertac, etc	Insecticides	Crop insects, insect pests, of livestock and field crops.	Cotton, poultry, soya-bean, sorghum, peanuts etc.	Ingestion of contaminated food, water, dermal contact and inhalation	High risk for manufacturer, farmers pesticides application.
8.	HCB Hexachlorobenzene (introduced 1940) (banned in 1984 in USA)	HCB	Fungicide industrial chemical/ pesticides.	Seed-dressing for cereals crops, preventing fungal disease (industrial process) fluxing agent (manufacture of Aluminum) peptizing agents (rubber for tire production)	Agricultural and industrial media	Consumption of diary products touching contaminated soil, drilling contaminated water, inhalation of contaminated air, breast milk from exposed mothers. By product of waste incineration.	health hazard such as live damage etc
9.	PCBs polychlorinated biphenyls (1930-1970 in USA)	Asbestols Askarel Bakola Chlorophen etc	Industrial Chemical	Closed uses: dielectric fluid open uses: Pesticides extender, sealants, flame retardant, dust control in roads	Transformers, capacitors heat transfer, hydraulic systems, carbonless paper, industrial oil, paints, adhesive plastics, flame.	Exposure and releases of PCBs occur in fire, spills, leakages of closed systems, evaporation and leakages from landfills or PCBs, storage site, incineration of wastes contaminated food.	Carcinogenic wide spectrum of adverse effects in animals and humans. Reproductive toxicity and immune toxicity.
10.	DDT (after world war II) Intentionally produced POPs	DDT	Organic insecticide (Broad Spectrum Pesticides)	Combat insect borne disease (malaria typhus) broad spectrum pesticides to control crop insects	Forest land, ground homes, gardens industrial and commercial purposes	Through lungs gastro intestinal tracts, skin DDT, dust exposure vapour from fumigated field & forest contact with moth proofing products, ingestion of fruit treated with DDT	Damaging effect on human and animals
11 & 12	Dioxin and Furans Dioxin-Polychlorinated dibenzo-p-dioxin (PCDDs)	75 different types of dioxins. 135 different types of furans	Chemical by-products industrial waste by-product (unintentional by-			Waste incinerator (dioxin) -Iron Ore sintering, -Plant, wood preservatives (pentachlorophenol) -Pulps and paper mills	Dioxin carcinogenic increase prevalence of prevalence of diabetes related motility

	Furans – Polychlorinated dibenzo furans (PCDFs)		product)			-Bleaching process with chlorine -PCBs significant sources of furans Enter the body through ingestion, inhalation, -Food contamination 90% source -Fish and other animals 80% of the overall	cardio vascular diseases infant neuro-disorder skin defects hormonal disorder

Source: Ezemonye 2006, (Modified after UN, Draft 2002)



- Petroleum refining catalyst regeneration
- Textiles and tanneries
- Cement kilning
- Wood products preservation
- Chemicals
- Crematoria
- Drum & barrel reclamation facilities
- Paper milling
- Solid mineral mining
- Iron and steel industry
- Pharmaceuticals
- Bleached chemical pulp and paper mills
- Hazardous waste incinerators
- Burning of fossil fuel
- Burning of wood

- Ferrous foundries
- Landfill
- Dump site
- Chemical factories
- Obsolete Chemical stock piles
- Industrial boilers burning hazardous waste
- Kraft black liquor recovery boilers
- Motor vehicles (leaded, unleaded and diesel)
- Primary ferrous metal smelting (sinter and coke)
- Secondary non-ferrous metal smelting (aluminum, copper, lead)
- Primary non-ferrous metal smelting
- Air emission
- Chemical ware houses
- Municipal solid waste incinerators
- Medical waste incinerators
- Power generating facilities (coal and oil)
- Residential oil combustion
- Sewage sludge incineration
- Scrap electric wire recovery
- Tyre combustion
- Wood combustion

Source: UNEP 2002

POPs CONTAMINATION OF THE ENVIRONMENT

Eight of the Stockholm POPs are pesticides that are intentionally released into the environment, through known pathways such as;

- Spray drift
- Evaporation from plants, soil, water
- Treated wood surface
- Surface water runoff

POPS WASTES GENERATORS

POPs wastes may be generated in various ways including:

- During their intentional manufacture;
- During industrial and other processes as unintended wastes or by-products
- During their sales/marketing/utilization by sellers/wholesalers/retailers/ end users;
- During the decommissioning/ removal/ transfer etc, of materials containing POPs
- During their disposal.

Table 3. POTENTIAL PCB WASTE CATEGORIES FOR NATIONAL INVENTORY

Category	Description
Aqueous Waste	Wastes from a variety of sources may be contaminated with PCBs that are associated with suspended matter.
Askarels	A mixture of PCBs and tri-and tetrachlorobenzene. This was the original PCB containing fluid used. It is a clear liquid with a density of approximately 1.5kg/L. PCB content ranges from 40-65%
Concentrated Decontaminated flushing	The first flushing from de-contamination of a transformer or solvent washing of solid PCB waste. PCB content is usually within 1-10%.
Contaminated Mineral Oil	Used in most outdoor transformer applications. Sometimes the new fluid becomes contaminated with residual amounts of PCB not removed by the original decontamination process.
Decontaminated Flushing	Similar to the previous flushing, however PCB content is usually less than 1%.
Dredging spoils	Sediments from streams, urban drains, or marine dredging PCB concentration can be up to thousands of parts per million and may be largely associated with an organic component of the waste.
Large PCB Capacitors	Capacitors that contain more than 0.5kg of PCBs. They range in size from a small book to a tall thin rectangle can be to 1m in height with internal paper and metal foil immersed and thoroughly impregnated with PCBs
Maintenance and Decommissioning Wastes	Similar to industrial waste from maintenance operations, includes small tools, rags, plastics, paper, sorbents and some free liquid (i.e. cleaning solvent contaminated with PCBs)
PCB Transformers, Hydraulic Equipment, Electromagnets, Heat Transfer Equipment, Vapour Diffusion Pumps	Large pieces of electrical/mechanical equipment that could be drained and/or decontaminated or complete units that still contain PCBs and/or PCB contaminated fluids.
Residues	Ash from incinerations, organic sludge from sodium-based oil decontamination processes, or solids from the decontamination of PCB equipment.
Small PCB Capacitors	Capacitors that contain less than 0.5kg of PCBs. They may be associated with electronic or lighting equipment.
Soils	Solid wastes resulting from a spill cleanup and Demolition Spoils
Waste oil	Used lubricating oils or other oils that have become contaminated with PCBs. Sludge may be present
Construction and demolition waste.	Construction and demolition wastes containing PCBs including PCB containing resin floors, glazing nits and capacitors.
Waste from manufacturer formulate supply an us (MFSU) of paint ad	Waste paint, varnish, paint sludge, aqueous sludge containing PCBs; Waste blasting materials containing PCBs;

varnish including blasting abrasive (including European Waste codes 08 01/12 01)	
Municipal waste (including European Waste codes 20 01	Municipal waste including electrical equipment for example fluorescent lamb ballasts containing PCBs

Source: UN draft guidelines on EMS 2002

THE NIGERIA EXPERIENCE

The Nigerian experience from available research shows that major POPs contamination of air, soil and water arises basically from the use of pesticides. Over 95% of all pesticides are imported as finished pre-packed products. Pesticides use in Nigeria includes certain chemicals that for environmental reason have been partially or completely banned in developed countries. However such chemicals continue to find their way into Nigeria for pest control.

The most commonly used pesticide is Lindane (Gamma BHC) on Kola-nuts (*cola nitida*) for protection against kola-nut weevils (*Balanogastris Kolae*). It is also widely use by fishermen to kill fish for commercial purposes in Nigeria.

Fenthion (an organophosphate insecticide) is an effective avicide and is used mostly in northern part of Nigeria against bird pest. DDT and Gammalin 20 a rodenticide that has been outlawed but is still illegally used in some part of Nigeria.

Until recently, the adverse effects of pesticides and their residues on non-target organisms have not been seriously considered in Nigeria. For example information on lethal limits of pesticide on Nigeria fish or food crops scarcely exists. (Ezemonye and Ilechie are currently working on a battery of biomalces and Atrazine toxicity to Amphibian tadpoles; Ezemonye and Ohofosa are working on site-specific Gammalin 20 bioaccumulation in fish from Niger Delta waters).

PCBs have also been identified in the waters sediments and fish in Niger Delta water namely Ethiope, Benin, and Warri Rivers (Ezemonye, 2005). This environmental alarm calls for regular monitoring of the water bodies.

Earlier studies by Osibanjo and Bamgbose (1990) revealed the presence of PCBs in the Nigerian Environment. Risk associated with drinking PCBs contaminates surface and underground water supplies were highlighted.

Some experts have reported traces of PCBs at the massive Oshodi-Oworonshoki expressway dumpsite and Adeniji Adele areas of Lagos.

Akingbade in his book "Nigeria, on the trail of Environment has reported uncommon ailments associated with PCB contamination to include

- Lack of brain coverage in children
- Microcephaly (cases of small brains)
- Macrocephaly (cases of extra large brain)
- Congenital heat disease
- Blocked anus in Children
- Urogenital Disorder

PILOT SCHEME- POPs awareness Status - Lagos State

A preliminary POPs awareness status was conducted in Lagos State as a pilot programme for POPs inventory mapping and status update. Structured questionnaire method was employed to randomly cover the sampling regime (Lagos metropolis). The sample size was limited to five hundred (500) respondents. The catchments area was also limited to referral sites that are representative of possible sources of POPs.

POSSIBLE POPs SOURCES IN LAGOS

The respondents outlined the following as possible POPs sites in Lagos metropolis

- Dump Site
- Canal Dump site
- PHCN Installations
- Chemical Store
- Transformer Oil
- Lagos Lagoon
- Drains
- Industrial area
- Chemical Companies
- Hydraulic train
- Lister Generator Operator
- Electric transformer
- Insecticides / Aerosol
- Textile industries
- Manufacturing company
- Ink Solvents
- Residential Areas
- Homes
- Water Bodies
- Every where
- Atmosphere

HEALTH HAZARDS

Respondents believe POPs can cause the follow health problem.

- Cancer
- Death
- Disabilities
- Discomfort
- Cough
- Bacterial infection
- Damage to liver
- Birth deformation
- Lung infection
- Impotency
- Brain deformity
- Diarrhea
- Electric transformer
- Skin infection
- Nervous system disorder
- Kidney problems
- Heart diseases
- Catarrh
- Irritation respiratory tract
- Irritation to the eye
- Headache & dizziness
- Shortens life span
- Loss of memory
- Liver cirrhosis

CONTROL OF POPs IN LAGOS

Respondents also proposed the following control measures

- Proper regulations
- Education
- Awareness campaign
- Regulate the use of pesticides
- Seminar
- Workshop
- Monitoring of Industrial activities
- Ban
- Media Campaign
- Improved Agriculture
- Use of other substitutes
- Alternative technology
- Enlightenment
- Encouraging environmentally friendly products
- Proper disposal of containers
- Stop refuse burning
- Scientific method
- Recycling of POPs substances
- investment

POPs contamination in Lagos was rated high and **industrial chemicals** were considered to be the predominant type. Locations in Lagos were respondents think POPs concentrations are highest are listed below. It was considered to be on the increase in the last five (05) years. Industrial activities are believed to contribute most to POPs contamination in Lagos.

POSSIBLE POPs CONTAMINATED SITES

- Iddo water way
- Ikeja Area
- Landfills
- Mushin
- Oshodi
- Apapa
- Ikorodu
- Industrial areas
- Dump sites
- Densely populated areas
- Ijora

The reasons for the increasing POPs contamination in Lagos as listed by respondents are presented below.

- Increase in industrial activities
- Nonchalant attitude towards industrial hygiene
- Continuous use of POP in manufacturing
- Still used as refrigerant
- Excess waste production
- Inadequate refuse disposal
- Establishment of more industries
- Indiscriminate release of used oil in water bodies
- Population of water bodies
- Increase in population

POPs contamination in Lagos can effective be management or control through the following strategy

- Awareness campaign
- Monitoring of industrial activities
- Legislation
- Law enforcement
- Reduce use of POPs-derived product
- Alternative technology
- Use of alternative chemical
- Waste treatment
- Penalty for contravention
- Ban on chemical fertilizer
- Allocation of funds to obtain facilities
- Training environmental personnel
- Effective effluent disposal method

Most of the respondents engage in activities that produce POPs such as PVC production and sales, manufacture and use of pesticides and incineration of wastes. These products are usually stored in warehouses and stores while obsolete ones are stockpiles. Usage is normally through manufacturer instructions and informal guide. Disposal of POPs containing waste are usually through open dumping, open burning, rivers/ocean dumping, landfill and incineration.

ENVIRONMENTALLY SOUND MANAGEMENT (ESM) PRINCIPLES

"Environmentally sound management of hazardous wastes or other wastes" means taking all practicable steps to ensure that hazardous wastes are managed in manner, which will protect human health and the environment against the adverse effects, which may result from such wastes.

The core performance elements from ESM are those that are applicable to all evaluation, dismantling, refurbishment, pre-treatment, treatment and disposal of wastes. They require that each destruction and/or management facility should:

- Adequate regulatory infrastructure and enforcement to ensure compliance with applicable regulations;
- Have waste minimization / recovery / recycling procedures;
- Have an appropriate operational monitoring and reporting programme;
- Have an operational inspection and recording programme for all input and output materials (life-cycle monitoring);
- Have appropriate in-house record keeping;
- Have an appropriate and verified emergency plan;
- Have an appropriate and operative training programme for its personnel;
- Have an adequate financial guarantee for emergency situations and closure.

- **Technologies For Destruction And /Or Irreversible Transformation Of POP Wastes**
  1. Incineration
  2. Gas-phase Chemical Reduction (Hydrogenation)
  3. Electrochemical Oxidation
  4. Molten Materials Treatment (molten metals or salts)
  5. Solvated Electron Processes
  6. Plasma Arc Processes
  7. Base-catalyzed Decomposition

- **Technologies for sequestration of POPs wastes**
  1. Engineered Landfills
  2. Long-term Storage
  3. Deep Well injection
  4. In-situ Verification

- **Pre-treatment technologies for concentration of POPs waste**
  1. Electro-osmosis
  2. Thermal Desorption
  3. Low Temperature Rinsing and recovery of PCB containing materials

NATIONAL INTERVENTIONS

- Chemical registration, which regulate import by requiring a notification/registration before formulation/importation.
- Establishment of the Standing Committee on PIC import decisions/Enforcement of national decisions,
- Donor Agency sponsored workshop on hazardous chemical tracking in Nigeria to raise awareness and hold consultations with all stakeholders involved in hazardous chemicals management and
- Preparation of a National Profile on chemical management infrastructure.

PRIORITY CONCERN

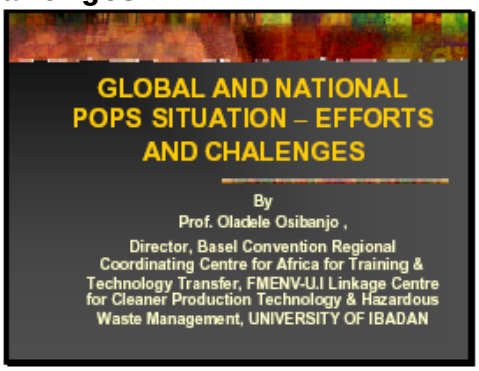
- The issue of existing POP pesticide stocks in the country
- The abuse and misuse of agrochemicals including POPs which is rampant due to inadequate legislative control, safety guidelines and public information on awareness of the harmful effect of these substances.
- The continual contamination and pollution faced by the Nigerian Coastal and Marine environment from pesticides run-offs with resultant fish kills and human deaths.
- The cases of off-label use involving illegal importation of banned, adulterated and obsolete pesticides into the country
- The inadequate technical and financial capacity to determine/identify sources and location of these stocks in the country in view of the large stock of these POP pesticides at cheap prices.

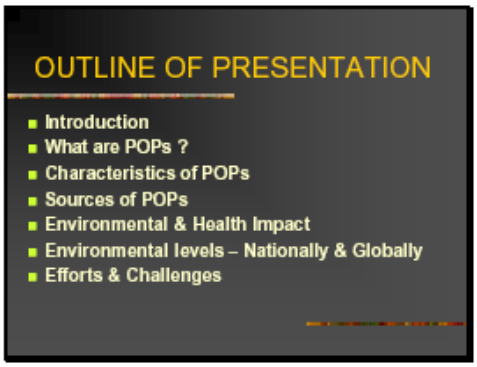
CONCLUSION

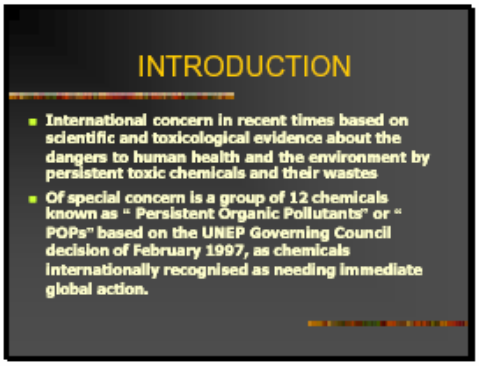
The identification and adaptation of sound chemicals tracking is recognized as the bedrock of sustainable management of toxic chemicals in the environment. About 90% of chemicals in use in Nigeria are imported. The use, storage, transportation and disposal of these, point to a growing problem that threatens the health of people and the ecosystem.

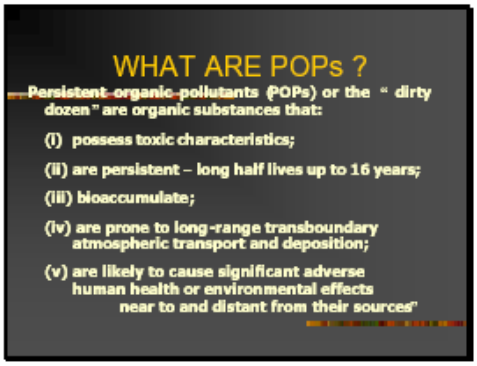
Regulatory framework and control on the production, importation and use of industrial chemicals should be put in place as well as strict enforcement programmes. An outright ban is advocated.

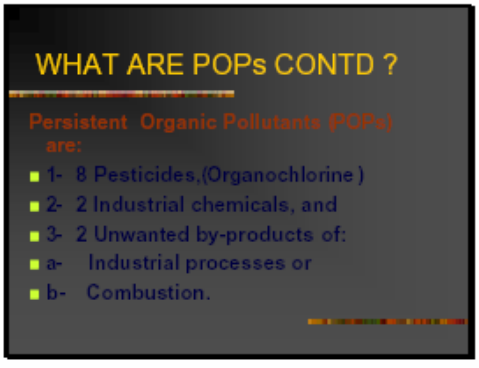
APPENDIX V: Global and National POPs Situation - Efforts and Challenges

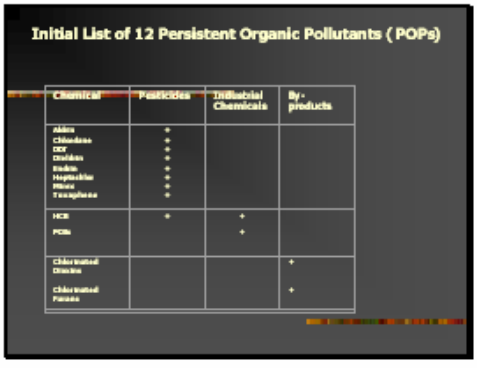






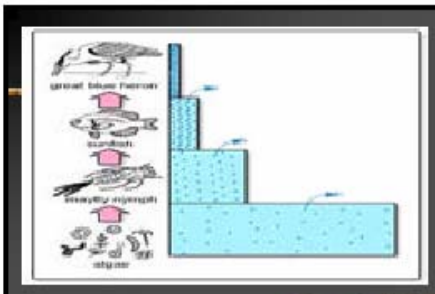






The problem of these chemicals:
1- Persistence in the environment (soil, water sediments, plants, animals),
2- Bioaccumulation, and
3- Part of the food- web (chain) and contaminate all trophic levels.
4- As a result they were accused of:
a- Causing endocrine disruption,
b- Suppression of immune system functions,
c- Reproductive and developmental effects.
d- Threat to biodiversity, and
e- Disruption at the ecosystem level.

Since the 1960's:
The concerns of scientists have been communicated to
1- Governments
2- General public
THE RESULT:
1- Several compounds were banned, or
2- Their use restricted [particularly in the developed world].
In spite of such action:
There is evidence of the continued presence of these chemicals at levels of concern, even in parts of the world where they have never been used:
- Persistence and
- Long range transport.



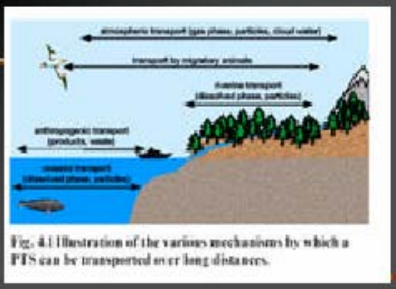
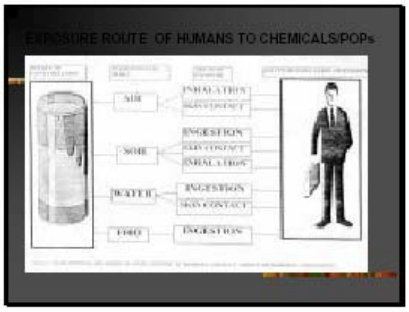


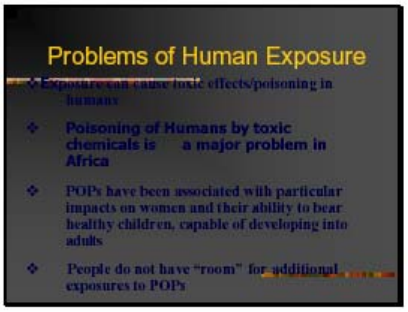
Fig. 4.1 Illustration of the various mechanisms by which a PTS can be transported over long distances.

Major Sources of POPs in Africa

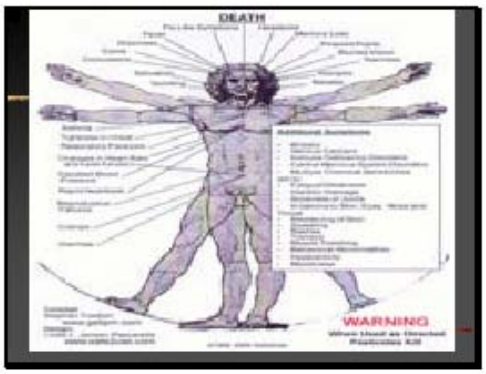
- The main categories of sources identified in the region were production and imports, use of PTS/POPs pesticides
- Issue of stocks of and reservoirs of obsolete, discarded and banned PTS/POPs pesticides and PCBs (120,000 MT FAO Estimate)
- industrial sources (manufacture, mining and electricity),-PCBs and Dioxins/Furans open /uncontrolled burning of waste.

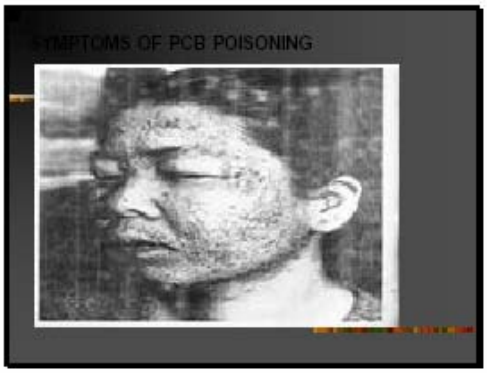
SOURCES OF POPs


EXPOSURE ROUTE OF HUMANS TO CHEMICALS/POPs
AIR
INHALATION
SOIL
INGESTION
WATER
INGESTION
FOOD
INGESTION


Problems of Human Exposure
Poisoning of Humans by toxic chemicals is a major problem in Africa
POPs have been associated with particular impacts on women and their ability to bear healthy children, capable of developing into adults
People do not have "room" for additional exposures to POPs


Recognize the Symptoms of
Toxic Exposure
DEATH, Nausea, Fever, Coma, Asthma, Cramps, Allergies, Diarrhoea, Dizziness, Vomiting, Convulsions, Memory Loss, Blurred Vision, Chronic Fatigue, Rapid Heartbeat, Soreness of Joints, Tightness in Chest, Flu Like Symptoms, Respiratory Paralysis, Reproductive Failures, Elevated Blood Pressure, Immune Deficiency Disorders, Central Nervous System (CNS) Disorders, Multiple chemical Sensitivities (MCS), Irritations to Skin, Eyes, Nose and Throat, Muscle Twitches, Loss of Coordination, Changes in Heart Rate and Liver Function, Behavioral Abnormalities, Hyperactivity, Miscarriage, Genetic Damage, Various Cancers


DEATH
WARNING


SYMPTOMS OF PCB POISONING


THE BASIS OF VICTIM OF PCB POISONING


Mommy's Eyes
Daddy's Hair
...And the Chemical Industry's PCBs, DDT and Dioxin!!!


INTERNATIONAL POLICY/LEGAL INSTRUMENTS TO ADDRESS SPECIFIC ASPECTS OF INTEGRATED AND ENVIRONMENTALLY SOUND MANAGEMENT OF TOXIC CHEMICALS
•The Rotterdam Convention on the Control of International Trade in Chemicals (Prior Informed Consent or PIC Procedure)) +
•The Montreal Protocol on Substances that Deplete the Ozone layer (ODSs), 1987.+ (Tokunbo fridges and freezers ! ! !)
•The FAO International Code of Conduct for the Distribution and Use of Pesticides amended in 1989.
•The ILO Convention on the Safety of Chemicals at the Workplace 1990.
•Inter-governmental Forum on Chemical Safety (IFCS) 1994, based on the recommendation of chapter 19 of the UNCED.
•Stockholm Convention on the persistent Organic Pollutants (POPs) May 2001 +
•The three international Conventions and Protocols that have been signed and/or ratified by the Federal Government of Nigeria are marked + above.
•Strategic Approach to Integrated Management of Chemicals (
SAICM) – New paradigm

POPs ENABLING ACTIVITIES – NIPS PROJECT

- The NIPs project aims at formulating a national implementation plan in order to protect human health and the environment from POPs chemicals
- The principal focus of these Enabling Activities is to assist countries in preparation of their Implementation Plans and first reporting obligations. Enabling Activities represent a basic building block of GEF assistance to countries. They are a means of fulfilling essential communication requirements to a Convention, providing a basic and essential level of information to enable policy and strategic decisions to be made, or assisting the development of plans that identify priority activities within a country.

Five Phases of the NIPs Project

- (i) Determination of the coordinating and organization process
- (II) Establishment of POPs inventories; assessment and strengthening of the National infrastructure and capacity - the development of Initial National POPs (INPOPs)
- (iii) Determination of objectives and setting of priorities -organization of National Priority Validation Workshop (NPVW)
- (iv) Formulation of National Implementation Plan (NIP) and Specific Action Plan on POPs (SAPs POPs) including expert review
- (v) Endorsement of National Implementation

Some Regional Experience on POPs NIPs– UNEP W/shop

The Role of non-government consultants, NGOs and other stakeholders in project activities	- In some countries NGOs complemented government on public awareness issues - Involvement of other stakeholders makes access to data easy e.g. Involvement of Power utility companies in PCBs inventory and decision making	- NGOs did not have sufficient funds to carry out POPs activities - NGO had to rely on independent budget allocation within the NIP - Lack of cooperation from small scale facilities due to lack sufficient organizational set up	- Provide information to NGOs for possible sources of funds such as IPEN - Provide planned budget lines for NGOs for such activities like awareness - Target support use high authorities or leadership [illegible]
Best practice in public awareness and education, particularly reaching the most vulnerable	- Awareness was achieved through; media, workshop, posters, translation of messages in local languages, TV programmes, drama at markets, contacts with traditional leaders, brochures, NGOs to contact target groups - High level awareness to parliamentary committee	- Difficulty in translating POPs ideas in local languages - Difficulty by public in perception of POPs problems	[illegible] following actions; Print and electronic media, workshop, posters, translation of messages in local languages, TV programmes, dramas at markets, contacts with traditional leaders, brochures, NGOs to contact target groups. High level awareness to parliamentary committee

International Action Against POPs

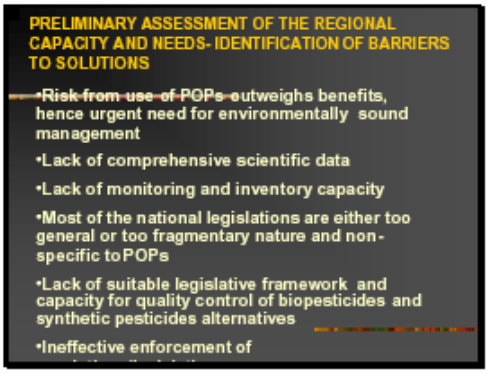
- Washington Declaration (UNEP 1995)
- UNEP Governing Council Decision in February 1997
- Both proclaimed the need for international action against POPs
- Stockholm Convention on POPs May 2001
- GEF/UNEP RBA Persistent Toxic Substances (PTS includes POPs) March 2001 – Sept. 2003

POPs Pesticides In Africa

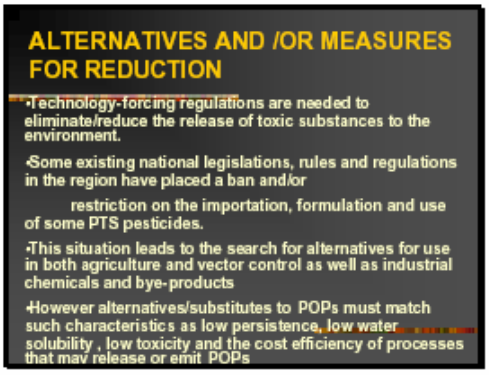
- Africa is a net importer and not a producer of POPs pesticides although formulation plants exist in some countries
- During the PTS technical workshops, African Region experts identified the most widely used PTS pesticides in agriculture as :
- mainly organochlorine pesticides namely: DDT, Endosulfan, Chlordane, Lindane (HCH), Heptachlor, Toxaphene, HCB and Aldrin; as well as Atrazine.
- DDT is still being used for malaria control , while chlordane is still the chemical of choice for termite control in some African countries

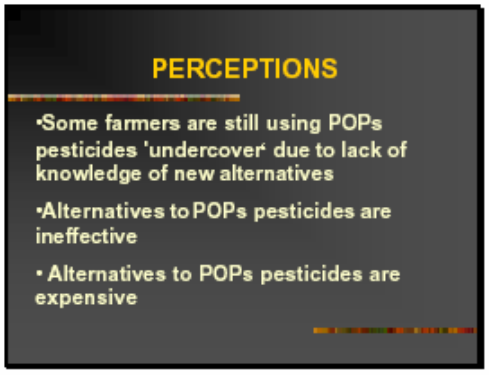
POPs Concentration Trend

- Generally there was gross contamination of environmental media, clinical samples (blood and breast milk) by PTS/POPs except air where data hardly existed
- the trend of concentration observed in Sub-Saharan Africa for is DDT> PCBs> toxaphene.
- Data apparently indicate that humans were less exposed than animals and vegetation to PTS/POPs during the period 1970 - 2002.
- accidental or occupational exposure and food contamination still remain as the major risks.
- Toxicological data generally lacking

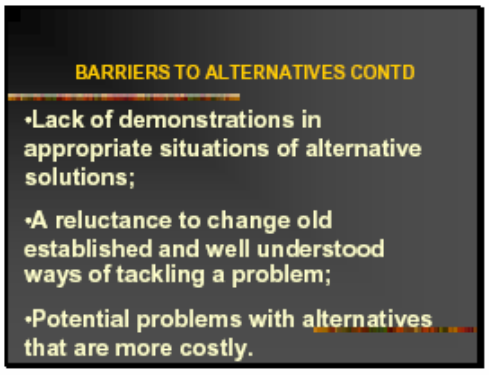

PRELIMINARY ASSESSMENT OF THE REGIONAL CAPACITY AND NEEDS- IDENTIFICATION OF BARRIERS TO SOLUTIONS
•Risk from use of POPs outweighs benefits, hence urgent need for environmentally sound management
•Lack of comprehensive scientific data
•Lack of monitoring and inventory capacity
•Most of the national legislations are either too general or too fragmentary nature and non-specific to POPs
•Lack of suitable legislative framework and capacity for quality control of biopesticides and synthetic pesticides alternatives
•Ineffective enforcement of

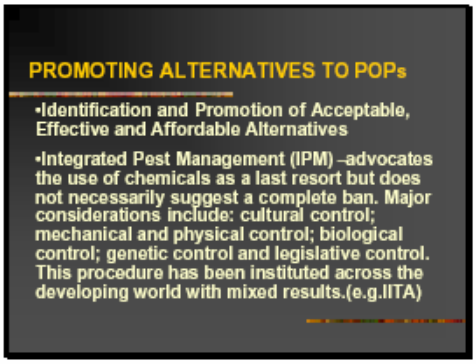

Barriers Contd
•Illegal trade and use
•Inappropriate use and abuse
•Lack of awareness and information
•Commercial pressures
•Lack of financial resources

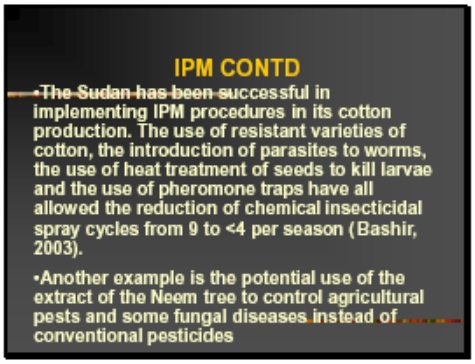

ALTERNATIVES AND /OR MEASURES FOR REDUCTION
•Technology-forcing regulations are needed to eliminate/reduce the release of toxic substances to the environment.
•Some existing national legislations, rules and regulations in the region have placed a ban and/or
restriction on the importation, formulation and use of some PTS pesticides.
•This situation leads to the search for alternatives for use in both agriculture and vector control as well as industrial chemicals and bye-products
•However alternatives/substitutes to POPs must match such characteristics as low persistence, low water solubility , low toxicity and the cost efficiency of processes that may release or emit POPs


PERCEPTIONS
•Some farmers are still using POPs pesticides 'undercover' due to lack of knowledge of new alternatives
•Alternatives to POPs pesticides are ineffective
• Alternatives to POPs pesticides are expensive


BARRIERS TO ALTERNATIVES
Barriers to development and application of alternatives include:
•High costs and long lead times of developing and assessing alternatives;
•Potential for unforeseen difficulties in application of an alternative in widely variableenvironments and with highly variable levels of infrastructure and resources in different countries;

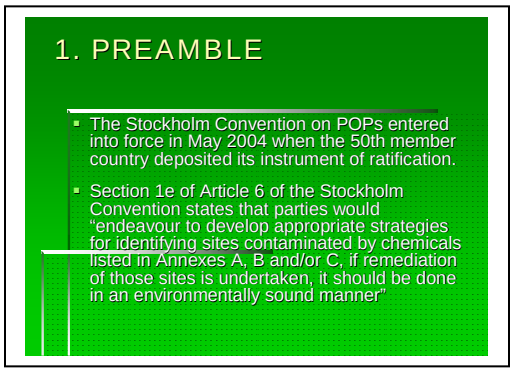

BARRIERS TO ALTERNATIVES CONTD
•Lack of demonstrations in appropriate situations of alternative solutions;
•A reluctance to change old established and well understood ways of tackling a problem;
•Potential problems with alternatives that are more costly.

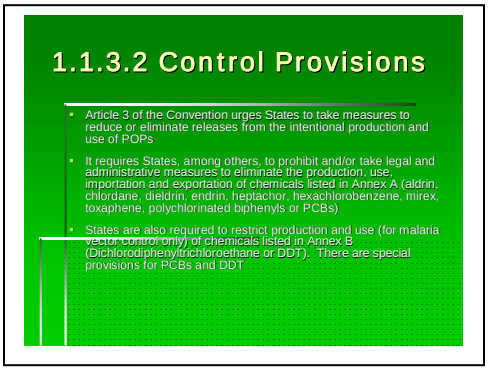

PROMOTING ALTERNATIVES TO POPs
•Identification and Promotion of Acceptable, Effective and Affordable Alternatives
•Integrated Pest Management (IPM) –advocates the use of chemicals as a last resort but does not necessarily suggest a complete ban. Major considerations include: cultural control; mechanical and physical control; biological control; genetic control and legislative control. This procedure has been instituted across the developing world with mixed results.(e.g.IITA)

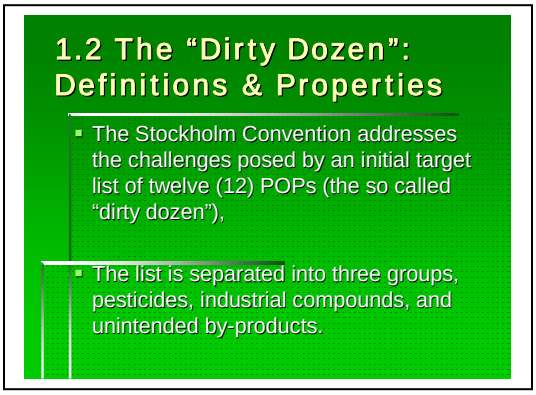

IPM CONTD
•The Sudan has been successful in implementing IPM procedures in its cotton production. The use of resistant varieties of cotton, the introduction of parasites to worms, the use of heat treatment of seeds to kill larvae and the use of pheromone traps have all allowed the reduction of chemical insecticidal spray cycles from 9 to <4 per season (Bashir, 2003).
•Another example is the potential use of the extract of the Neem tree to control agricultural pests and some fungal diseases instead of conventional pesticides

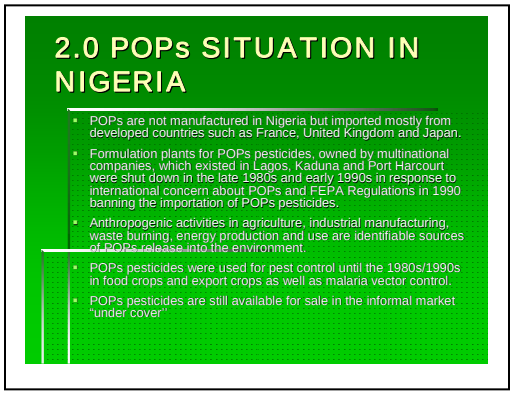

•THANK YOU FOR YOUR KIND ATTENTION AND GOD BLESS

APPENDIX VI: Remediation Technologies for POPs Contaminated Sites









POPs SITUATION IN NIGERIA (contd)

- The Nigerian Federal Ministry of Health indicated that Aldrin, Dieldrin, Chlordane, DDT and Endrin are POPs pesticides used for control of arthropods of Medical and Veterinary importance and their use was stopped in 2002.
- The use of DDT continues on a continual basis for malaria control on as a need basis.
- Data is generally lacking on POPs imports and consumption. Inadequate funding is claimed to be responsible for the low levels of obsolete stocks of POPs as chemicals were consumed as soon as they were purchased.
- Potentially POPs contaminated site with variable level of contamination could include but not limited to:
  - Manufacture facilities for POP chemicals
  - Storage and Distribution facilities for POPs
  - Places where POPs chemicals have been used (agricultural lands, electric power stations, etc.)
- No studies have been undertaken to identify the hazards of these sites to humans and the environment

POPs SITUATION IN NIGERIA (contd)

- Uncontrollable management of domestic refuse has been an intractable problem in the country over the years.
- Co-disposal of non-hazardous domestic waste and hazardous industrial waste including POPs wastes and containers is generally practised.
- The solid wastes are normally set on fire to reduce the mountains of refuse which many times cover urban landscapes in major cities.
- Based on per capita waste generation of 0.43 kg/per person /day, an estimated Total TEQ 11,397 mg TEQ/day emission releases from domestic waste burning was earlier reported for Nigeria (Osibanjo et. al 2002)
- This suggests that solid waste combustion could be a major source of PCDD/PCDF release in Nigeria.

4. Preliminary Assessment Of The Extent Of Exposure Of The Human Population And The Environment, Especially Vulnerable Groups To POPs

- There are two types of POPs exposure, i.e. occupational and non-occupational exposure..
- Exposures in both cases could be either accidental or deliberate.
- The vulnerable groups include wholesalers and retailers of pesticides; users, farm workers; adults and children at homes where pesticides are stored, and the general public
- The general population, especially the informal sector, is particularly exposed to unintentional produced POPs as a result of absence of regulations.
- ECG and VRA technicians responsible for the servicing and maintenance of PCB- containing transformers and capacitors are at risk to the adverse effects of PCB exposure.

REMEDIATION TECHNOLOGIES

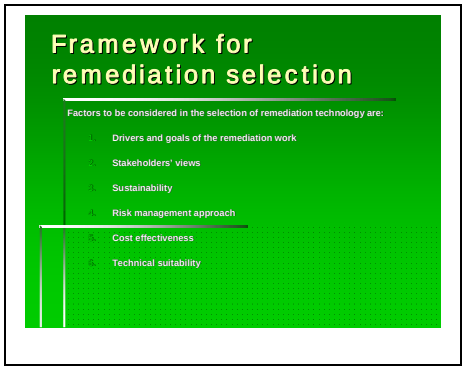
- Introduction
- Framework for remediation selection
- Contaminated land remediation technologies
- POPs contaminated land remediation Technologies

PREAMBLE

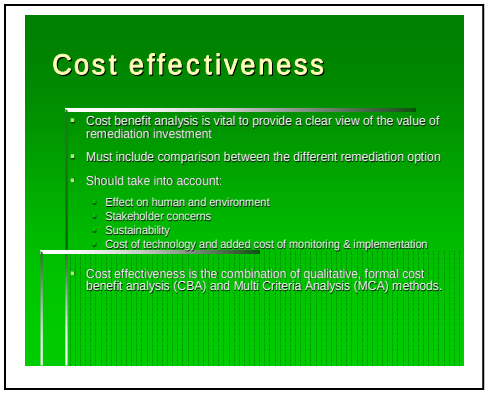
- The Linkage framework
  - In many countries the risk based approach is adopted for the management of contaminated land
  - Management of Risk for contaminated land is based on pollutant linkage which has three vital components

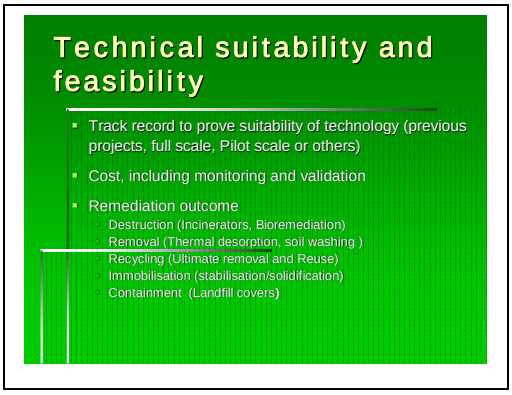
PREAMBLE (contd)

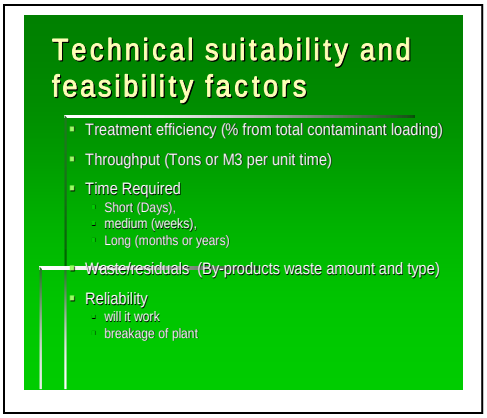
- Risk control is based on breaking the pollutant linkage
  - **Reduce or modify the source**
    - **(destroying or removing the contaminant)**
      - Incinerators
      - Bioremediation
      - Thermal desorption
  - **Managing or breaking the pathway**
    - **(Containment, Immobilisation)**
      - Landfill covers,
      - Reactive Barriers
      - Solidification/stabilisation
  - **Modifying the exposure**
    - Restricted land use
    - limiting access

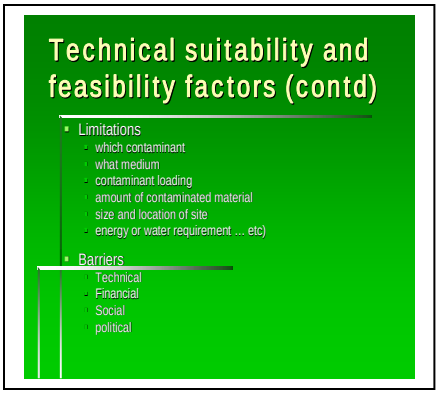

Framework for remediation selection
Factors to be considered in the selection of remediation technology are:
1. Drivers and goals of the remediation work
2. Stakeholders' views
3. Sustainability
4. Risk management approach
5. Cost effectiveness
6. Technical suitability

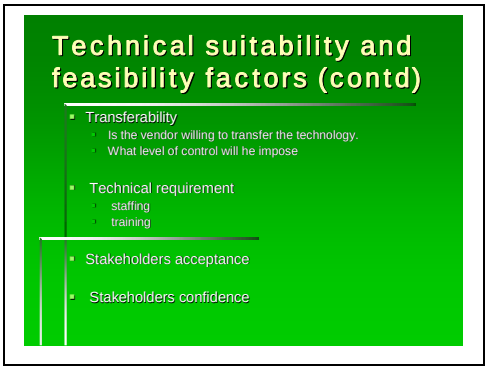

Risk management
Remediation technology selection depends on type of risk control proposed
Drivers for Risk Control
-Source-Pathway-Receptor Linkage
-Risk control is based on Breaking the pollutant linkage
Reduce or modify the source (destroying or removing the contaminant)
Managing or breaking the pathway (Containment, Land filling, Barriers)
Modifying the exposure (Restricted land use, limiting access)

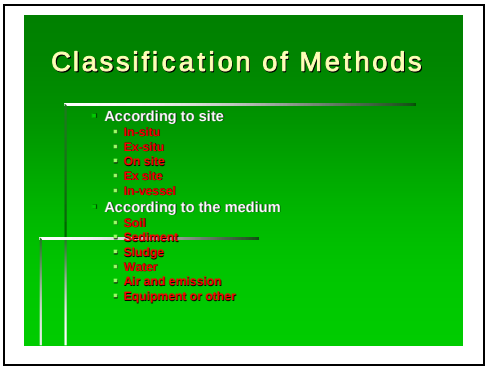

Cost effectiveness
Cost benefit analysis is vital to provide a clear view of the value of remediation investment
Must include comparison between the different remediation option
Should take into account:
Effect on human and environment
Stakeholder concerns
Sustainability
Cost of technology and added cost of monitoring & implementation
Cost effectiveness is the combination of qualitative, formal cost benefit analysis (CBA) and Multi Criteria Analysis (MCA) methods.

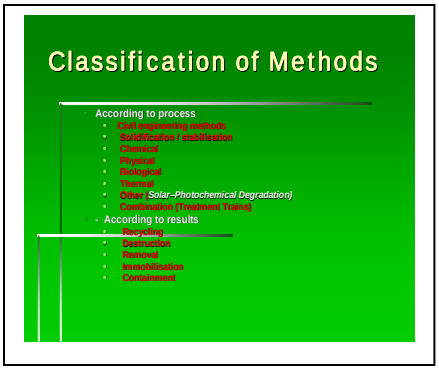

Technical suitability and feasibility
Track record to prove suitability of technology (previous projects, full scale, Pilot scale or others)
Cost, including monitoring and validation
Remediation outcome
Destruction (Incinerators, Bioremediation)
Removal (Thermal desorption, soil washing)
Recycling (Ultimate removal and Reuse)
Immobilisation (stabilisation/solidification)
Containment (Landfill covers)

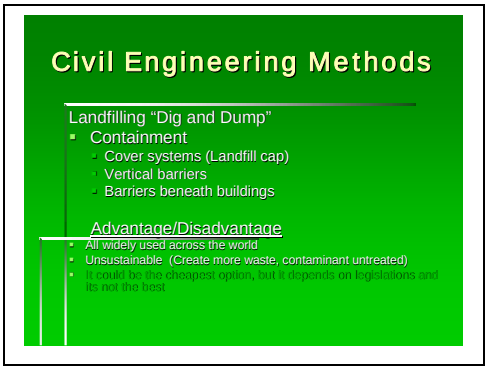

Technical suitability and feasibility factors
Treatment efficiency (% from total contaminant loading)
Throughput (Tons or M3 per unit time)
Time Required
Short (Days),
medium (weeks),
Long (months or years)
Waste/residuals (By-products waste amount and type)
Reliability
will it work
breakage of plant


Technical suitability and feasibility factors (contd)
Limitations
which contaminant
what medium
contaminant loading
amount of contaminated material
size and location of site
energy or water requirement ... etc)
Barriers
Technical
Financial
Social
political

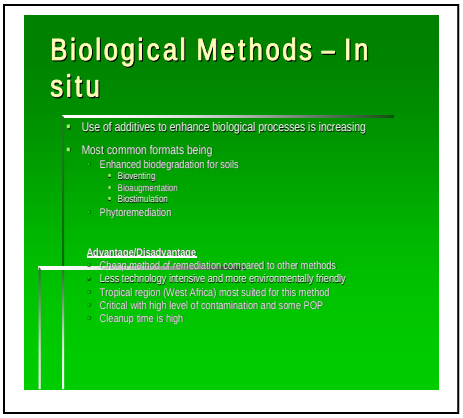

Technical suitability and feasibility factors (contd)
Transferability
Is the vendor willing to transfer the technology.
What level of control will he impose
Technical requirement
staffing
training
Stakeholders acceptance
Stakeholders confidence


Classification of Methods
According to site
In-situ
Ex-situ
On site
Ex site
In-vessel
According to the medium
Soil
Sediment
Sludge
Water
Air and emission
Equipment or other


Classification of Methods
According to process
Civil engineering methods
Solidification / stabilisation
Chemical
Physical
Biological
Thermal
Other (Solar–Photochemical Degradation)
Combination (Treatment Train)
According to results
Destruction
Removal
Immobilisation
Containment


Civil Engineering Methods
Landfilling "Dig and Dump"
Containment
Cover systems (Landfill cap)
Vertical barriers
Barriers beneath buildings
Advantage/Disadvantage
All widely used across the world
Unsustainable (Create more waste, contaminant untreated)
It could be the cheapest option, but it depends on legislations and its not the best


Solidification & Stabilisation
Solidification encapsulates the contaminants in a solid mass from which the contaminant cannot leach
Pozzolanic methods: lime, cement, PFA
Stabilisation is the binding of the contaminant using a chemical additive to reduce their mobility
Binders: silicates, bentonites, zeolites, resins
Questions of durability and leaching remain
Wide availability of required equipment and raw material.


Biological Methods – In situ
Use of additives to enhance biological processes is increasing
Most common formats being
Enhanced biodegradation for soils
Bioventing
Bioaugmentation
Biostimulation
Phytoremediation
Advantage/Disadvantage
Cheap method of remediation compared to other methods
Less technology intensive and more environmentally friendly
Tropical region (West Africa) most suited for this method
Critical with high level of contamination and some POP
Cleanup time is high

Biological Methods - Exsitu

- Ex-situ biological methods are widely available in the UK, USA and EU
- Most common formats being
  - composting
  - biopiles
  - Bioreactors (Slurry Phase Bio. Treatment)
  - land farming

Advantages/Disadvantage

- Less cleanup time is required compare to insitu.
- Cover wider scope of POP contamination.
- Cost more than insitu methods
- requires excavation and transport and associated disadvantages.

Chemical Methods

- Chemical Oxidation and Reduction
- Chemical Extraction
- Dehalogenation (Chemical, Thermal)
- Gas Phase Chemical Reduction (Chemical, Thermal)

Advantage/Disadvantage

- Most of them destruct the contaminant
- Expensive and technology intensive

Thermal

- Hot Gas Decontamination
- Radio Frequency/Electromagnetic Heating
- Hot Air/Steam Injection
- Electrical Resistance Heating
- Incineration
- *Vitrification*
- Cement Kiln
- Open Burn/Open Detonation
- Pyrolysis
- Thermal Desorption

Advantage/Disadvantage

- Require the use of energy which make it expensive and less environmentally friendly
- Not all method are destructive
- Can be used for high contamination level

POP Remediation Examples

Technology (Section & Title)	Cost US$/m³	Use Rating	Applicability*	Reliability*	Cleanup Time*	Technology Function*
1 IN SITU BIOLOGICAL TREATMENT						
Bioventing	10-70	Limited	Use with other technology	Depend	Depend	Destruct
Enhanced Biodegradation	30-100	Wide	Depend	Depend	worse	Destruct
Phytoremediation	30-50	Wide	Average	Average	worse	Destruct

Cost based on application in the US

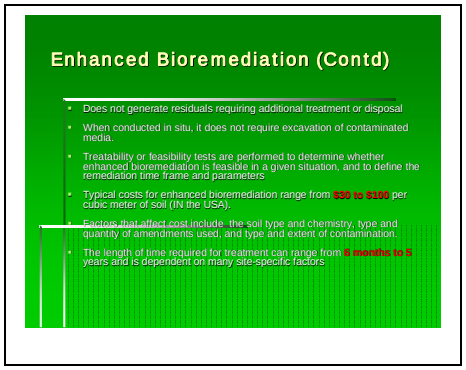
Bioventing is a complementary process and not a full technology

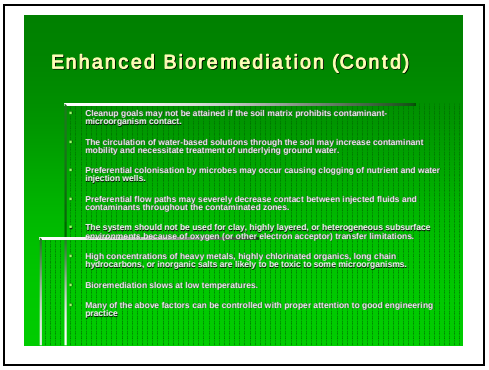
POP Remediation Tech Examples (Contd)

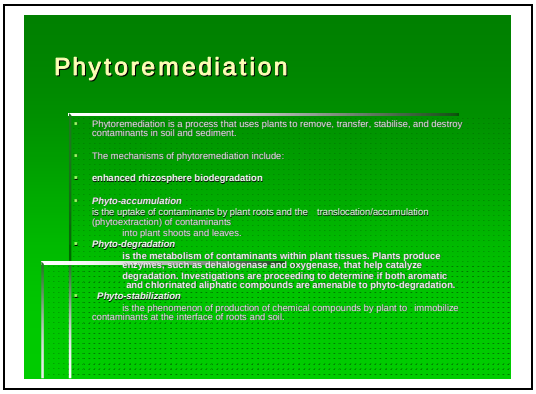
Technology (Section & Title)	Cost US$/m³	Use Rating	Applicability*	Reliability*	Cleanup Time*	Technology Function*
4 EX SITU BIOLOGICAL TREATMENT (ASSUMING EXCAVATION)						
Biopiles	130-160	Wide	Refer to profile	Average	Average	Destruct
Composting	190-290	Wide	Refer to profile	Average	Average	Destruct
Land Farming	100-150	Wide	Refer to profile	Better	Average	Destruct
Slurry Phase Bio. Treatment	160-210	Limited	Refer to profile	Better	Average	Destruct

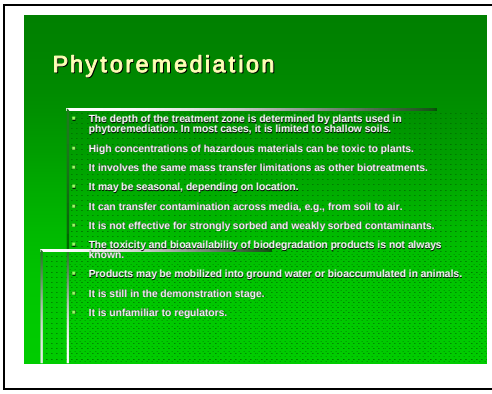
Enhanced Bioremediation

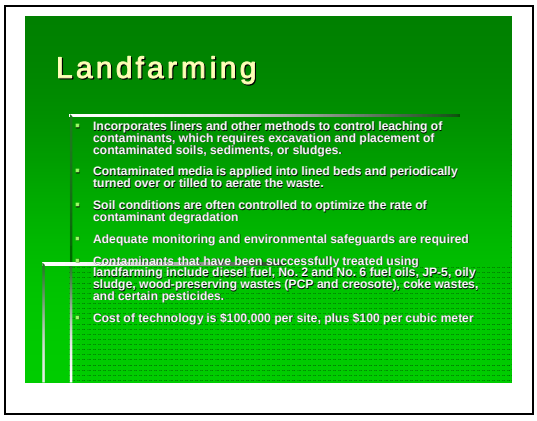
- Is a process in which **indigenous or inoculated** micro-organisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants
- Nutrients, oxygen or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials.
- Have been successfully used to remediate soils, sludges, and ground water contaminated with petroleum hydrocarbons, solvents, pesticides, wood preservatives, and other organic chemicals.
- Bioremediation is especially effective for remediating low level residual contamination in conjunction with source removal
- Does not require heating, requires relatively inexpensive inputs, such as nutrients

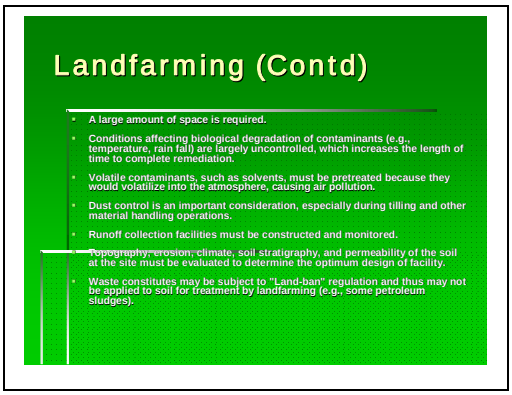

Enhanced Bioremediation (Contd)
Does not generate residuals requiring additional treatment or disposal
When conducted in situ, it does not require excavation of contaminated media.
Treatability or feasibility tests are performed to determine whether enhanced bioremediation is feasible in a given situation, and to define the remediation time frame and parameters
Typical costs for enhanced bioremediation range from $30 to $100 per cubic meter of soil (IN the USA).
Factors that affect cost include the soil type and chemistry, type and quantity of amendments used, and type and extent of contamination.
The length of time required for treatment can range from 6 months to 5 years and is dependent on many site-specific factors


Enhanced Bioremediation (Contd)
Cleanup goals may not be attained if the soil matrix prohibits contaminant-microorganism contact.
The circulation of water-based solutions through the soil may increase contaminant mobility and necessitate treatment of underlying ground water.
Preferential colonisation by microbes may occur causing clogging of nutrient and water injection wells.
Preferential flow paths may severely decrease contact between injected fluids and contaminants throughout the contaminated zones.
The system should not be used for clay, highly layered, or heterogeneous subsurface environments because of oxygen (or other electron acceptor) transfer limitations.
High concentrations of heavy metals, highly chlorinated organics, long chain hydrocarbons, or inorganic salts are likely to be toxic to some microorganisms.
Bioremediation slows at low temperatures.
Many of the above factors can be controlled with proper attention to good engineering practice


Phytoremediation
Phytoremediation is a process that uses plants to remove, transfer, stabilise, and destroy contaminants in soil and sediment.
The mechanisms of phytoremediation include:
enhanced rhizosphere biodegradation
Phyto-accumulation
is the uptake of contaminants by plant roots and the translocation/accumulation (phytoextraction) of contaminants
into plant shoots and leaves.
Phyto-degradation
is the metabolism of contaminants within plant tissues. Plants produce enzymes, such as dehalogenase and oxygenase, that help catalyze degradation. Investigations are proceeding to determine if both aromatic and chlorinated aliphatic compounds are amenable to phyto-degradation.
Phyto-stabilization
is the phenomenon of production of chemical compounds by plant to immobilize contaminants at the interface of roots and soil.


Phytoremediation
The depth of the treatment zone is determined by plants used in phytoremediation. In most cases, it is limited to shallow soils.
High concentrations of hazardous materials can be toxic to plants.
It involves the same mass transfer limitations as other biotreatments.
It may be seasonal, depending on location.
It can transfer contamination across media, e.g., from soil to air.
It is not effective for strongly sorbed and weakly sorbed contaminants.
The toxicity and bioavailability of biodegradation products is not always known.
Products may be mobilized into ground water or bioaccumulated in animals.
It is still in the demonstration stage.
It is unfamiliar to regulators.


Landfarming
Incorporates liners and other methods to control leaching of contaminants, which requires excavation and placement of contaminated soils, sediments, or sludges.
Contaminated media is applied into lined beds and periodically turned over or tilled to aerate the waste.
Soil conditions are often controlled to optimize the rate of contaminant degradation
Adequate monitoring and environmental safeguards are required
Contaminants that have been successfully treated using landfarming include diesel fuel, No. 2 and No. 6 fuel oils, JP-5, oily sludge, wood-preserving wastes (PCP and creosote), coke wastes, and certain pesticides.
Cost of technology is $100,000 per site, plus $100 per cubic meter


Landfarming (Contd)
A large amount of space is required.
Conditions affecting biological degradation of contaminants (e.g., temperature, rain fall) are largely uncontrolled, which increases the length of time to complete remediation.
Volatile contaminants, such as solvents, must be pretreated because they would volatilize into the atmosphere, causing air pollution.
Dust control is an important consideration, especially during tilling and other material handling operations.
Runoff collection facilities must be constructed and monitored.
Topography, erosion, climate, soil stratigraphy, and permeability of the soil at the site must be evaluated to determine the optimum design of facility.
Waste constitutes may be subject to "Land-ban" regulation and thus may not be applied to soil for treatment by landfarming (e.g., some petroleum sludges).

Composting

- Soil is excavated and mixed with bulking agents and organic amendments such as wood chips, hay, manure, and vegetative (e.g., potato) wastes.
- Proper amendment selection ensure adequate porosity and provides a balance of carbon and nitrogen to promote thermophilic microbial activity
- Typically, thermophilic conditions (54 to 65 °C) must be maintained to properly compost soil contaminated with hazardous organic contaminants
- There are three process designs used in composting:
  - aerated static pile composting (compost is formed into piles and aerated with blowers or vacuum pumps),
  - mechanically agitated in-vessel composting (compost is placed in a reactor vessel where it is mixed and aerated), and
  - windrow composting (compost is placed in long piles known as windrows and periodically mixed with mobile equipment).
  - Windrow composting is usually considered to be the most cost-effective composting alternative. Meanwhile, it may also have the highest fugitive emissions. If VOC or SVOC contaminants are present in soils, off-gas control may be required.

Composting (contd)

- All materials and equipment used for composting are commercially available
- The relatively simple equipment requirements combined with these performance results make windrow composting economically and technically attractive
- Costs will vary with the amount of soil to be treated, contaminant and type of composting process ($190 - $300)
- Limitations
  - Substantial space is required for composting.
  - Excavation of contaminated soils is required and may cause the uncontrolled release of VOCs.
  - Composting results in a volumetric increase in material because of the addition of amendment material.
  - Although levels of metals may be reduced via dilution, heavy metals are not treated by this method. Also high levels of heavy metals can be toxic to the microorganisms

Landfill Caps

- Landfill caps can be used to:
  - Minimize exposure on the surface of the contaminated land.
  - Prevent vertical infiltration of water into contaminated land that would create contaminated leachate.
  - Contain contaminated land while treatment is being applied.
  - Control gas emissions from underlying waste.
  - Create a land surface that can support vegetation and/or be used for other purposes.
- Landfill Capping is the most common form of remediation because it is generally less expensive than other technologies and effectively manages the human and ecological risks associated with a remediation site.
- Landfill cap could be
  - Concrete
  - Asphalt
  - Coposit (Sand, vegetation, geomembrain

Limitation of Caps

- Landfill cap does not lessen toxicity, mobility, or volume of contaminated land, but does mitigate migration.
- Landfill caps are most effective where most of the contaminated land is above the water table.
- A cap, by itself, cannot prevent the horizontal flow of ground water through the waste, only the vertical entry of water into the waste.
- In many cases landfill caps are used in conjunction with vertical walls to minimize horizontal flow and migration.
- The effective life of landfill components (including cap) can be extended by long-term inspection and maintenance.
- Vegetation, which has a tendency for deep root penetration, must be eliminated from the cap area.

Thermal Desorption

- Thermal desorption is a physical separation process and is not designed to destroy organics. Wastes are heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to the gas treatment system. The bed temperatures and residence times designed into these systems will volatilize selected contaminants but will typically not oxidize them.
- Based on the operating temperature of the desorber, thermal desorption processes can be categorized into two groups: high temperature thermal desorption (HTTD) (320 to 560 °C) and low temperature thermal desorption (LTTD) (90 and 320 °C).
- The target contaminants for HTTD are SVOCs, PAHs, PCBs, and pesticides; however, VOCs and fuels also may be treated, but treatment may be less cost-effective
- Rates charged to remediate petroleum hydrocarbon contaminated soil range from $45 to $330 per metric ton

Thermal Desorption (contd)

- There are specific particle size and materials handling requirements that can impact applicability or cost at specific sites.
- Dewatering may be necessary to achieve acceptable soil moisture content levels.
- Highly abrasive feed potentially can damage the processor unit.
- Heavy metals in the feed may produce a treated solid residue that requires stabilization.
- Clay and silty soils and high humic content soils increase reaction time as a result of binding of contaminants.

Pyrolysis

- Pyrolysis is formally defined as chemical decomposition induced in organic materials by heat in the absence of oxygen.
- Pyrolysis transforms hazardous organic materials into gaseous components, small quantities of liquid, and a solid residue (coke) containing fixed carbon and ash
- Pyrolysis typically occurs under pressure and at operating temperatures above 430 °C (800 °F). The pyrolysis gases require further treatment
- Pyrolysis is an emerging technology. Although the basic concepts of the process have been validated, the performance data for an emerging technology have not been evaluated
- The target contaminant groups for pyrolysis are SVOCs and pesticides
- Pyrolysis has shown promise in treating organic contaminants in soils and oily sludges. Chemical contaminants for which treatment data exist include PCBs

Pyrolysis

- There are specific feed size and materials handling requirements that impact applicability or cost at specific sites.
- The technology requires drying of the soil to achieve a low soil moisture content (< 1%).
- Highly abrasive feed can potentially damage the processor unit.
- High moisture content increases treatment costs.
- Treated media containing heavy metals may require stabilization.
- The overall cost for remediating approximately 18,200 metric tons (20,000 tons) of contaminated media is expected to be approximately $330 per metric ton ($300 per ton).

CONCLUSION

- Destructive low cost remediation technologies for West African low level pop contaminated soil could include in situ and ex situ biological treatment.
- Less environmentally friendly but economical technologies for POPs sites remediation (without destruction) could include containment (Covers) and solidification/stabilisation depending on type of contaminant, contaminant loading, soil condition and regulatory issues.
- For high level POPs contamination, thermal desorption and Pyrolysis could be applied depending on conditions.

Thank you for your attention

APPENDIX VII: NES Project Module

IPEP AND NES PROJECT MODULE

BY

ANE LESLIE ADOGAME, *F.I.E.A.D. FIAMN*
Executive Secretary, Nigerian Environmental Society

Introduction

- The Stockholm Convention on Persistent Organic Pollutants (POPs) is an international treaty designed to end the production and use of some of the world's most poisonous chemicals.
- To the initial list of **Twelve POPs** whose releases the Stockholm Convention will aim to eliminate

Introd. Contd.

- Dioxins
- Furans
- DDT
- PCBs
- Chlordane
- Heptachlor
- Aldrin
- Dieldrin
- Endrin
- Mirex
- Toxaphene and
- Hexachlorobezene also named **Dirty Dozens**

- Many of these chemicals have been used to kill insects and other pests. Others were used as industrial chemicals or were produced as a by-product of industrial process.

What they have in common is:

- that they are bad for people and environment,
- they last a long time
- they travel over great distances transported by the air and water.

- **IPEP** is international POPs Elimination Project (IPEP), a GEF approved project of IPEN (*International POPs Elimination Network*).
- **IPEN** is a network of NGOs PO (participating organization) with a renewed commitment to work jointly towards the elimination of POPs and other persistent toxic substances (PTS) from the world's environment.
- In Sweden in May 22,2001 known as IPEN Stockholm Declaration.

- NES is a participating organization (PO) of IPEN by endorsing the IPEN Stockholm declaration and other policy documents.
- In Nigeria today, three (3) IPEN PO are recognized **NES, FOTE** and **NEST** involved in the POPs elimination project.
- NES involvement in IPEP started by submitting a signed IPAM (IPEP Project Activity memorandum for NGOs) which contained features like:

- - Project title
- - Project location, duration, cost
- - Brief summary of work to be performed
- - Justification of project
- - Introduction/aim

- - Detailed description of project activities
- - Work schedules
- - Payment schedule
- - Anticipated results, outcomes and update
- - Opportunities for project replication

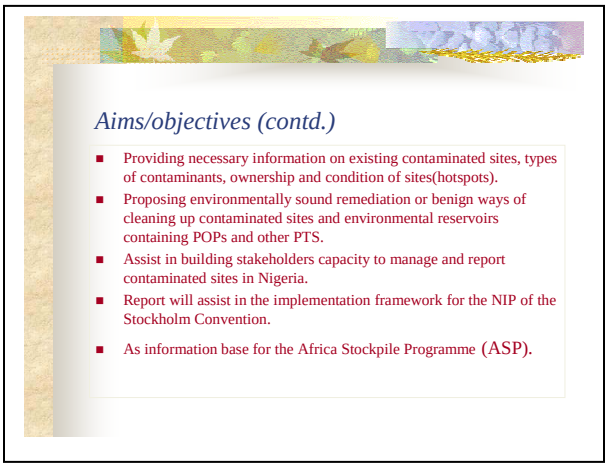
NES Project Module

Project title:

Identification and Control of POPs contaminated sites(hotspots) in Lagos, Southwestern, Nigeria.

Aims/Objectives:

- Providing necessary information on existing contaminated sites, types of contaminants, ownership and condition of sites(hotspots).
- Proposing environmentally sound remediation or benign ways of cleaning up contaminated sites and environmental reservoirs containing POPs and other PTS.
- Assist in building stakeholders capacity to manage and report contaminated sites in Nigeria.
- Report will assist in the implementation framework for the NIP of the Stockholm Convention.
- As information base for the Africa Stockpile Programme (ASP).


Aims/objectives (contd.)
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Assist in building stakeholders capacity to manage and report contaminated sites in Nigeria.
Report will assist in the implementation framework for the NIP of the Stockholm Convention.
As information base for the Africa Stockpile Programme (ASP).


Report will be submitted by March 2006
Thank you