GOVERNMENT OF PAPUA NEW GUINEA

NATIONAL IMPLEMENTATION PLAN

FOR MANAGEMENT OF PERSISTENT ORGANIC POLLUTANTS IN PAPUA NEW GUINEA

A PLAN OF ACTION BY THE GOVERNMENT OF PAPUA NEW GUINEA IN FULFILLING ITS OBLIGATION UNDER THE STOCKHOLM CONVENTION ON PERSISITENT ORGANIC POLLUTANTS

PREFACE

Papua New Guinea has an interest in protecting the global environment for the wellbeing of its population and the global community at large. It has made public declarations and commitments at regional and international forums to be a party to a number of Environmental Treaties and Conventions including those relating to control of chemicals and hazardous substances. In particular, it is a party to: (i) the Basel Convention on the Trans-boundary Movement of Hazardous Wastes and their Disposal; (ii) the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, (iii) the Vienna Convention on Protection of the Ozone Layer, (iv) the Montreal Protocol on Ozone Depleting Substances, (v) the London Dumping of Wastes at Sea, and (vi) the Stockholm Convention on Persistent Organic Pollutants of which this National Implementation Plan has been developed. The ratification at these Conventions signifies PNG's commitment to protecting the global environment from further degradation.

To demonstrate PNG's commitment to meeting the objects of the Stockholm Convention on POPs to which it is a party, and in achieving compliance with the obligations set out in the Convention, this National Implementation Plan has been specifically developed to set the framework for the management of Persistent Organic Pollutants and establish options for strategy development in order to deal with POPs issues in the country with the ultimate aim of protecting human health and the environment from the harmful effects of POPs chemicals.

The National Executive Council, in its decision No: 183/2001 in 2001, gave the National Coordinating Committee; which comprised of key Government, private and non-governmental organisations the mandate to undertake sectoral studies to develop this National Implementation Plan. I am pleased to acknowledge the time and efforts put by these technical institutions to develop this document.

This Plan has been developed in the context of existing legislative and policy framework including the social and economic development goals set out in the Medium-Term Development Strategy (MTDS) of PNG, and practical plan of actions have been developed for implementation.

I am optimistic that necessary coordinating mechanisms will be developed between line Government, private and non-governmental organisations to implement this National Implementation Plan.

Rt. Honourable, Sir Michael Somare; Kt, MP
Prime Minister of Papua New Guinea

FOREWORD

The Stockholm Convention was developed within the precincts of the Rio Declaration, an international effort to protect human health and the environment. Chapter 19 of Agenda 21 complements the Fourth Goal of the National Constitution of PNG which calls for protection of the environment for the wellbeing of the future generations.

The Stockholm Convention on Persistent Organic Pollutants (POPs) which entered into force on 17th May 2004 calls for each of its Parties including Papua New Guinea to update or develop National Implementation Plans on the management and disposal of POPs so that the natural environment is not polluted and human health is protected from any harmful effects.

This National Implementation Plan was developed under the auspicies of the National Coordinating Committee which was coordinated through the Department of Environment & Conservation. Funding was provided by the Global Environment Facility through the United Nations Environment Programme to support the production of this document.

The National Implementation Plan provides the basis for establishing a programme for monitoring PNG's progress in addressing the POPs issue. Strategies and Action Plans have been developed to reduce and eliminate POPs use and releases to the environment. It also sets the stage for effective registration, coordination, handling and monitoring systems between relevant agencies and institutions of Government and the private sector.

It highlights the issues of public awareness, and participation by the different stakeholders to effectively manage POPs and POPs-like chemicals through existing management regimes with the aim of eliminating their usage, as well as, import into the country by 2010.

The Department of Environment & Conservation is committed to this call, and capacity for closer dialogue with relevant institutions will be established for implementation of the Action Plans in the NIP to ensure PNG complies with the requirements of the Stockholm Convention.

Honourable William Duma, LLB, MP
Minister for Environment & Conservation

ACKNOWLEDGEMENTS

The Government of Papua New Guinea, and in particular; the Department of Environment and Conservation wish to thank all those people in Government, private sector and research organisations for supply necessary data and information for production of this National Implementation Plan for Papua New Guinea. The participation of the members of the National Coordinating Committee and the Task Team Consultants in the production of the sector reports is fully acknowledged. Names of all those people that produced the sector reports are on page (ix) of this report.

The contribution of the principal Consultant; Mr. Jaru Bisa, who reviewed all the task team reports to produce this National Implementation is also acknowledged.

The support of the POPs office staff in the Department of Environment and Conservation, and in particular, the Project Coordinator; Ms. Katrina Solien for providing revisions and logistics is greatly appreciated. Without the support of the POPs Office staff, this report would not have been fully completed on time.

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CRI	=	Coffee Research Organisation
DAL	=	Department of Agriculture and Livestock
DEC	=	Department of Environment & Conservation
DDT	=	
DNPM	=	Department of National Planning & Monitoring
ECA	=	Environment Contaminants Act
FAO	=	Food & Agriculture Organisation
GDP	=	Gross Domestic Product
GEF	=	Global Environment Facility
HCB	=	hexachlorinated benzene
HPLC	=	high performance liquid chromatography
IFC	=	International Financial Corporation
INC	=	Inter-governmental Negotiating Committee
IRPTC	=	International register of Potentially Toxic Chemicals
ISO	=	International Standards Organisation
km	=	kilometre
LLG	=	Local Level Government
mg/l	=	milligram per litre
MTDS	=	Medium Term Development Strategy
NAQIA	=	National Agriculture Quarantine Inspection Authority
NARI	=	National Agriculture Research Institute
NEC	=	National Executive Council
NCC	=	National (POPs) Coordinating Committee
NCDC	=	National Capital District Commission
NGO	=	Non-Governmental Organisation
NIP	=	National Implementation Plan
OLPG	=	Organic La on Provincial Government
PCBs	=	polychlorinated biphenyl
PCDD	=	polychlorinated dibenzo dioxin
PCDF	=	polychlorinated dibenzo furans
PNG	=	Papua New Guinea
POPs	=	Persistent Organic Pollutants
PPL	=	PNG Power Limited
ppm	=	parts per million
UNECE	=	United Nations Economic Commission for Europe
UNEP	=	United Nations Environment Programme
UNFCCC	=	United Nations Framework Convention on Climate Change

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EXECUTIVE SUMMARY

There has been a dramatic growth in chemical manufacturing in the last decade that has resulted in the release of toxic chemicals into the environment. Many of these chemicals are essential to human society but they can also pose a serious threat to human health and the bio-physical environment. One group of pollutants that has caused such world wide concern is termed as 'persistent organic pollutants' (POPs). These highly stable compounds include some pesticides, industrial chemicals and also those that are produced unintentionally as by-products of combustion and industrial processes.

POPs are specifically a problem because they: (i) cause wide range of toxic effects poisoning humans and wildlife, (ii) *p*ersist in the environment for a long time, (iii) travel long distances to all parts of the earth, even remote areas thousands of kilometres from the nearest POPs source, *and (iv)a*ccumulate in tissues of most living organisms, through food, water or air they breathe *(bioaccumulate, may biomagnify).*

The Stockholm Convention on Persistent Organic Pollutants (POPs) which entered into force on 17 May 2004 calls for each of its Parties including Papua New Guinea to update or develop their National Implementation Plans (NIPs) on the management and disposal of POPs. Hence this report which has been produced to fulfil PNG's obligation under the Stockholm Convention. Funding was provided by the Global Environment Facility through UNEP to support the production of this report.

The National Implementation Plan for PNG was developed under the auspicies of the National Coordinating Committee (NCC) which was mandated in NEC Decision 183/2001. The Department of Environment & Conservation was the Executing Agency for the project.

The NCC of the Papua New Guinea Sub-project held a number of workshops and agreed that priority for management need to be given both to POPS chemicals used and/or likely to exist in PNG, and also to other chemicals which are likely to cause health and environmental problems in PNG. At a workshop in September 2003 in Lae, it was agreed that the chemicals that need to be considered would include those that have been identified through various efforts including:

- Persistent Organic Pollutants (POPs): those specified under the Stockholm Convention.
- POPs – like chemicals: those containing some of the properties of being persistent, toxic, mobile, biologically accumulate and so are high risk to the environment and to human health through environmental and occupational exposure.
- Persistent Toxic Substances (PTS): as included in the studies published by UNEP Chemicals and Funded by GEF which included both the Pacific Islands and South East Asia and South Pacific regional reports.
- Hazardous Chemicals or environmental contaminants: as originally defined under the PNG Environmental Contaminants Act, which is now repealed and amalgamated to Environment Act 2000.
- Chemicals, included, as appropriate, under the UNITAR guidance documents for producing / updating the National Profile.
- Chemicals included under the Rotterdam Convention on "Prior Informed Consent", and the Basel and Waigani Conventions.

Information and data were collected by sectoral teams formed under the project and Action Plans have been developed to deal with key issues identified regarding the following categories of chemcals:

(i) *POPs Chemicals*

- DDT - officially used in malaria control in specific areas in the country.
- PCBs - used or contaminants of oils in transformers and capacitors in the electricity sector.
- Dioxins and furans – unintentional by-products of incomplete combustion – little is known about these in PNG.

(ii) *Other POPs-like Chemicals*

An inventory and assessment of POPs and POP's like chemicals used in the industrial sector such as timber treatment plants.

SUMMARY (Cont'd)

Management Options and Institutional Framework and Policy directions have been outlined to deal with chemical usage and disposal issues in the country. Education/ and training, and awareness issues have been highlighted as part of this programme.

The purpose of the National Implementation Plan is to set the framework for the management of Persistent Organic Pollutants and establish strategies and measures for dealing with POPs issues with the overall aim of protecting human health and the environment from the harmful effects of POPs. The NIP has been developed to highlight the following:

i) To demonstrate PNG's commitment to meeting the objects of the Stockholm Convention on POPs to which it is a Party, and in achieving compliance with the obligations set out in this and other related international and regional conventions;
ii) It presents the POPs issues in the country and the country's needs in addressing these issues, and forms the information base and the outcomes of assessment and analysis carried out in the strategies and action plan development process for the reduction or elimination of POPs to improve environmental quality and human health;
iii) Provides the basis for establishing a programme for monitoring PNG's progress in addressing the POPs issue, the effectiveness of the strategies and actions for the reduction and elimination of POPs used and releases to the environment, and sets the stage for an effective monitoring system for DDT, PCB and unintentionally produced POPs;
iv) It highlights the issues of public awareness and participation of the public and stakeholders on POPs issues for environmental and health protection;
v) The need for a strategic approach for dealing with POPs issues to maximize use of the limited resources available;
vi) Promotes and maintains an integrated and collaborative approach to dealing with POPs issues and PNG's development;
vii) Sets the stage for a comprehensive and effective framework for the chemical management system with supporting legal and administrative measures to eliminate the use of POPs and the prohibition of their imports and exports by 2010 except as allowed under the Convention;
viii) Is a starting point for a national policy or programme for the management of wastes and obsolete stockpiles of persistent organic pollutants and other hazardous chemicals including the storage, management and disposal of hazardous wastes, DDT stocks and PCB contaminated oils and equipment;
ix) It sets the stage for the establishment of an efficient and effective information exchange mechanism on chemicals and creates the opportunity for establishing an effective chemical awareness and education mechanism;
x) It forms the basis for building or strengthening national capacity for the management of chemicals in the country including areas of research and development for safer alternatives and promotion of research and support of efforts in the integrated management of insect pests and vector borne diseases through greater collaboration between line agencies and sectors, and seeks the integration of environment, agriculture and environment where feasible and practicable;
xi) It highlights the problem of relying on DDT in the health sector, and identify the need for promoting and strengthening capacity for research and development into safer alternatives including the potential for using local knowledge and integration with efforts under the healthy island concept and other such programmes, and to phase out the use of POPs in the agriculture, forestry and construction industry through the application of environmentally friendly alternatives;
xii) It sets the stage for application of environmentally friendly technologies or techniques for the management and disposal of medical, industrial and municipal wastes; and
xiii) It sets a framework for closer dialogue between line regulatory agencies, the private sector and the public.

CHAPTER 1 INTRODUCTION

The ever-increasing problem of persistence, toxicity and trans-boundary transportation of chemicals mainly through air emissions and water discharges has caused concern globally because of the adverse effects (direct and indirect) these chemicals have on human health and the natural environment. There is now clear evidence of various toxic and hazardous substances that are causing health problems, as well as, posing threats to integrity of ecosystems, and stimulating pressure by environmental groups and the international community to regulate and manage such substances. One group of chemicals possessing such characteristics are referred to as Persistent Organic Pollutants (POPs). Some POPs are used as pesticides, others are industrial chemicals, while others are generated as unintentional by-products resulting from combustion and industrial processes.

POPs are characteristics, toxic, persistent, and accumulate in the fatty tissues of most living organisms. Some of them can be transported by birds or animals or through natural processes such as the water cycle migrating over long distances through countries and continents. It is these properties of the chemicals that have caused major concern among many countries, leading to the development of global agreements and conventions to manage POPs at the country level.

1.1 The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants culminated from a series of global initiatives establishing the effects of certain pollutants on human health and the environment over the past few decades. These included various activities of the UNEP, WHO, IFCS and IPCS from the 1972 Stockholm Conference recommendation for the creation of the International Register of Potentially Toxic Chemicals (IRPTC) through the 1990 United Nations Economic Commission for Europe (UNECE) initiated work of the expert group on Persistent Organic Pollutants (POPs) and the UNEP Governing Council decision calling for the elimination, phase out or reduction with aim of elimination of substances that are toxic, persistent and bioaccumulative. The 1992 United Nations Conference on Environment and Development (Rio Earth Summit) Agenda 21 provided the framework for global actions to protect the environment and human health outlining the responsibility of states for achieving sustainable development. It is within this precinct that the Stockholm Convention was designed. The process for the development of an international legally binding instrument for action against twelve initial POPs began with the Decision 18/32 by the UNEP Governing Council in May 1995 in Nairobi which addressed the need for international action to reduce or eliminate the emissions of Persistent Organic Pollutants.

In 1996, UNECE launched negotiations on a protocol on POPs. The IFCS (Adhoc Working Group on Persistent Organic Pollutants) report concluded it appropriate and important to consider material policies in developing strategies to minimize and/or eliminate releases of both the polychlorinated

and polybrominated dioxins and furans. In1997 the recommendations of the 1996 IFCS report was adopted by UNEP Governing Council as part of its process of achieving a legally binding instrument for eliminating POPs in the global environment.

Following the recommendations of the 1996 report by the IFCS, the UNEP Governing Council in its Decision 19/13C of February 1997 directed the Executive Director to convene an inter-governmental negotiating committee (INC) with the mandate to develop an international legally binding instrument for the reduction or elimination of emissions of certain persistent organic pollutants (POPs). The initial list of twelve chemicals included aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCB, dioxins and furans. A total of five (5) INC meetings were held between 1998 and 2000. The text of the convention was adopted in Johannesburg, South Africa in December 2000. The Convention was opened for signing in 22 May 2001 in Stockholm, Swedenand entered into force on 17 May 2004, ninety days after the deposition of the 50th ratification.

The aim of the Stockholm Convention is to protect human health and the environment from the harmful effects of POPs. It recognizes the need for countries in their implementation of the convention to integrate the conventions requirements with the overall goals of sustainable development and without jeopardising a countries social or economic status. It also endeavours to compliment the requirements and implementing tools of other related international conventions particularly the Basel Convention on the Trans-boundary Movement of Hazardous Wastes and their Disposal and the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure as well as other international and regional conventions relating to chemicals. **Table 1** shows the chemicals listed under the Rotterdam and Stockholm Conventions.

Papua New Guinea is a member of the Governing Council of the United Nations Environment Programme, and it has membership to a number international and regional treaties and conventions relating to environment, and those that relate specifically to control of hazardous substances include:

(i) Basel Convention on the Trans-boundary Movement of Hazardous Wastes and Their Disposal;
(ii) Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
(iii) Stockholm Convention on Persistent Organic Pollutants;
(iv) Vienna Convention on Protection of the Ozone Layer;
(v) Montreal Protocol on Ozone Depleting Substances; and the
(vi) London Dumping of Wastes at Sea.

The regional agreements include:

(i) Waigani Convention; and
(ii) South Pacific Regional Environmental Programme

PNG is a member of the Intergovernmental Forum on Chemical Safety and though it is yet to become a Party to the Rotterdam Convention on Prior Informed Consent (PIC), PNG has been participating in the PIC process on a

voluntary basis under an interim arrangement. Since the Convention has entered into force PNG would need to ratify and become a member.

Table 1: List of Chemicals under Stockholm and Rotterdam Conventions

Stockholm Convention	Rotterdam Convention
Annex A • aldrin • chlordane • dieldrin • endrin • heptachlor • hexachlorobenzene • mirex • toxaphene • polychlorinated biphenyls (PCB)	**Pesticides** • 2,4,5-T • aldrin • captafol • chlordane • chlordimeform • chlorobenzilate • DDT • dieldrin • dinoseb and dinoseb salts • 1,2-dibromoethane (EDB) • fluroacetamide • HCH (mixed isomers) • heptachlor • hexachlorobenzene • lindane • certain mercury compounds • pentachlorophenol **certain hazardous pesticide formulations of** • methamidophos • methyl-parathion • monocrotophos • phosphamidon • parathion **Industrial chemicals** • asbestos (crocidolite) • polybrominated biphenyls (PBBs) • polychlorinated byphenyls (PCBs) • polychlorinated terphenyls (PCTs) • tris (2,3-dibromopropyl) phosphate **recently added include** **pesticides** • binapacryl • toxaphene • ethylene dichloride • ethylene oxide • DNOC and its salts • All formulations of monocrotophos and parathion • Certain formulations of benomyl, carbofuran and thiram **industrial chemicals** • asbestos (actinolite,anthophyllite, amosite, tremolite) • Tetraethyl and tetramethyl lead

1.2 What are Persistent Organic Pollutants?

Persistent Organic Pollutants (POPs) are carbon-based chemicals containing chlorine atoms in various structural conjugations. They are resistant to natural break-down, are volatile and have trans-boundary effects, travelling through air, water and migratory birds and animals; bio-accumulate in humans

and other organisms and exhibit acute and chronic effects including cancer, impairment of the immune system and effects on reproductive and other functional processes in organisms. Due to these characteristics, POPs are found in the air, water, soil and food. POPs and other persistent substances have been used since the industrial revolution. Their dangers on human health and the environment were only realized in last few decades prompting countries to take action against some of them. Incidents relating to exposure of workers in agriculture and industrial sectors and food contamination, as well as, increased scientific evidence of their effects were the driving forces behind those actions.

The Stockholm Convention was developed within the precincts of the Rio Declaration, an international effort to protect human health and the environment. Against this background, Country Parties are required to immediately implement the provisions of the convention within their capacities and capabilities.

Chapter 19 of Agenda 21 compliments the Fourth Goal of the National Constitution of PNG which calls for protection of the environment for wellbeing of the future generations.

The requirements on intentional POPs include measures to:

(i) reduce or eliminate the production and use of intentional POPs listed in Annex A Part I (aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex and toxaphene);

(ii) to identify and remove POPS listed under Annex A Part II (PCBs) from use of PCB in equipment above threshold limits, use only non-leak equipment and to remove PCB containing equipment and oils from populated areas, food and feedstock and to put in place measures for their sound management;

(iii) restrict the production and use of POPs in Annex B Part I (DDT);

(iv) allow imports and exports of POPs in Annexes A and B only for sound disposal or to a Party for permitted use or purpose or to a non-Party if certified that it would comply with applicable provisions of the convention;

(v) disallows any reuse, recycle, reclamation, recovery, reuse of POPs and prohibits improper transport of wastes across international borders;

(vi) identify and manage stockpiles of POPs and materials or wastes contaminated with POPs as well as contaminated sites.

(vii) put in place measures to avoid production of any chemicals with POPs-like characteristics;

(viii) establish mechanisms for information exchange, education and awareness of the public including women, children and the least educated in chemicals,

(ix) work towards the improvement of their emissions of unintentionally produced POPs, dioxins, furans, PCBs and HCBs through the application of “Best Available Techniques” and “Best Environmental Practices”, and

(x) establish a POPs Review Committee to consider any additional POPs candidates through an evaluation process, and Parties with articles in use and those with exemptions for close-system site-specific intermediates are to notify the Secretariat.

Provisions in the Convention also allow for developed countries to provide financial and technical assistance to developing countries and countries with economies in transition in their management of POPs and identification of stockpiles, storage and contaminated sites and the safe disposal (irreversible destruction of wastes containing POPs. .

The Convention also calls for the registration of all intentional POPs uses in the Master List and makes provisions for the inclusion of future POPs candidates. The Convention also requires the exchange of POPs related information and the designation of a National Focal Point for this purpose. Article 10 calls for parties to promote and facilitate public information, awareness and education programmes within their capabilities. Funding will be provided to each participating country to establish their POPs inventories and assess the infrastructure and capacity and identify the needs for managing POPs.

1.3 Development of National Implementation Plans

Article 7 of the Stockholm Convention calls for countries to endeavour to update or develop and implement a National Implementation Plan (NIP) for the management of POPs to meet their obligations under the convention. Parties are required to transmit their plans to the conference of the parties within 2 years of the Convention's entry into force. This plan will be reviewed on a periodic basis and in a manner to be determined by the conference of the parties. Parties are required to have in place measures to reduce or eliminate the intentional production and use of POPs and releases from unintentional production, and this information should be included in the NIP.

1.3.1 Formulation of the PNG National Implementation Plan

The National Executive Council (NEC), in its decision No: 183/2001 in 2001 gave the National Coordinating Committee the mandate to oversee the overall operation and implementation of the NIP development project.

The preparation of the PNG National Implementation Plan was funded under a 2-year GEF/UNEP 12-Country Pilot National Implementation Plans on Persistent Organic Pollutants (POPs). The project was funded by the Global Environment Facility, with co-financing provided by the government of Germany. The United Nations Environment Programme was the implementing agency. A total of $306,000 was granted to PNG to undertake the task. The Government of PNG provided in-kind support through provision of office space, utilities and most of the furniture, staff in the National Coordinating Committee and Task Teams for preparation of sectoral reports and administration and general supervision for the project. The focal point appointed by the PNG Government is Department of Environment and Conservation, which provided overall project management including management of the Project Trust Fund.

The goal of the NIP is to provide the overall framework for the management of Persistent Organic Pollutants and other persistent chemicals in the country and sets forth the strategies and measures for dealing with these substances

to assist Papua New Guinea in meeting its obligations under the Stockholm Convention on POPs. It provides an initial inventory of POPs (chemicals, obsolete stockpiles and contaminated sites) and presents the results of assessments of their management and proposed Action Plan and strategies to address priority issues concerning POPs in the country.

PNG received additional financial assistance from the GEF-UNEP under its Small Grants Scheme to undertake some initial advocacy activities to create some public awareness and increase the level of understanding and knowledge of various community members and groups about POPs and their risks. Under this programme networks were established with women's groups, and other community based groups including schools. The public was also informed about the Stockholm Convention, the NIP development process, and health and safety issues concerning POPs.

It is envisaged that that the National Implementation Plan would be integrated into core government programmes including the Department of Environment and Conservation Corporate Plan and Vision which will form part of the overall Government's plan and strategy for environmental protection and management in the country. This plan will supplement other supporting policies and strategies in the areas of health, education, agriculture and waste management implemented by other agencies of the PNG Government. It has been developed in the context of the Medium Term Development Strategy (MTDS), the PNG Millenium Development Goals and will support the Government's Export Driven Economic Recovery Policy and Poverty Alleviation Strategy with the overall goal of promoting environmental sustainability and socio-economic development.

1.3.2 Stakeholder Participation

The Department of Environment and Conservation; being the national focal point for the Stockholm Convention in the country, took the lead role in coordinating stakeholder participation in the development of the National Implementation Plan for Papua New Guinea. Line Agencies of Government that participated in the consultation process included Department of Health, Department of Agriculture and Livestock, Department of Attorney General, Internal Revenue Commission (Customs), Department of National Planning & Monitoring, Department of Labour & Employment, Department of the Prime Minister & National Executive Council, University of PNG who represented the academia, National Environmental Watch Group who represented the Civil Society, Oil Palm Research Association who represented the business sector. Technical officers from these organisations formed the National Coordinating Committee (NCC), and formed various Task Teams to develop sectoral reports concerning POPs in PNG.

The list of those who contributed to the development in one way or another is given in *Annex II*. The National Coordinator of the Project was responsible for coordinating the functions and meetings of the National Coordinating Committee and Task Teams.

Since the start of the NIP formulation process, over six major workshops were held in the country between 2003 and 2004. These workshops covered topics on chemical risks and management, data collection and analysis, priority setting on critical management issues, and capacity building and training. The workshops also highlighted relevant regulatory and non-regulatory measures

for dealing with POPs in the country. Participants attended in these workshops came from various government departments and agencies, provincial authorities, industries, NGO groups and the general public, and stakeholders shared their experiences on the status of POPs and management of chemicals in their respective establishments.

While the emphasis of the NIP is on POPs, it is recognized that POPs issues cannot be treated in isolation as economic, social and developmental implications could arise from decisions made with regard to POP management issues. The NIP thus encompasses other chemicals that may in the future, become POPs candidates and so a holistic approach is taken to accommodate all chemical management issues together with social, economic and developmental concerns.

1.4 Structure of the NIP Report

The structure of the NIP is as follows:

Chapter 2 - provides a general profile of the Country including information on the Geography and Population, the Political and Economic profile, an overview of the environment, a profile of the various sectors, Assessment of the POPs Issue in the country;

Chapter 3 - outlines the Current Situation (Existing Legislative Institutional and Policy Framework, and an Assessment of existing POPs in the Country).

Chapter 4 has information on the Action Plans for Strengthening Regulatory and Management Functions.

Chapter 5 - outlines the Strategies and Priorities for Implementation.

Chapter 6 - the detail Implementation Plan (Timetable for Plan Implementation, Activities, and Resource Requirements) is presented here.

Chapter 7 - highlights the need for Resources to implement the NIP in PNG.

Annexure - comprises of the original action plans produced by task teams.

CHAPTER 2 COUNTRY PROFILE

2.1 GENERAL OVERVIEW

2.1.1 Geographical Setting

Papua New Guinea (PNG) comprises the eastern half of the island of New Guinea, and it is situated between latitude 0-12^{o} South and latitudes 141-153^{o}. It is bounded on the north by the Bismarck Sea; on the east by the Solomon Sea; on the south by the Coral Sea and the Torres Strait and on the west by the Indonesian province of West Papua (formerly Irian Jaya). The immediate neighbouring countries include Indonesia on the east, Solomon Islands on the West, Federated States of Micronesia and Palau on the North and Australia on the South. A land boundary of 820 km separates PNG from the Indonesian Province of Papua.

Figure1: Map showing Location of Papua New Guinea among Neighbouring Countries

PNG has a total land area of 462,840 km^2 with over 78 percent forest cover. Like any Pacific Island State, PNG is a maritime state with a total sea area of 3,120,000 km^2 and a total coastline of 17,110 kilometres. It comprises of

greater islands of New Britain, New Ireland, Manus and Bougainville along with about 600 smaller islands and islets.

2.1.2 Landform and Climate

Landform

The country has variable landforms ranging from flat to undulating lowlands at the coast to hills and mountain terrains towards the interior of the main island of New Guinea. Many of the 600 islands have similar topography except for the smaller ones that are generally flat to undulating. In the southern part of the country, it is deeply indented by river mouths and by a number of bays, including, at the eastern extremity called Milne Bay. The Fly River is the largest river system in the country and it forms a vast low-lying catchment with inter-connected tributaries and a large delta to the south-west. On the northern side of the island, the Sepik, Ramu and Markham rivers have similar watershed characteristic and these rivers flow in a northerly direction towards the Bismarck sea.

The country is characterised by rugged mountain ranges that stretch along the interior of the mainland to form large corridors between the south and north of the island of PNG. The main mountain ranges that separate the island of mainland PNG are the Toricelli-Bewani ranges which stretch from West Papua (border with Indonesia) to the east, and this range joins the Kubor ranges in central highlands of PNG where Mt Willem (the highest point of PNG with an elevation of 4,509 metres above sea level) is situated. . The mountain ranges act as corridors between the north and south of the island of New Guinea, and these has caused main river systems to cascade and flow in opposite directions.

The large islands of PNG including New Britain, New Ireland, Manus and Bougainville have similar landforms with main mountainous ranges cutting across the islands causing major river systems to flow in opposite directions. These islands are mostly situated in the north of mainland PNG, and are volcanic in origin. The smaller islands are mostly low-lying coral atolls.

More detailed information on landforms in PNG is provided in the *PNG National Profile* document appended as Volume 2 of this report.

Climate

Papua New Guinea has a tropical climate, which is typically monsoonal and is hot and humid throughout the year. In the lowland regions, the temperatures range between 25^{o}C and 32^{o}C and it is quite warm both during the day and night. In the highlands regions, the temperatures range from about 15^{o}C to 20^{o}C and night temperatures can drop to below 15^{o}C depending on elevation and location, and the localised rainfall patterns.

Annual rainfalls are greatly influenced by topographic conditions and localised wind patterns, thus vary from one place to the other. The highest rainfall recorded in the country is at the upper reaches of the Fly river with maximum annual about 8,000mm. The highlands region has rainfall ranging from 2000mm to 4000mm depending on topographic and other environmental

factors. The coastal areas experience comparably lower rainfall ranging from 1,800mm to about 1,200mm in Port Moresby.

2.1.3 Biological Diversity

The island of New Guinea is home to about five percent of the world's biological diversity. This is remarkable in itself given that New Guinea has one percent of the world's land area. This includes both marine and terrestrial plants and animal species, and some of these are endemic and are important from a scientific and customary perspective. Papua New Guinea's wildlife is abundant and varied, and the commonly found mammals include the tree kangaroo, wallaby, wild pig, and various species of squirrels, rats and bats. There are numerous species of butterflies including the world's largest butterfly (Queen Alexandria Birdwing), and tropical birds abound, including the bird of paradise. The coastal waters support many species of fish, shellfish, turtles and corals.

The freshwater ecosystems which comprise of about 34,444 km^2 of wetlands and 290,194km2 of watershed represent about 7 percent and 12 percent of the total land area of the country respectively. The mountain, island and marine ecosystems make up the other 81 percent. These ecosystems are home to 300 000 insects, 90 000 fungi, 762 birds of which of which 405 are endemic, 187 mammals and 71 species of marsupials of which 60 are endemic, 195 species of reptiles of which 98 species are snakes, Andover 3000 fresh and marine fish species. In terms of fauna, there are over 20,000 species of fern and flowering plants, 15 000 vascular plants, and over 300 corals species.

About 82 per cent (1995) of Papua New Guinea's total land area is under forest cover, including some of the least disturbed tropical forests in the world. However, some destruction of forest areas rich in biodiversity has occurred. In the mid-1990s, there was clear evidence of deforestation which resulted from clear-fell logging operations and subsistence gardening activities. About 666,000 hectares of forestland was lost, and forest habitats holding 122 species of plants and animals were threatened with extinction.

Only 1.5 per cent of the land in Papua New Guinea is arable or under permanent cropland, but agriculture is nonetheless an integral part of the country's economy. Soil erosion is a problem in areas cleared for agricultural use. Mining has caused serious environmental problems, including pollution of waterways with untreated heavy-metal run-off from mines. Papua New Guinea is party to international treaties concerning biodiversity, climate change, endangered species, marine dumping, ship pollution, tropical timber, and wetlands.

2.1.4 Government and Political Profile

The PNG government structure is based on the Westminster system and comprises three levels of government; the national, provincial and local level governments. Each parliament has a five year term and is elected through a preferential voting basis. It is governed by a constitution that came into effect when it gained independence from Australia in 1975. The political head of the

country is the Prime Minister who is elected by parliament, and the main executive body is the National Executive Council which is responsible to parliament. The Queen is the Head of State and is represented by a Governor General who is also elected by parliament and approved by the monarch. The country is politically divided into nineteen provinces and the national capital district (Port Moresby), constituting a number of districts/electorates with a total of 109 members of parliament. Each province is governed by a Provincial Government and administered by a Provincial Administration.

In 1995 the government re-established the National Planning Office and passed the New Organic Law on Provincial and Local Level Governments (OLPLLG). Both these events are landmark decisions in terms of planning and governance in PNG. The reforms allowed provincial governments to impose taxes and control in areas such as education, health and local economies, among other things, but the provincial governments are answerable to the national parliament. The OLPLLG brought about significant reforms to the powers, roles and responsibilities and structures of all levels of government, both on the political as well as the administrative structures. It was a response to increasing dissatisfaction about the poor delivery of goods and services at local levels and was intended to increase participation at community levels.

In essence, the OLPGLLG gave local level Governments direct funding, law making powers and decision making powers, as well as, some revenue raising powers. As a result, LLGs are now responsible for planning and budgeting, charging taxes and levies, passing laws and contracting organisations to provide services.

Perhaps the most important policy document in terms of national planning since the OLPGLLG was passed in 1995 is the Medium Term Development Strategy (MTDS). The overall goal of the MTDS is to improve the delivery and impact of goods and services to the people of PNG. In this regard, it complements the spirit of the OLPLLG. In essence this document has three main elements: Firstly, it laid down government's priorities for the period 1997 to 2002. These priority areas are health, education, infrastructure, private sector and law and order. Secondly, it sets a resource framework linking the goals and policies to the resources expected to be available over this period – The Medium Term Resource Framework. Thirdly, it set out the mechanisms for monitoring the achievement or otherwise of this goals. The goals were recently reviewed, and a second MTDS was passed by parliament in 2005 with emphasis on the same themes to promote the Government's new development policy on "Export-Driven Recovery" which promotes downstream processing and export of products from PNG to overseas markets.

2.1.5 Education System

Improving access to education was a government priority since the 1990s, with initiatives aiming to introduce compulsory universal primary education. In 2004, the Government adopted its National Education Plan for the period 2005-2014 with the theme "Prosperity through Self-Reliance" as part of the Government's Medium Term Development Strategy. According to recent media reports (February 2006) by the Secretary of the Department of

Education, the aim of this plan is to promote integral human development of young people so that they can become literate, skilled, healthy and self-reliant citizen who can contribute to the peace and prosperity of the nation. Since the start of the education reform sector about 12 years ago, the Government now provides eduction and training for over 1 million students in 8,000 institutions. Enrolments have doubled and 2-3 times more students are now completing grade 8 and 10, and eight times more students are completing grade 12. There is also greater support for vocational and college training as well as adult literacy programmes. Despite this campaign, a large number of school-age children do not attend school, with a non-attendance and dropout rate of 30 per cent. However, the literacy rate is relatively high at 80 percent since 2000.

The country has four government-run universities—the University of Papua New Guinea, the Papua New Guinea University of Technology, the University of Goroka (for secondary school teachers), and the University of Vudal (for Agriculture training). There are also three church-run universities – the Divine Word University (owned by the Catholic Church), the Pacific Adventist University (owned by the Seventh Day Adventist Church) and Jubilee University (owned by the Penticostal Churches.

2.1.6 Population and Culture

Papua New Guinea has a population of 5.4 million (based on the 2000 census), and an annual growth rate of 2.5 percent. The overall population density is about 12 people per square kilometre. Over 80 percent of the people are subsistence based who live in rural areas. Infant mortality in 2004 was 53 deaths per 1,000 live births, and life expectancy in 2004 was 65 years.

The country is divided into four regions. The Momase region includes the northern part of the country and includes the provinces of Morobe, Madang, East and West Sepik. The New Guinea Islands region is made up of the large islands of Manus, Bougainville, and New Britain and some smaller islands and atolls. The Papuan region is the southern part of the country comprising the Western, Central, Gulf and Oro Provinces. The Highlands region comprises the provinces of Eastern Highland, Western Highlands, Enga and Southern Highlands forming the central mountainous region of the island of New Guinea. About 98 per cent of the people are Melanesian, and two percent are Polynesian, Micronesian, and mix Chinese and European descent.

According to the Summer Institute of Linguistics, there are more than 800 indigenous languages spoken in Papua New Guinea, which is believed to be the only country in the world with the most diverse languages and cultures. The official languages are Hiri Motu, Tok Pisin, and English. Tok pisin is widely spoken in all four regions of the country, and hiri motu is spoken in the Papuan region whilst English is the official and the main language for business and commerce and education although in elementary schools students are taught in local vernacular.

Papua New Guinea was inhabited by people for at least 50,000 years. Several waves of migration to Papua New Guinea from Asia and through neighbouring islands have taken place over the centuries, with each group

developing its own language and tribal culture. This cultural diversity has provided Papua New Guinea with a fascinating cultural heritage of sculpture, painting, handicraft, music, storytelling, and dances.

2.1.7 Economic Sector Profiles

According to the World Bank figures of 2002, Papua New Guinea's gross national product is about US$2,840 million a year which is equivalent to US$530 per head. In 1999 estimated budgetary expenditure was US$1,071 million against estimated income of US$785 million. The monetary unit of Papua New Guinea is the kina, which is divided into 100 toeas.

Mineral and petroleum exports from copper, gold and liquefied gas are the main sources of revenue for the country. Copper is still the most important export, although exports dropped after the closure of the Bougainville mines in 1989 owing to secessionist rebellion. Timber and agricultural commodities like cocoa and coffee are also high in the list of export commodities

Papua New Guinea depends on imports for most of its consumers, intermediate and capital goods. Imports totalled K 967 million in 2003. The main imports are machinery and transport equipment, manufactured goods, processed foods, lubricants and chemicals. The major import partners are Australia (44.3 %), Singapore (20.5 %), New Zealand (7.7%) and China (4.9%). It is the Government policy to ensure that Papua New Guinea obtains goods for developmental needs at the lowest possible cost. For this reason the import duty on machinery and equipment other than transport is generally low. In terms of export, PNG exports mainly oil, gold copper ore, logs, palm oil, coffee, crayfish, tea, spices and prawns, and the principal imports are machinery and transport equipment, foodstuffs, and petroleum products. Its export partners are Australia (27 %), Japan (7.3 %), China (5.8 %). In general, PNG has an "open economy" in the sense that it places very few restrictions on imports. Its tariffs are modest compared to other developing countries and are mainly for revenue purposes.

(i) Agriculture Industry

Agriculture is the mainstay of life in Papua New Guinea providing income, employment and a livelihood for over 85 per cent of the population and absorbs about 40 per cent of formal private sector employment (DAL, 1995). It also contributes around one-quarter of GDP and over one-third of export income (World Bank, 1997). Three sub-sectors exist in the agriculture sector: the plantations and estates, smallholders growing cash crops and subsistence farmers growing staple root crops, fruits and vegetables for their own consumption or for sale on a small scale within their immediate vicinity. There is considerable overlap between the subsistence sector and the smallholders, both producing cash crops, although few people limit themselves exclusively to one or the other. Their activities are more or less determined by commodity prices. The major export cash crops coffee, cocoa and copra are grown by all categories of producers but types of crops grown are dependent on the soil and climatic conditions.

According to DAL reports of 2001, smallholders are the main driving force in agricultural production in PNG, accounting for about 85, 000 households (NDAL, 2001). They traditionally produce 75 % coffee, 80% of coconuts, 70 % of cocoa and 25 % of oil palm. Nearly all the cardamom and chillies and pyrethrum are smallholder produce. Downstream processing of agriculture output is very limited with only an estimated 8 per cent going into local processing and manufacturing such as palm oil, coconut oil and coffee. Most commodities are simply dried/cured, sorted, graded and packed for export. The most important agricultural export commodity is coffee with over 62,500 tonnes in 2003, cocoa with over 42,000 tonnes and copra with over 100,000 in 1995

Some 97 per cent of the agricultural land is held under traditional land tenure system where communal ownership is common. About 30 per cent of the total land area of 460,000 km^2 is classified as suitable for major agricultural development. Of this, about a quarter is regularly used for agriculture and another quarter is used at lower intensity, hence half of the total arable land is being used for agriculture. Larger contiguous areas of unused arable land are generally available in areas with low population densities than those in highly densely populated areas.

The value of commercial agriculture to the export economy of PNG for the period 1993 to 1997 averaged approximately K500 million annually, but increased to approximately K900 million annually between 1999 and 2003. Much of this increase is due to oil palm and in recent years cocoa. The real significance of this sector is experienced with in the rural areas where populations rely heavily on agriculture for both their basic needs and cash income.

Fishing and hunting are also important subsistence activities practised by over 80 percent of the rural people. Poultry is the main livestock industry in the country with over 3.92 million chicken reported to be farmed in the country in 2003 followed by piggery with 1.70 million farmed and slaughtered in the same period.

(ii) Forestry Industry

Up to 77 percent of the total land area of PNG (36 million hectares) is still primary forest of which approximately 180,000 hectares is selectively logged annually. Another 25,000 hectares of natural forest are cleared for agricultural and infrastructure development. It is estimated that shifting cultivation clears another 200,000 hectares, although it is not clear as to how much of this is primary forest.

Papua New Guinea is a relatively small player in the global market for tropical timber products, which accounts for about one quarter of world timber exports. But PNG retains an important role as the world's second largest exporter of tropical logs. About 1.5 million cubic meters of tropical hardwood timber were exported which in reality was a drop down from a peak of 3 million cubic meters in 1997.

Papua New Guinea's forestry activities have slowed down after a 10-year pause in the awarding of timber permits due to a moratorium imposed by the

PNG Government to meet one of its condition set by the World Bank) and a more recent plunge in global timber prices,. This decline has seen the nation's log production being processed into high valued products prior to export. This direction is in line with the government's policy to promote export-led economic growth.

Figures from the PNG Forest Industry Association (PNGFIA) show that the value of processed timber products has risen four-fold in the past 5 years, going from K24 million in 1997 to K98 million last year. One third of Papua New Guinea's timber industry is made up of production and sales "dedicated to processing".

(iii) Fisheries

PNG has an extensive and valuable fisheries sector. The sector covers commercial, artisanal, subsistence and recreational fisheries, and the largest fishery in the country is commercial tuna fishery. The other significant sectors are beeche-de-mer, lobster and reef fish. There is also potential for aquaculture and inland fishery but these are currently not been fully exploited.

PNG has a fisheries zone of 2.4 million square kilometres, and it is one of the largest in the South Pacific region. This zone includes an extended reef system, numerous islands and an extensive coastline. This vast area provides huge opportunities in terms of resources but also presents an enormous challenge in terms of monitoring, control and surveillance for illegal commercial fishing companies. Threats to fisheries include over-exploitation, land based pollution, dynamite fishing and sedimentation.

(iv) Mining and Petroleum Industry

The mining and petroleum industry in Papua New Guinea play a major role with respect to the development of the economy. Since the earliest discovery of gold in PNG and its development, the sector has been responsible for many of the infrastructure developments. During the period 1999-2003 the sector accounted for 70-80 per cent of the total export earnings and like agriculture, contributed more than a quarter of the GDP and contributed significantly to major spin-off benefits such as landowner businesses, contractors and retailers.

The operations of the large copper and gold mines began in the 1970s on Bougainville and on the mainland. The Bougainville copper mines, however, closed in 1989 due to secessionist activities on the island. Mineral output in 2002 included copper, 211,311 tonnes; silver, 75 tonnes; and gold 65,200 kg earning 51.3 per cent of exports. Despite being an important economic activity, the exploitation of Papua New Guinea's extensive mineral resources, has been hampered factors such as high cost of development and inhospitable terrain.

Major mines in the country include the Ok Tedi Mining Ltd (gold and copper) in Western province, the Porgera Joint Venture (gold) in Enga Province, the Tolukuma Gold Mine in Central province, and the Lihir Gold Mine in New Ireland Province. Other new mines are now in the development process.

These include the Ramu Nickel Mine in Madang Province and the Hidden Valley Gold Mine in Morobe Province.

Current petroleum production operations include the Kutubu, Gobe and Moran oil fields and the Hides Natural Gas; all in the Southern Highlands province. The petroleum industry also contributes substantially to PNG exports and GDP.

(v) Manufacturing Industry

The country's manufacturing industry is limited mainly to the production of basic consumer items such as processed foods, furniture and clothing. The company has a large sugar factory and the refined products are exported to overseas markets in the United States, Solomon Islands and Fiji. Under the current Government's export recovery policy, the Government is encouraging informal sector businesses such as small-sale artefact industries, and downstream processing of raw materials to encourage employment, promote economic growth and rural livelihood.

(vi) Transport and Road Infrastructure

The country has over 20,000 kilometres of roads and there are no railways. There is no national road network linking all the main commercial centres in the country mainly due to rugged terrain that makes it extremely difficult and expensive to construct roads. The only methods of transport to major towns in the country are air and sea. Thus, much of the trade in goods and services has to be conducted through expensive air transport, or slow and inefficient coastal shipping services. As a result, the level of in-country trade and commercial activity is generally low.

Air services provide essential links for many areas around the country. Air Niugini; the national airline offers domestic and international connections. There are also other airline companies which operate as third level airlines serving mostly domestic routes.

(vii) Media and Information

There are two daily newspapers: the Post Courier and The National. There is one commercial television station (Em TV) and provincial radio station services in every province. Radio is the main mode of information dissemination to the rural populations. There are currently four main radio stations - one of these is owned by the Government while the other two are owned by Christian missions.

2.2 ENVIRONMENT OVERVIEW

Papua New Guinea holds 5-7 percent of the world's biodiversity, and there are many endemic species of plants and animal life not found anywhere on earth. Some of these diverse plants and animals live in habitats that are very fragile, and are also culturally sensitive due to the connections they have had with local inhabitants for thousands of years. The Conservation Needs

Assessment study of 1996 on the biological diversity of PNG reported over 15-20,000 higher plants, 300 species of orchards, 600 species of fish, 800 species of corals, 304 species of mammals, 733 species of birds, 298 species of reptiles, and 228 species of amphibians. There are 45 different types of forest and wetlands of mixed stands containing tropical timbers, an abundant supply of clean fresh water and generally a pollution free atmosphere. There are extensive mineral deposits and hydrocarbons, some of which are yet to be exploited.

PNG's natural habitats and biodiversity could be at risk of destruction if no proper framework, strategies and mechanisms are put in place to plan for the management, protection and conservation of the natural resources and mitigation of potentially harmful impacts resulting from project development activities. In fact, it is the duty of every citizen of PNG, and developers to take measures to protect and conserve these natural ecosystems and habitats, animal and plant species that exist, many of which are fragile.

The biological resources are owned and managed by the indigenous population under their traditional land tenure system. However, the forces of social and economic development are threatening this rich biological diversity and the livelihood of the local people who are dependent on these rich terrestrial and marine ecosystems for their rural livelihood. The Fourth Goal of the Constitution of PNG calls for the natural resources of the country to be used wisely and managed sustainably so that the future generation can benefit from the use of these resources in the years to come.

Recent rural and industrial development activities and unsustainable extraction of natural resources has resulted in over-exploitation of natural resources in PNG. Water bodies in some areas have been contaminated and some habitats of important plant and animal species have been disturbed, an example of this is Taurama river which has been disturbed due to widespread logging activities by large-scale logging companies. There have been reports of fish resources been depleted, for instance along the Fly river system due to sedimentation effects from the mine. The quality of the environment at many resource extraction sites have been put at risk also from the use and disposal, and spillage and emission of dangerous and toxic chemicals. To conserve and protect the environment and human health from dangerous chemicals, it is necessary to ensure that appropriate environmentally systems are put in place to manage dangerous and toxic chemicals.

These rising expectations have in the past led the governments of the day to aggressively pursue the development and processing of these natural resources, often in an unsustainable manner. Environmental considerations and the sustainability of the resource base have often been relegated to a low level of priority as the demands for development revenues superseded all other considerations. Furthermore, in the rush to increase exports and maintain the revenue base, little thought appears to have been given to the sustainability and management of the natural environment.

It is likely that the demand for revenue generation will continue to rise, and natural resources exploited will proportionally increase over time. The potential for significant further degradation is inevitable if no measures of

environmental protection and management are established at resource extraction sites.

A number of environmental NGOs in the country have been very vocal since the 1990s and international assistance has been sought from overseas NGOs to protect the natural environment from further degradation. These NGOs recognized this task as challenging, and local capacity has been built at the community level to inform resource owners to be aware of their right to a clean and safe environment. Environmental NGO activities have been confined mainly to biodiversity conservation and mining especially in terms of awareness and advocacy on chemical related issues. Environmental education and awareness is strongly advocated as a tool to empower the resource owners and their children to care for and respect their environment. Equally important is the challenge and urgency to improve the capacity of state agencies to develop monitoring programmes to identify and address any environmental degradation, and also establish an effective database system to monitor toxic effluent and solid waste management generated from industries and urban environments. In this respect, the integration of environmental issues into the development agenda should be a priority programme in order to promote sustainable growth and development in the country.

PNG is a party to a number of international environmental conventions such as the Stockholm Convention on POPs. However, the level of commitment to environmental protection does not feature on the priority list of the government. It is argued that perhaps this commitment is not forthcoming from the Government because it is presently taken for granted that the state of environment in PNG is still intact and environmental degradation is of no immediate concern at present. This is indicated by the level of funding and support provided to institutions of state mandated to safeguard and manage the state of the environment in PNG.

2.3 INSTITUTIONAL AND POLICY FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

The need for sustainable development was recognized in the early history of the country and has been enshrined in the National Constitution of Papua New Guinea which has five National Goals and Directive principles. The fourth goal states that "*Papua New Guinea's natural resources and environment should be conserved for the collective benefit of all and should be replenished for the present and future generations*." The supporting Directive Principles call for:

(i) Wise use to be made of our natural resources and environment in and on the land or seabed, in the sea, under the land and in the air, in the interest of our development and in trust for future generations;

(ii) The conservation and replenishment, for the benefit of ourselves and prosperity, of the environment and its sacred, scenic and historical qualities; and

(iii) All necessary steps to be taken to give adequate protection to our valuable birds, animals, insects, plants and trees.

The Department of Environment and Conservation (DEC) is the agency of the Government mandated to protect and manage the bio-physical environment of the country, as well as, to protect the socio-economic dimensions of the environment. The enforcement and monitoring functions also rests with this agency which is mandated to support the government in its efforts towards poverty alleviation and the export driven economy whilst maintaining the quality of the environment and its resources.

A number of organizations are also mandated to support other aspects of the fourth goal of the constitution and so there is scope for netter coordination and networking between these organizations and DEC.

The DEC Mission Statement is: "*To ensure natural and physical resources are managed to sustain environmental quality and human well being*." A new Environment Act 2000 (No. 64 of 2000, Amended 2004) was passed by Parliament and gazetted on 19th April 2001 after extensive consultation with many stakeholders representing government, non-governmental organizations, private sector, academia and provincial governments. The new Environment Act is an amalgamation of the Environmental Planning Act (1979), the Environmental Contaminants Act (1978), and the Water Resources Act (1982).

The Department of Environment and Conservation (DEC) is responsible for the administration and implementation of the new Environmental Law. Any developer who wishes to conduct any form of development that is likely to cause an impact on the natural condition of the environment would be required to comply fully with the provisions relating to sound environmental management practices, and environmental sustainability and rural development.

The new Environment Act 2000 complements the Medium Term Development Strategy which focuses on five key thematic areas:

- Export driven economy
- Good Governance
- Rural Development.
- Human Resource Development
- Poverty Alleviation

The new legislation is aimed at increasing the efficiency in terms of environmental regulation, enforcement and monitoring. Effective implementation of the legislation would compliment the Government's export-driven economic recovery policy by providing a framework with a step-by-step process, and a "one-stop-shop" to potential developers requiring environmental permits to license their waste disposal and production systems.

CHAPTER 3 CURRENT SITUATION PERTAINING TO MANAGEMENT OF PERSISTENT ORGANIC POLLUTANTS IN PAPUA NEW GUINEA

The new Environment Act, its procedures and guidelines for environmental impact assessment, and enforcement and monitoring has been developed to provide for, and give effect to the Fourth National Goal and Directive Principles of the PNG Constitution, The amalgamation of the three environmental Acts has resulted in streamlining the rather complicated permit approval procedures.

This Act has three classifications of "Activities" which is defined as "*an activity which results or is likely to result in a change to the environment*", and could involve activities like:

(i) construction of works, land clearance, demolition, excavation or other works in relation to land or water;
(ii) installation, operation or maintenance of plant or equipment;
(iii) activities for purpose of extracting or harvesting natural resources;
(iv) release of contaminants, chemicals or pollutants to land, air, water in conjunction with any of the activities.

Prior to the enactment of the new Environment Act 2000, the principal Act that was administered by the Department of Environment and Conservation to regulate the importation, exportation, use, manufacture, handling and disposal of hazardous substances was the Environmental Contaminants Act (1978). This Act was not fully enforced due to lack of resources. It has now been repealed and many provisions relating to chemical and hazardous waste management have been amalgamated into the current Environment Act 2000.

3.1 EXISTING INSTITUTIONAL, POLICY AND REGULATORY FRAMEWORK

It is a constitutional requirement for all citizens of the Papua New Guinea to protect the environment. Corporate bodies whose operations or activities cause adverse or irreversible damage to the environment are required to put in place proper management strategies to avoid or mitigate adverse impacts.

Chemical users also have a role in having in place proper procedures to ensure that the chemicals used are managed in a manner that would avoid unnecessary releases to the environment.

3.1.1 Institutional and Policy Framework

The Department of Environment & Conservation is empowered under the Environmental Act, 2000 (Pesticide Regulation 1998) to monitor and regulate the import, use and management of chemicals in the country. Under the regulation, DEC is responsible for awarding import permits, transfer of permits, issuing of pesticide guidelines (for sales, importation, manufacture, distribution, promotion, advertisement and use), keep records of pesticide imports, provide packaging guidelines, scrutinize advertising, and impose fines for offences of non-compliance.

There is no institutional framework or network for controlling the monitoring and management of chemicals in Papua New Guinea. A permitting system existed under the repealed Environmental Contaminants Act, but this was not fully enforced due to lack of capacity in the Department of Environment and Conservation. Appropriate systems are now being established under the new Environment Act to ensure the import, use and management of chemicals are properly registered and monitored. For instance, a Regulation of the Environment Act has a provision for pesticides users to submit annual Pesticides Returns which gives an indication of the amount of the various pesticides products being imported.

Apart from pesticides, management of hazardous chemicals especially industrial chemicals is non-existent as far as application of a national Regulation of an Act of Parliament is concerned. Pesticides and Chemicals for household use, pharmaceuticals and vetenerary chemicals) except ecto-parasiticides) are not regulated under the Environment Act. While pesticides dealers are required under the Environment Contaminants (Pesticides) Regulation to apply for permits to import their products into the country, there are still a lot of cases where operators are importing and selling products without licensing.

The Secretary of the Department of Environment & Conservation is the Registrar of Pesticides, and his Department is responsible for field inspections and monitoring, and consulting with relevant agencies of Government in ensuring safe use and handling of chemicals and hazardous substances. Various other Government bodies have been given similar responsibilities. For instance, the Customs Operations section of the Internal Revenue Commission (IRC), who are responsible for regulating the export and import of goods into the country, have also been empowered under the Customs and Exercise Act to assist in the regulation of hazardous chemicals at the point of entry. Similarly, the Attorney General's Office is responsible for any matters of litigation, the Health Department is directly responsible for monitoring effects of chemicals on public health, the Department of Trade and Industry for trade of goods by private sector industries, and the private sector agencies are also responsible for directly liaising with their respective industries to introduce best practices of waste management, public health and safety.

Importers of hazardous chemicals (excluding those holding permits for pesticides) bring in chemicals into the country without prior approval from the regulatory bodies such as DEC. The only clearance given is by the PNG Customs. However, weaknesses in this system result in importation of some highly toxic chemicals which need proper management. The clearance done by Customs Section of IRC has a general database for clearance which groups chemicals into general categories, and no specification is given to differentiate between the types of chemicals.

No systematic process for policy consultation exists at present between regulatory agencies of government. It is only recently that DEC is carrying out awareness and informing private sector agencies about the risks and hazardous nature of POPs and POP-like chemicals including DDT which is still being used in the health sector for the control of malaria in the Highlands

region. Awareness is also been raised by DEC and Department of Agriculture and National Agriculture Research Institute (NARI) about the common types of chemicals used in the agricultural sector (eg: organophosphate and carbamate group of pesticides and fertilizers) about the potential risks of these chemicals to humans and the environment.

3.1.2 Legislative and Regulatory Framework

The new Environment Act provides for a regulatory framework for environment management which also covers management of chemicals and hazardous substances. The Act specifies three levels of Activities which is more-or-less a categorisation of the degree and magnitude of environmental impacts. Levels of impacts are categorized into three groups:

Level 1 Activities - are those that require a minimum level of environmental protection. Regulation of such activities will be based on standards, codes and regulations that set benchmarks for environmentally acceptable activities. For example, maximum discharge levels, ambient quality standards for receiving environment, codes of practice, guidelines for best/acceptable practice. In cases of non-compliance, environmental protection orders, clean-up orders and emergency directions may be issued.

Level 2 Activities - are those that require a framework of environmental approvals allowing for water discharge permits, or licensing for importation, sale and use of environmental contaminants (hazardous chemicals) and for site-specific environmental conditions to be set for these activities which have more significant potential impacts. Level two activities will be regulated by means of conditions in environmental permits, environmental improvement plans and environmental management programs.

Level 3 activities - cover those with the potential of major environmental impact and are projects of national significance or of large scale. Such activities will be subject to a process of public and detailed considerations of environmental implication through the Environmental Impact Assessment process.

The management of chemicals would fall under Level 1 and Level 2 activities, with hazardous environmental contaminants and important pollutants subject to the Level 2 regulatory mechanism. Various regulations supporting the Act were gazetted in 2002 (see **Table 2.0**), and making the Act fully operational. Various tools have been developed to assist implement the new *Environment Act* and its regulations. These include environmental policies and regulations, environmental impact assessment, environmental permits, codes of practice , bonds, fees and levies, environmental improvement plans, clean-up orders, environmental protection order, auditing and monitoring. Persons and organisations are required to accept an “environmental duty [of care]” and to avoid causing environmental harm.

Table 2.0: References to Existing Legal Instruments which Address the Management of Chemicals in Papua New Guinea

Legal Instrument (Type, Reference, Year)	**Responsible bodies**	**Chemical Use Categories Covered/ Areas**	**Objective of Legislation**	**Relevant Articles / Provisions**	**Resources Allocated**	**Enforcement Ranking**
Environment Act , 2000	DEC	all	To ensure safe use of chemicals at all stages of life cycle: covers import, production /manufacturing/ formulation, export & handling, disposal/waste management, sale, use and storage; and for wastes, to develop pollution release and transfer registers	Environment Contaminants (Pesticides) Regulation 1998 Ozone Regulation Environment (Permits and Transitional) Regulations 2002 Environment (Prescribed Activities) Regulations 2002 Environment (Procedures) Regulation 2002 Environment (Water Quality Criteria) Regulation 2002 Environment (Fees and Charges) Regulation 2002 Oil Palm Processing Code of Practice Vehicle, machinery and fuel storage Code of Practice Landfill Code of Practice Requirement for Cleaner Production.	Trained persons: inadequate. Funding: inadequate	Varies – but generally low
Environmental Contaminants Act, 1978[1] (super ceded by Environment Act, 2000)	DEC	Pesticides including wood preservatives/ timber treatment chemicals, and vector control/ public health chemicals	Control importation, manufacture, distribution and sale of pesticides to protect human health and environment from indiscriminate use of agrochemicals	Pesticides regulations ECA Pesticides Guidelines Guidelines for writing PNG pesticide labels Pesticide Registration Guidelines Customs (Prohibited Imports) Pesticides Regulations *(all still applicable)*	Trained persons: inadequate. Funding: inadequate	imports fair: sale: fair: use: weak
		Industrial; discharges and emissions	Control importation, manufacture and use of hazardous chemicals to protect human health and the environment	Hazardous Chemicals regulations (draft) General Pollution (no regulations drafted)	Trained persons: inadequate. funding :inadequate	Very weak / for most categories is non-existent.
Water Resources Act, 1982 (super ceded by Environment Act, 2000)	DEC	water use & discharge (contaminants, discharges)	Manages water resources and water catchments, control use of water and discharges into water Not control chemicals, but only regulate discharge of waste (at end-of-pipe).		trained persons: inadequate. funding :inadequate	fair
Environmental Planning Act, 1978 (super ceded by Environment Act, 2000)	DEC	Big industries eg mining, forestry, agriculture	Through environmental plans and related EIA. Tools ensure proper environmental management of larger scale projects in PNG	Only regulates planning / monitoring. EIA sections refer to the *Environmental Contaminants Act* for chemical management aspects.	trained persons: inadequate. funding :inadequate	Varies from weak to fair to effective
Industrial Safety Health & Welfare Act 1961 (Chapter 175)	Department of Labour & Industrial Relations	Occupational safety / Safety at work	Provisions for dangerous work, handling, disposal, waste management, storage, occupational health, safety, awareness, education training and research	Includes special orders / regulations covering chemical treatment of timber as per Industrial Safety (Chemical Treatment of Timber) Order 1975; and in cacao as per Industrial safety (Monocrotophos) Order 1971.	inadequate	Implementation ranges from good to very good, though monitoring of aspects of chemicals remains a problem.

Legal Instrument (Type, Reference, Year)	**Responsible bodies**	**Chemical Use Categories Covered/ Areas**	**Objective of Legislation**	**Relevant Articles / Provisions**	**Resources Allocated**	**Enforcement Ranking**
Inflammable Liquids Act 1953 (Chapter 311)	Department of Labour & Industrial Relations	Inflammable materials	Controls / regulate storage, transport and packaging of dangerous goods, explosives, inflammable liquids through issuance of licenses register all premises that store, transport and package of flammable and dangerous chemicals			
Poisons & Dangerous Substances , Act 1952 Consequential amendments made in the "Medicines and Cosmetics Act 1999."	Department of Health	Includes pesticides (but out of date)		Covers parquet – additives, storage and , sale		fair in some areas. uncertain in others
Public Health Act Food Sanitation Act 1991 Drugs Act 1952	Department of Health			Includes "Public Health (Sanitation and General) Regulations 1973	*Inadequate* - Department of Health - delegated function to NCDC	fair
Dumping of Wastes at Sea Act 1979	Department of Transport and Civil Aviation, DEC	Discharge wastes (Sections 6&7)	Supplemented WRA regulations (section 28) to manage discharges		inadequate	*weak*
Prevention of Pollution of the Sea Act 1979	Department of Transport and Civil Aviation, DEC				inadequate	*weak*
NISIT Act 1993	Department of Trade and Industry	Establish standards. for chemical and related fields and occupational health and safety	Safeguard PNG against unsafe and substandard products. Also established Health and Safety standards for chemical measurements		inadequate	na
NAQIA Act 1997 Quarantine Act 1953	NAQIA		Quarantine chemical usage. Protect local flora and fauna from potential diseases.		Adequate for quarantine purposes	

Legal Instrument (Type, Reference, Year)	**Responsible bodies**	**Chemical Use Categories Covered/ Areas**	**Objective of Legislation**	**Relevant Articles / Provisions**	**Resources Allocated**	**Enforcement Ranking**
Mining (Safety Act) 1977, Chapter 195A Mining Act, 1992	Department of Mining [4]	Industrial	Ensures companies comply with safety practices. Regulations cover cyanide in gold mining, sulphides for copper mining and nitrates used in explosives, and precaution against fire, waste, inflammable materials, health and sanitation, drinking water , explosives		Staff shortage	effective
Mining (Ok Tedi Agreement Act),1976	DEC and Department of Mining	Mining	Water / tailing discharge and environmental protection matters related to Ok Tedi mine.	And subsequent Ok Tedi (Supplemental Agreement) Acts 1980-1995.		
Oil and Gas Act 1998 (as amended)	Department of Petroleum and Energy	Petroleum products	Covers disposal/ waste management, use, storage, emergency response, public health, occupational health and safety, pollutant release and transfer registers and awareness, education and training	Oil and Gas Regulation 1997, No 10 of 2002 Petroleum Policy Handbook Petroleum Policy (pipeline) Gas Policy 1995 (Policy / Guideline) Gas Agreement (Guideline) Standard Petroleum Agreement (Guideline) Pipeline Policy 1998		
Customs Act (1951). And Customs Tariff Act 1970	Customs (Internal Revenue Commission)	Implementation of imports only. Pesticides including wood preservatives/ timber treatment chemicals, and vector control/ public health chemicals	Control of dangerous goods. Traffic charges.	Customs Prohibited Regulation (Imports and Exports) including eg Customs (Prohibited Imports) Pesticides Regulations (1993) Customs (Ad Valorem Duties) Regulations	Inadequately trained staff and funds	Weak
Civil Aviation Safety Orders Under Civil Aviation Act?	Transport and Civil Aviation		transport of dangerous goods in aircraft			

It can be clearly deduced from the above table that the main chemicals (apart from medicinal drugs and pharmaceuticals) for which regulatory controls exist in PNG at present, are pesticides and petroleum products. No regulations exist to control other chemicals, for example; industrial and consumer chemicals, except in specific instances where particular chemicals are named. For instance, there is a Health Act regulation on the herbicide paraquat and industrial safety regulations on timber treatment chemicals, and the now unused insecticide called monocrotophos and methamidophos or chlorpyrifos. The new Environment Act 2000 has similar provisions, but the processes for regulations and controls are vague and yet to be tested in the field.

In spite of this, all other regulations have broad provisions for management of chemicals in PNG, and some of them even have specific provisions and mandates to meet PNG's obligations under various International Treaties and Conventions to which PNG is a party.

Perhaps the most important outcome of the review of the various Acts of Parliament is the identification of the missing linkages which could be developed in the future to improve coordination mechanisms and also identification of functions and responsibilities of agencies for better management of chemicals imported into PNG. The review process has also highlighted the need for closer dialogue amongst the various agencies of the Government in developing appropriate policies, regulations, guidelines and other relevant tools for effective control and management of chemicals in the country.

3.2 Assessment of Current POPs and POP-like Chemicals in PNG

The POPs chemicals confirmed to be currently used in PNG include; DDT and Industrial chemicals, and polychlorinated biphenyls (PCBs). Unintended by-products including dioxins and furans, and most likely PCBs and HCBs are likely to be generated through certain industrial processes and combustion of waste materials.

No POPs pesticides listed under Annex A Part I was found to be in use in all sectors. DDT which is listed under Annex B is used in the health sector. Lindane which is an organo-chlorine was last registered in 1980s when it was used for head lice shampoo. The last batch of heptachlor may have been used for termite treatment in Kavieng, New Ireland Province in 2003, but there have been no written records available to substantiate it.

An inventory and assessment of POPs and other chemicals with POPs-like properties was carried out under the GEF/UNEP sub-project between 2004 and 2005. No surveys were carried out for chemicals used in learning institutions and the military stores. This will be done later in the course of implementing the Action Plans specified in the National Implementation Plan.

A number of other chemicals included under the Rotterdam Convention may have been used in PNG in the past, and there is a possibility that some of these chemicals may still be used today. Below is a table showing list of pesticides used in the Agriculture and Livestock sector in PNG:

Table 3.0: List of Pesticides currently used in the Agriculture & Livestock sector of Papua New Guinea

	Chemical Trade Name	Active Ingredients		Chemical Trade Name	Active Ingredients
1	"Dibbs" Bromo-O-Gas	methyl bromide	55	Calixin	tridemorph
2	2, 4-D Amine	2, 4-D	56	Carbofuran	carbofuran
3	Abate	temephos	57	Chemoxone	paraquat
4	Acephate (Pilarthene)	acephate	58	Chemoxone	paraquat
5	Acephate 75 SP	acephate	59	Chloropyrifos	chloropyrifos
6	Actellic	pirimiphos-methyl	60	Cislin	deltamethrin
7	Actellic 50 EC	pirimiphos-methyl	61	Confidor	acephate
8	Aimit insecticide	permethrin	62	Coopex dust	permethrin
9	Ally 20 DF	metsulfuron methyl	63	Copper Nordox	copper oxide
10	Amatrex 50 SC	ametryn	64	Copper Oxychloride	copper oxychloride
11	Ametrex	ametryn	65	Cypermetrin	permethrin
12	Anisban	chloropyrifos	66	DDVP 50 Ec	dichlorvos
13	Atrazine 5- % FW	atrazine	67	Decis 200 EC	deltamethrin
14	Atrazine 50 % ww	atrazine	68	Delfin	bacillus thuringiensis
15	Banvel	dicamba	69	Diuron 800	diuron *
16	Barrack 720	chlorothalonil	70	Diuron 900	diuron *
17	Basta	glufosinate ammonium	71	Diuron 900 Df	diuron *
18	Bayfidan	triadimenol *	72	Dow-Agroscience-Chloropyrifos Dursban 5	chloropyrifos
19	Bayfidan	triadimenol *	73	Ebor baits	warfarin
20	Baythiod	cyfluthrin	74	Ebor rat bait	warfarin
21	Befenthrin	bifenthrin	75	Elanco garlon 600	triclopyr
22	Benlate	benomyl **R**	76	Ezy kill	permethrin
23	Benlate	benomyl **R**	77	Feritrothion 1000	fenitrothion 1000
24	Bifenthrin	bifenthrin	78	Ficam dust	bendiocarb
25	Blitzem	metaldehyde	79	**Fumtoxin**	aluminum phosphide
26	Blitzem granules	metaldehyde	80	Fumtoxin	aluminum phosphide
27	Blizem	mataldehyde	81	Fusilade 212	fluazipop-butyl *
28	Blue copper	copper hydroxide	82	Fusiland post emergency selective herbicide	fluazipop-butyl *
29	Bravo	chlorothalonil	83	Garlon	triclopyr
30	Bravo	chlorothalonil	84	**Garlow**	triclopyr
31	Bromakil bait	bromadiolone	85	Glyphosate	glyphosate
32	Calixin	tridemorph	86	Gramoxone	paraquat
33	Icon 10 WP	lambda cyhalothrin	87		
34	Iconet satchhets	lambda cyhalothrin	88	Racumin 8 Tracking powder	coumatetralyl
35	Imada 70 WSB	phosmet	89	Racumin	coumatetralyl
36	Invader	triclopyr	90	Round up	glyphosate
37	Invader 600	triclopyr	91	Shoot weedicide	glyphosate
38	Kamba	dicamba	92	Spread stick	Aclcohole alkoxylate ??
37	Karate	lambda cyhalothrin	93	Starane	fluroxypyr *
38	Mavrik insect Spray	tau- fluvalinate	94	Starane	fluroxypyr *
39	Mesurol	methiocarb	95	Starane 200	fluroxypyr *
40	Methamidophos	methamidophos **R**	96	Stedfast	alpha cypermethrin
41	Mimic	tebufenozide *	97	Stomp	Pendimethalin
42	Mimic	tebufenozide *	98	Storm rat bait	flocoumafen
43	MSMA	monosodium methyl arsenate (MSMA)	99	Storm rodenticides	flocoumaten
44	Mustang	imidacloprid	100	Striker 50 EC	hexaconazole
45	Mustang 200	imidacloprid	101	Tallon pellets	brodifacoum
46	Nutrazene	atrazine	102	Tamaron special	methamidiphos
47	Orthene	acephate	103	Tecto Flowable SC	thiabendazole
48	Ortin	acephate	104	Terbutryn FW	terbutryne *
49	Perkil 25 EC	permethrin	105	Terbutryne	terbutryne *
50	Permatrin powder	permethrin	106	Thiram WDG	thiram **R**
51	Permethrine dust	permethrin	107	Tomcat Blox	bromadiolone
52	Pilafuran	carbofuran **R**	108	Toxaphos	aluminium phosphide
53	Pilarfuran	carbofuran 10 % w/w, 2,3-dimethyl 1-7 benzofuran **R**	109	Trisodium Phosphate	triadimefon
54	Punch 330	flusilazole	110	Weedmaster	glyphosate

*Not on list of registered pesticides **R** = Rotterdam / PIC

(Source: Kuman, 2005)

(i) Inventory of POPs and POP-like chemicals presently used in PNG

There are 106 products and 57 active ingredients, and some of these were unregistered which are additional to those reported by Nakmai (2005) in her report (see *Annex 7*). The POPs and PIC pesticides used in PNG include: (a) POPs pesticides DDT and PIC pesticides benomyl, carbofuran, methamidophos and thiram. Kuman also noted that heptachlor (a POP) was used up to 2003 by pest control companies. Some old stocks were dumped in a mine trench at Lihir in 2003. The amounts were not determined in these surveys.

(ii) Status of Obsolete Stocks

Most user of chemicals in the country reported that most old stocks of pesticides that have been used are either burned or buried, and some have been placed in a store or in a container awaiting advice on how to dispose. This includes benomyl and old timber treatment chemicals (CCA) that are normally left outside timber treatment sites.

Figure 2: An example of a contaminated site: obsolete pesticides being stored in drums under unacceptable conditions that have the potential to expose into the environment and to people.

(iii) *Pesticide Suppliers, Dealers and Users*

There are about 5-6 major suppliers of agricultural and other chemicals in PNG which have supply stores in major centres of PNG. Industrial chemicals are supplied to smaller retailers from these suppliers while some large plantations import their own supplies directly from overseas. The number of suppliers has decreased over recent years compared to 15 years ago, and illegal sale of DDT and other pesticides especially in the Highlands is becoming common. Some pesticides listed on Table 3 are imported without undergoing proper registration process. Anecdotal reports indicate that DDT is sold and used illegally for agricultural purposes. These are suspected to have been obtained from stored or obsolete stockpiles belonging to the Health Department and sold to village farmers. It was reported by the Survey Team that often smallholder farmers buy pesticides from retailers who then arrange to resell the products in smaller quantities to private outlets on the streets and in the villages. Often these smaller packets do not have proper labels and

safety instructions in local languages such as English or Tok Pisin which are widely spoken in the country.

(iv) *Chemical Storage Facilities*

The survey showed that the storage condition of pesticides stores throughout the country vary enormously. Some larger plantations and companies have facilities that are lockable with sufficient ventilation, concrete floor, available running water, electricity and adequate lighting.

A common problem is that many of these users store their pesticides in old sheds including shipping containers (some contained in small receptacles). In many instances, the facilities are very old and often in dilapidated conditions. Small farmers and villagers store their chemicals in their houses which raises a safety concern.

Figure 3: An example of a chemical storage shed in an oil palm plantation with ISO 14000 Accreditation.

(v) *Use of Empty Pesticide Containers*

The use of empty pesticide containers as water containers is widespread, and documented. This is a nationwide problem and is of great concern. There is not much control over empty containers even if there are company policies in place, their enforcement can be challenging even if they have ISO14001/ ISO9000 accreditation especially if they are unable to control and/or manage the disposal of empty containers. Quite often people are informed to wash such containers “thoroughly” before use.

Some companies with overseas affiliations have arrangements in place for returning empty containers to the place of manufacture for refilling. This is a good programme because it promotes good stewardship, and it should be advocated as one way of addressing this problem.

(vi) *Chemical Applications and Use*

The largest pesticides users in the country are the large oil palm and coffee plantations. In the Highlands region alone, over a million kina is spent annually on pesticides and fertilisers whilst in the New Guinea Islands region, the oil palm industry uses more than 2.5 million kina worth of pesticides each year. In both Momase (North Coast-mainland) region and the Southern region

comparably fewer pesticides are used due to less agricultural industries in these regions. It is difficult to determine how much pesticide is used by individual industries because of the reluctance by many companies to provide data and information.

Other major chemical users include the mining and petroleum industries, forestry/timber sector, health sector and building/construction industries.

The Internal Revenue Commission (IRC) records show that revenue earned from pesticide imports in 2003 was K7.2 million and fertilizers for the same year was K41 million. The number of pesticides users has dropped recently which is mainly due to high costs of the products except for herbicides glyphosate and paraquat which have increased by over 90 percent. This figure is not reflected in the IRC records due to problems of labelling and weaknesses in the IRC Customs Harmonozed System of Classification.

The main insecticide is acephate (Orthene) and a commonly used fungicide is metalaxyl (Ridomil).

(vii) *Protection / Protective Gear*

Protective gear is not always worn during application and use of pesticides and agricultural chemicals. In general, large oil palm plantations enfoce health and safety rules, and protective clothing are usually provided. However, it has been observed that some companies do not always provide full protective clothing and gear to guarantee safety. Often workers fail to wear protective gear either because they are ignorant and/or they have not been trained to properly use the equipment in the filed. It has been reported that two large oil palm companies in the country are accredited with ISO14001 / ISO 9000 and they have polices to address safety, health and environment issues in order to comply with national standards (NISIT Standards) set by the Government for using hazardous chemicals referred to as PNG 1516-Part1-1991 and Part 2-1992.

Figure 4: Two examples; one on the left does not have full protective gear to cover his face while the one on the right is fully covered.

There is practically little or no awareness about the nature of the chemical and risks associated with the use of pesticides. Moreover, little information is available to users. Many of the users are neither illiterate in English nor Tok Pisin which makes it difficult for them to read and understand the labels. Government extension officers provide little assistance in informing the farmers about the safety and long-term health risks.

(viii) *Management of Wastes*

Little consideration is given to safe disposal of obsolete chemicals. For large companies, wastes are kept on site but in many instances stocks that are no longer usable are kept in sheds which are not properly secured. This has led to leakages and concerns have been raised about environment pollution particularly underground and surface water pollution and contamination.

(ix) *Training*

The training on the use and storage of pesticides is inadequate in many part parts of the country. The situation is the same with other sectors using hazardous substances. There are, however, some large research and training organisations (eg; NARI and University of Vudal) who are providing in-service training courses for farm managers on safe and efficient use of pesticides, and handling and management of chemicals. In large operations (such as plantations and the mining companies), training is provided by managers and supervisors although some are done on an adhoc basis. Some companies provide no training, often relying on employees' past work experience and training. NISIT has developed a standard or guidelines on health, safety and well-being in the workplace (NISIT National Health and Safety Standard PNGS 1082-1991). However, it appears few organizations are aware of these guidelines.

(x) *Medical Services, Health and Safety*

There is inadequate medical preparedness to deal with people poisoned by chemical inhalation or accidental consumption. Most medical workers are not trained and so often do not know what to do. There have been a few instances of poisoning due to persons drinking paraquat, resulting in deaths; two were deliberate, another was associated with a drinking binge – where 16 persons were claimed to have died. Anecdotal reports indicate that instances of poisoning have decreased due to stricter controls on distribution of certain chemicals to smallholders farmers. The management of most large plantations, farms and companies have stated that they are committed to worker safety, but as far as they are concerned it is really the worker that has to take extra care and responsibility when handling chemicals.

3.2.1 Assessment of Annex A Part I Chemicals (Pesticides)

As mentioned in section 3.2 above, the agriculture sector is an important importer and user of pesticides in PNG. Efforts were made 10-20 years ago to better inform traders and users about safer use of pesticides. Much effort was given to provide training in safe and efficient use of pesticides, and safe handling and management of pesticides. The Pesticide Regulations stipulates

that traders and buyers of pesticides should be aware of the FAO Code of Conduct on the Distribution and Use of Pesticides, and that posters and leaflets on poisoning and treatment should be distributed to all major hospitals so that medical workers are aware about the emergency procedures. Unfortunately, very little has been done in this area, and the situation seems to remain unchanged although there are already signs of improvements especially in large plantations on the safe handling and use of pesticides. Storage of chemicals, use of safety equipment and protective gear, use and disposal of empty containers, management of wastes, lack of training, lack of adequate health monitoring of workers all remain important issues that need to be addressed by regulatory bodies of the Government and also by those industries importing chemicals to the country.

The findings of the surveys carried for the NIP development process indicate that except for PCBs no chemicals listed under Annex A Part I of the Stockholm Convention are being used in the country. Due to the lack of historical records, it is difficult to establish past uses of those chemicals listed as well. However, there are some unconfirmed reports of past uses of chlordane and heptachlor in the agriculture, forestry and building/construction industries. The last reported use of heptachlor as mentioned earlier was in 2003; obsolete stocks of which are reported to have been dumped.

A decision was made by the now defunct Pesticides Committee under the repealed Environmental Contaminants Act to ban the use of organo-chlorines in various sectors in the country in the 1980s. Heptachlor was exempted for use in the treatment of sub-terranean termites in the building/construction industry. Lindane, now under consideration by the POPs Expert Group was allowed for use in the agriculture sector only if recommended by the Department of Agriculture while DDT was exempted for use in the health sector for the control of vector borne diseases such as malaria.

PCB transformers and capacitors have been used since the 1940s in the electricity industry. Some of this equipment is still in use although some retro-filling have been done. To date, the main power generating company in the country (PPL) which was once upon a time a State-owned enterprise is still in possession of PCB containing equipment. Many have become obsolete and are being stored at backyards to power stations which are exposed to rainfall and corrosive agents. Old building in the urban centres and townships built in pre-Independence era (in 1970s) still remain, and are believed to have light capacitors and ballasts containing PCB. Currently there is no plan or policy in place to deal with hazardous substances at time of removal from use during renovations or demolition of buildings.

The issue of PCB risks and hazards to the environment and human health only became known to the management and workers of the power company during the GEF/UNEP POPs Pilot project in 2003.

Given the above scenario, the government would need to put in place legal or administrative measures to prevent the Annex A Part I chemicals from re-entering PNG and have proper mechanisms in place for dealing with the PCB issues.

Table 4.0 Types of Pesticides Imported into PNG, 2001-2004

Types of Pesticide	Volume in '000 tonnes'				Value in '000 kina'			
	2001	2002	2003	2004	2001	2002	2003	2004
Insecticide	203	251	418	286	2920	3285	4000	2692
Herbicide	229	351	499	337	3727	5115	7420	4138
Fungicide	19	20	18	12	295	313	368	194
Rodenticide	0	0	0	0	0	0	157	0
Disinfectants	0	39	26	26	0	294	209	209
Total	451	659	961	643	6941	9006	12254	7233

Large projects and the vast majority of smallholders and farmers have yet to realize the cumulative impacts of chemicals on their health and the environment. There is an environmental regulatory framework and registration system for pesticides but it is not working due to lack of enforcement capacity in the Department of Environment and Conservation. Some large plantations may have their own policies and good practices in place, however, the national framework has not been fully developed to allow for proper management of pesticides at each stage of their life-cycle and ensure the best practice. All including the smaller operators and village farmers need proper training and guidance on the safe and efficient use of pesticides.

The lack of proper policing and registration system has led to chemicals entering the country without proper and informed clearance procedures and wastes and obsolete stockpiles being disposed without much care of the environment and people who live within the vicinity of the disposal site. Managing the disposal of pesticides in the country is a very difficult task.
The majority of people in PNG have little or no knowledge of pesticides and so many use pesticides with no proper education and training on chemicals. The general lack of awareness and education of the public is another factor that leads to unwanted exposure to pesticides and their wastes into the environment.

3.2.2 Assessment of Annex A Part II Chemicals (PCBs)

Polychlorinated biphenyls (PCBs) are a subset of the synthetic organic chemicals known as chlorinated hydrocarbons. PCBs have been produced on an industrial scale for more than fifty years and have been exported as chemicals and in products to virtually every country in the world. PCBs were commonly used as dielectric fluids in transformers and capacitors, in heat transfer and hydraulic systems, and as ink solvents in carbonless copy paper. Other uses of PCBs included the formulation of lubricating and cutting oils, as plasticizers in paints, in adhesives, in sealants, as flame-retardants, and in plastics.

Commercial PCBs consist of a mixture of PCB congeners, the most abundant of which tend to be readily degradable. A smaller portion of PCB congeners, however, tends to be "dioxin-like" PCBs, which are very stable and resistant to biodegradation and metabolism. These latter congeners have been found in all environmental matrices. Unfortunately, very little is known about PCB and its impact on humans and the environment in Papua New Guinea.

PCBs are present in PNG due to their use in electrical transformers and other electrical equipment. The use of PCB containing transformers and capacitors

commenced when the use of power generation started in the early colonial days. To-date while many of the transformers installed in the late 1970s are still in use, others especially the earlier (redundant) transformers still lie in the waste yards. Most of the transformers are owned by the then PNG Electricity Commission (now PNG Power Ltd), a State owned company responsible for generating and supplying electricity to major centres in the country. Major mining companies like the Ok Tedi and Bougainville Mines also have some PCB containing equipment, some of which are obsolete. Relatively large amounts were released due to inappropriate disposal and storage practices, accidents, and leakage from industrial facilities leading to possible environmental contamination.

Many countries, including Australia, Canada, Germany, Sweden, the United Kingdom, and United States consider materials with 50 ppm (parts per million, also expressed as milligrams per kilogram (mg/kg) by weight PCBs as the benchmark level for PCB regulation. In theses countries, materials with greater than 50 ppm PCBs generally must be handled in accordance with their specific PCB regulations. PCB concentration levels are also pertinent in determining the necessary disposal method. For example, PCB-containing capacitors and transformers tend to have PCB concentrations of well over 500 ppm. Most countries regulating PCBs require that products containing high concentrations be disposed of by specific methods (e.g, incineration). The levels of PCBs are not monitored in PNG. Tolimanaram (2005) reported that oil from obsolete transformers from a mine contained PCB concentrations in 42 samples of oils. The lowest reading was 2.6 mg/kg and highest was 263.6 mg/kg. Three different isomers of Aroclor were identified in the samples. Arrangements are now underway to ship these wastes for disposal to a safe location.

The PCBs in other establishments in the country have not been tested. Assessments still need to be carried out on other potentially PCB containing materials inclusive of lubricants, heat transfer fluids, hydraulic fluids, vacuum pumps, liquid filled cables, household appliances like light ballast and capacitors, surface coatings, adhesives, plasticizers and inks.

In 1963, the then PNG Electricity Commission (ELCOM) was formally created and as the government's commercial statutory authority vested with the sole responsibility for the development, generation, transmission, distribution and sale of electricity throughout the country. In 2003 ELCOM became a private enterprise and was renamed; PNG Power Ltd (PPL). In its endeavour to meet consumer requirements, PPL has embarked on many major development projects and these include the both hydro and thermal power stations and transmission and distribution systems. These meant acquiring more transformers and to a lesser extent, capacitor banks, vital equipments in power generating and distribution systems from countries such as Australia, New Zealand, UK, Japan, China, South Korea, Italy and Germany. It is highly likely that the equipments that were used between 1940 and 1986 contain PCB oils. This is due to the fact that commercial production of PCBs used in transformers began in the 1920s and did not cease until the mid 1970s in some countries, however, most countries ceased production after 1986.

PCB oils were phased out in electrical equipment in the 1980s and alternative oils have been produced to replace them. PPL presently uses an alternative PCB free oil which is mineral based (Onan) since the above ban came into force through international decisions driven by product availability. As such, most of the waste transformers and capacitors are currently lying at the backyards of PPL workshops in ninety Government centres around the country.

The retro filling of transformers is a process where old oils are drained out and re-filled with new oils. This is carried out to remove PCB containing oils from older transformers and replacing them with PCB-free oils. The process is normally carried out by PPL technicians during maintenance. The process was done not with the intention of replacing PCB containing oils; rather, it is only because the new oils for re-filling the transformers are PCB free. There is a possibility that old/used re-filtered oils that maybe PCB containing has been used to re-fill PCB free transformers in PPL ninety operated centres.

PPL has an oil filtration unit located in Lae which is used to clean used/old oils through a filtration process for re-use. The process only involves physical removal of solids but does not remove the PCBs.

PNG Power is also faced with the problem of safe handling, storage and disposal of PCB containing transformers and capacitors. The lack of knowledge and hazards posed by PCBs has resulted in human exposure during services and maintenance of transformers. The lack of care for obsolete equipment are now leaking PCBs into the environment due mainly to negligence or lack of awareness about the risks associated with handling of old transformers. Many obsolete equipment that are stored in unsafe and unprotected environment are already leaking PCBs into the environment.

Figure 5: Obsolete Stockpile of Equipment that could contain PCBs and produce dielectric fluids

There are no proper storage facilities for the old transformers at all PPL centres, thus oil released from old leaking equipment possibly containing PCBs pose risks to people who live within the immediate vicinity of these sites. The oils from the transformers are believed to be drained and used for various applications including lubricants for chainsaws, marking of playing fields or stored in various places for household uses.

During the survey, it was observed that some of the workers particularly the technicians and linesmen had some health conditions such as problems of fingernail pigmentation, fertility problems and skin rashes. No medical tests were carried out to ascertain if these effects are caused by PCBs in transformers that the workers have been exposed to over the years. The number of people affected seems to be common among that particular group of workers whose occupation involves handling and maintenance of transformers. Therefore, one can infer that this health problem could have been due to their continuous exposure to the oils and inhalation, ingestion (if there is contaminated food or drink) and skin absorption.

Below is a summary of the findings of Tolimanaram (2005) which covered 80 percent of the PPL operations in the country:

(i) Half of the transformers assessed were manufactured before and up to 1986 and are likely to be PCB contaminated. Tests need to be carried out to verify PCB contamination.
(ii) PCBs congeners have been identified at commercial establishments, and it is believed that these congers are still releasing PCBs via diffuse emissions from some industrial facilities.
(iii) More than 68.7 tons of waste oils containing PCB are stored in steel drums tanks and in obsolete equipment in all the centres assessed.
(iv) Three contaminated sites were identified, one each in Lae, Wewak and Port Moresby.
(v) In all centres noted the storage of obsolete equipment and waste oils is improper and do not meet the requirements of the Stockholm Convention.
(vi) There were no proper records of transformers that have undergone retro-filling.
(vii) A numbers of leaking transformers in service or obsolete were seen in all the centres visited.
(viii) There is general lack of knowledge, capacity and skills to manage PCBs in Papua New Guinea.

3.2.3 Assessment of Annex B Chemicals (DDT)

DDT (1,1,1-trichloro-2, 2-bis[4-chlorophenyl] ethane) was synthesized in the late 1800's and its insecticidal properties were realized in the 1930s. It was considered an effective broad-spectrum insecticide at that time and was extensively used in the early part of the 1900s as an agricultural pest control agent in cotton fields, deciduous fruits, and for the control of potato beetle, the European corn borer and other agricultural pests. It was also widely used during the war (WWII) to protect troops and civilians from various vector-borne diseases such as malaria, typhus, dengue fever and others. During this period, large quantities of DDT were used and much of it may have been

released into the environment mainly due to lack of knowledge about the risks associated with its usage.

DDT was first used in PNG in the 1950s to control malaria carrying mosquitos. In the 1960s, it was used to control vector borne diseases and pests in all sectors carrying out pest control. Other organo-chlorines were introduced at about the same time. In most cases pesticides were applied indiscriminately in the various sectors such as the agriculture, health, forestry and building and construction industries. DDT was used on a trial project for the indoor residual spraying (IRS) in Maprik in 1957. The trial was extended to the Goodenough Islands in the Milne Bay Province a year later. The success of the trial projects prompted the use of DDT as the choice for malarial vector control in all other parts of PNG in subsequent years. Since the commencement of the use of DDT in 1957, a substantial amount of DDT has been imported and used in both the health and agriculture sectors.

Table 5.0 DDT Usage and Storage in Major Towns and Provinces in Papua New Guinea

No.	Town/Province	Quantity of DDT Used (kg)	DDT Stockpile (kg)	WHO Survey (WHO: 2000) (kg)
1	Goroka, Eastern Highlands	2,510	630	19,700
2	Kundiawa, Simbu	894.5	?	2,000
3	Mt. Hagen, Western Highlands	205.67	35	3,100
4	Wabag, Enga	17,345	4,554.2	5,300
5	Mendi, Southern Highlands	102,500	108	3,800
6	Lae, Morobe	Nil	Nil	-
7	Madang, Madang	Nil	Nil	-
8	Wewak, East Sepik	Nil	Nil	-
9	Vanimo, West Sepik	Nil	Nil	-
10	Rabaul, East New Britain	Nil	15,880	17,700
11	Glocester, West New Britain	Nil	?	-
12	Kimbe, West New Britain	NS	Nil	-
13	Lorengau, Manus	NS	NS	-
14	Kavieng, NewIreland	NS	Nil	-
15	Buka, North Solomons	NS	NS	-
16	Port Moresby & Central	Nil	Nil	-
17	Daru, Western	Nil	Nil	1,500
18	Kerema, Gulf	Nil	Nil	-
19	Alotau, Milne Bay	Nil	10,000	5,500
20	Esa'ala, Milne Bay	Nil	5,000	1,500
21	Misima, Milne Bay	Nil	3,000	2,800
22	Lousiade, Milne Bay	Nil	500	-
23	Raba Raba, Milne Bay*	Nil		-
24	Bolo Bolo, Milne Bay	Nil	Appr. 1,500	-
25	Popondetta, Oro	?	?	800
	TOTAL	**123,450.17**	**44,099.2**	**63,700**

Note: 1. * The DDT Storage shed and its content and were completely burnt down in a bush fire in 1986). Soil contamination may be investigated.
2. Nil = no stock; NS = not surveyed; ? = results pending

The ban on DDT for use in other sectors was enforced in 1983 and the Department of Health is the only agency in the country that has been permitted by law to import and use DDT vector control agent against

mosquitoes in indoor residual spraying programmes especially during major malaria outbreaks. The programme is confined to the highlands region due to low immunity pf the population against malaria.

Since the ban on the use of DDT in PNG, a large quantity of DDT stockpiles remain in warehouses and sheds around the country. Many of these are stored under unacceptable conditions. A survey by World Health Organisation (WHO) in 2000 recorded a total of over sixty-three (63) tonnes of DDT stockpile scattered between various sites in the country. The recent survey by Wossa and Inikupa (2005) under the GEF/UNEP Pilot NIP reported a reduction in that figure to about 43 tonnes. As can be seen on Table 5, more than half of this amount is located in Milne Bay and the East and West New Britain provinces. These stockpiles can be considered obsolete because most have been in their present locations for over 20 years. The DDT stocks in the provincial centres of the Highlands region will be used in the ongoing residual indoor spraying programmes to contain the malaria epidemics in this region. The stocks in the East and West New Britain provinces will have to be mobilized, their efficacies tested and stocks that are not useable will need to be disposed.

The organisations responsible for the management of DDT are the Departments of Health for import, use, disposal and reporting of DDT in use; Department of Environment & Conservation for registration of pesticides (and hazardous substances) and national authority movement of hazardous substances under the Basel Convention; and Internal Revenue Commission (IRC) (clearance of imports) while the Department of Transport and Department of Industrial Relations has responsibilities relating to the transport and handling, and the Department of Labour and Employment is responsible for occupational health and safety aspects.

While it is known that the latest import of DDT took place in 2000, the records of the total quantity of DDT imported and used in PNG is unclear at present. According to the IRC records, no materials for the production of DDT have entered the country. This confirms the suspicion that DDT is not manufactured in the country.

Wossa and Sinikupa (2005) reported the following on DDT and stockpiles in PNG:

(i) Malaria continues to be a major disease in PNG, both in the coastal areas and the highlands. It is the second major cause of death (after pneumonia).
(ii) The use of DDT for malaria vector control continues in highlands areas, for which 20 tonnes of DDT was imported by the Health Department in 2000, and some old but viable stocks from the coastal areas were also used for the purpose.
(iii) WHO (2000) reported that 63.7 tonnes of DDT was stockpiled in 13 storage sites around PNG. Wossa and Sinikupa estimated 43 tonnes of DDT are stockpiled mainly in the highlands provinces, in Rabaul or scattered around Milne Bay Province.
(iv) Poor conditions of storage sheds and burial of some stockpiles pose high risk of environmental contamination. Some contaminated sites were identified.

(v) Over 123 tonnes of DDT have been used in the last 20 years for malarial control.

(vi) The main alternative to DDT is the insecticide impregnated mosquito bed nets. However more research is needed to establish its efficiencies and its effectiveness compared to DDT in reducing malaria.

(vii) Research into the development of malaria vaccines and anti-malarial drugs are important components for malaria control. However effective vector control and management regimes remain important part of the programmes.

(viii) According to anecdotal reports, there may be illegal use of DDT, probably stolen or sold illegally from old DDT stockpiles in the highlands which are used illegally in gardens by village farmers. Some anecdotal reports indicate that this may be happening in some coastal areas as well. Further field assessments are necessary to verify these reports.

3.2.4 Assessment of Unintentional POPs Releases – Annex C Chemicals (PCDD/PCDF, HCB & PCBs)

Four unintentional POPs substances are covered under the Stockholm Convention that are unintentionally produced as by-products or trace contaminants of many chemical industrial processes and combustion processes. These are polychlorinated dibenzo-p-dioxins (PCDDs); polychlorinated dibenzofurans (PCDFs); polychlorinated biphenyls (PCBs); and, hexachlorobenzene (HCB). These chemicals are usually generated and subsequently released through a number of anthropogenic and natural activities. PCDDs and PCDFs have been detected in effluents from municipal effluents, waste incinerators, cement kilns, steel plants and wood combustion. PCBs and HCB intentionally produced for specific purposes are covered elsewhere.

In fact, dioxins and furans are amongst the most toxic substances known to man yet many people don't realize the dangers of these products. Due to lack of awareness, the harmful effects of dioxins and furans and other unintentionally produced chemicals are not fully known to the majority of Papua New Guineans. Some activities in PNG that could lead to generation of unintentional POPs include power generation using combustion processes, backyard burning and waste incineration. Awareness on unintentional POPs was only raised recently by the PNG POPs project under the GEF/UNEP Pilot and people in PNG are beginning to learn about the long-term effects of dioxin and furans.

At present, the Government does not have any policy, capacity or regulatory tool to effectively control, manage or reduce dioxins and furans and other unintentionally produced POPs in the country. The lack of knowledge and ignorance about the hazards associated with the production of emissions from industrial processes and combustion to air and contamination of soils and water from by-products has been the main reason for the lack of firm policies on their management. Furthermore, it is even more difficult to regulate the activities of communities where cooking, heating, lighting, food processing, agricultural practices, transport and waste disposal practices have been traditionally practiced for many years, and continues to this day to be the key

to the survival of people particularly in the rural areas. Yet these are the very activities that contribute to these unwanted by-products. With the lack of resources and lack of affordability of the general population to immediately resort to alternatives, this situation may remain for many years to come unless assistance is sought to address emissions from specific activities and more awareness /education activities are carried out on the risks.

In addition, the Government does not have the means to establish proper inventories and information on unintentionally produced POPs and other hazardous substances causing air pollution in the country. Hence, further work would be required to improve the knowledge and data base in order to identify the problem source categories. PNG would need to closely monitor the findings in other parts of the world especially in relation to progressing on the development of the Toolkit and the guidelines on Best Available Techniques and Guidance for Best Environmental Practice to further progress in its efforts to reduce emissions of unintentional POPs.

Petsul and Totome (2005) attempted to determine a preliminary inventory of releases of dioxins and furans in PNG from various sources in 2004 using the UNEP Toolkit. **Table 6.0** shows the different sources and the activities associated with it that has the potential to produce unintentional POPs in PNG.

Table 6.0: Potential Sources of PCDD/PCDF emissions in Papua New Guinea

No	SOURCE	ACTIVITIES
1	Waste incineration	Includes hospital waste, incineration of quarantine solid waste, hazardous animal carcasses.
2	Metal production and recycling	Primary and secondary plants for the production of gold, silver, copper, aluminium, zinc, lead, copper wire reclamation
3	Power generation, industrial fuel burning and home heating/cooking	Power boilers (plant) fuelled with diesel, gas, crude oil, wood, and industrial heating for heaters and dryers fuelled with biomass for use on-site (e.g. copra dryer). Household heating and cooking fuelled with wood, kerosene, LPG, sawdust and plastic.
4	Mineral production	Production of lime, brick, and asphalt mixing, etc
5	Transport and fixed engines (including power generation):	Passenger cars, busses, trucks, tractors run on unleaded petrol or diesel, motor bikes, ships, boats and outboard motors including chainsaws and lawnmowers + power generation in stationary (diesel) engines
6	Uncontrolled combustions	Biomass burning, burning of buildings, industry wastes, burning of dumpsites & landfills, backyard, construction and demolition, and accidental building and vehicle fires
7	Miscellaneous	Accidental burning, candle fires, contaminated sites burning and crematoria.

Estimates of the PCDD/PCDF were calculated using the UNEP Toolkit and the results are presented in Table 6.0 below. Although these figures are comparably low, it is clear that the main emitters of PCDD/PCDF are

uncontrolled combustion, power generation and industrial burning, and hospital wastes incineration. There are no properly constructed facilities or purpose built sites for the disposal of prescribed wastes or hazardous chemical wastes in the country. Therefore these wastes are dumped either at the backyard of buildings or, along with other municipal wastes posing the risk of ground and surface water contamination. ***Figure 7*** shows an example of uncontrolled combustion resulting from a town waste dump site.

Figure 7: Uncontrolled Combustion – Waste Dump Site Burning

The results in Table 6 show that dioxin and furan are emitted mainly into air (as residues). Emissions to water and land could not be determined in this study.

Many of the dump sites such as the one shown in the photograph have human dwellings within close proximity and lack any containment – this does pose risks to human health and the environment.

Table 7.0: PCDD/PCDF annual fluxes (g I-TEQ/a); reference year 2003/4. Total air emissions from known sources = 47.714 g I-TEQ/a

Cat No.	Main Categories & Subcategories	Air	Water	Land	Residue
1	Waste Incineration	0.910	0.000	0.000	0.000
2	Metal production & Recycling	0.000	0.000	0.000	0.000
3	Power generation, Industrial fuel burning, Household heating and cooking	5.857	0.000	0.000	0.000
4	Mineral production	0.000	0.000	0.000	0.000
5	Transport & Fixed engines	0.019	0.000	0.000	0.000
6	Uncontrolled combustion processes	40.928	0.000	0.000	6.725
7	Miscellaneous	0.000	0.000	0.000	0.000

Total emissions from known sources = 12.657 g 1-TEQ/a.

This study is the first attempt in PNG in so far as developing an inventory of dioxins and furans in the country is concerned. Therefore, the data presented is only restricted to dioxin and furan emissions into the air. Reservoirs of unintentional POPs include landfill, waste dump sites, contaminated soils, and sediments. At the same time, one should be aware that the emission factors generated in PNG is difficult to quantify for some sources and so no emission factors were determined, for instance; for biomass burning and bush fires.

In terms of the availability of data, and the extent of coverage in PNG, the study by Petsul and Totome (2005) can be summarized as follows:

- The PCDD/PCDF emission inventory was not estimated in residues, such as incinerator ash.

- The present survey on the existing inventory only addressed PCDD/PCDF emissions to air. Other reservoirs that were not assessed include landfill, waste dump sites, contaminated soils and sediments.

The inventory generated in PNG is difficult to ascertain because some sources that were identified had no emission factors determined, and compositions of materials vary greatly, for instance; for open rubbish and backyard burning, landfill, waste dumps and fires. Below are some of the observations made in the survey:

- Amongst the main source sectors, the best coverage made in this survey was for hospital waste incineration, transport and fixed engines, and power generation and industrial fuel burning. As these sectors undergo the dramatic changes in technology, emission factors and PCDD/PCDF emissions may change rapidly. As a consequence, good effective awareness, education, research and rigid legislation can be established to minimize the emissions.

- There is only limited data and information available from the metal production and recycling and the mineral production sectors. This sector is not considered to be a “hot spot” but more reliable data will be required in future to ascertain this as more activities in this category will be established in the future. Current practices for recovery of metals do not appear to be environmentally acceptable.

- There is no data available on dioxin and furan emissions to water and land, but from observations, it can be assumed that emissions to water may only be attributed to pentachlorophenol (PCP) and the PCDF in polychlorinated biphenyls (PCB) being leached by storm waters.

- Presently there exist no harmonized methods for generating and evaluating data for PCDD/PCDF inventory. The only available harmonization of data acquisition and evaluation is the UNEP Chemicals Standardized Toolkit which was consulted in preparing the dioxin and furan inventory in PNG.

- PNG requires a harmonization of protocols for sampling emissions in air, water and soils analysis using proper instrumentation to establish accurate releases. Given the absence of analytical facilities in the country other simpler methods for estimation of releases are required.

The above findings should only be seen as a first attempt to identify the major source categories for PCDD/PCDF emissions and estimate total releases of these compounds into the environment. The major sectors of PCDD/PCDF releases established in industrialized countries cannot be assumed to be representative for all industries in other countries including PNG. The data collected so far indicates the coverage and extent which is not sufficient to estimate real emissions of PCDD/PCDF. Nevertheless, the present inventory will be updated in future, as it is obvious that dioxins and furans is a real problem and will only get worst if measures are not periodically taken by appropriate regulatory bodies to minimize impacts on humans and the environment.

PNG would be willing to participate in future studies for establishing site specific releases through open burning of wastes and agricultural residues; it will seek to establish relevant databases for the management of emissions. It should also endeavor to put in place practicable legal or administrative measures to control general emissions from sources. The releases of dioxins, furans and other unintentional POPs will be reduced in the process.

CHAPTER 4: ACTION PLANS FOR EFFECTIVE MANAGEMENT OF POPS AND HAZARDOUS CHEMICALS IN PNG

Article 7 of the Stockholm Convention on POPs requires each Party to develop or update their Action Plans to implement the programmes and activities outlined in the National Implementation Plan. In particular, the Convention requires Parties to develop strategies, measures, and action plans to address specific issues in relation to:

(i) Intentional production and use of POPs (Article 3 and 4, Annexes A and B);
(ii) Unintentional production of POPs (Article 5 and Annex C Parts I, II and III);
(iii) Stockpiles and wastes (Article 6); and
(iv) Measures related to information exchange (Article 9), public information, awareness and education (Article 10), research, development and monitoring (Articles 11) and reporting (Article 15).

Task teams engaged under the GEF/UNEP funded sub-project on POPs developed action plans specifically for the different sectors. The data and information presented in the NIP gives a broad overview of the situation in PNG, and an analysis of all these action plans for the various sectors has resulted in the compilation of generic plans necessary for PNG to meet its obligations as a party under the Stockholm Convention. Action Plans presented below apply to management of both POPs under the Stockholm Convention that are of important to PNG, as well as, the other hazardous or harmful chemicals. Key strategies and measures have also been developed to enable implementation of these action plans.

There is no legislative framework or policy or a systematic and coordinated process for the management of chemicals imported into the country. The only registration system currently operating is that for pesticides. The data system operated by Internal Revenue Commission is not effective in monitoring import and export of chemical, thus this constraint has led to improper entry of chemicals into the country without undergoing any proper informed clearance procedures. The lack of a proper information exchange mechanism has further weaken this situation leading to improper disposal of wastes from obsolete stockpiles without much consideration for human health, safety, and environment protection. Given this scenario, there is now an immediate need to develop action plans and mechanisms that will improve collaboration between the various regulatory agencies of the Government in order to effectively register, monitor and manage chemicals at all stages of their life-cycle (imports, exports, manufacture, distribution, handling, use and disposal) in the country.

4.1 Action Plan for the Control of Production, Import ,Export, Use and Management of Stockpiles and Wastes of Annex A POPs Pesticides (Annex A, Part 1 Chemicals)

Context and Analysis of Issue

According to information obtained from those industries involved in pesticide use and distribution, none of the POPs listed under Annex A Part I are currently used in PNG. However, there are some reports of past uses and disposal of POPs pesticides wastes, and this need to be closely studied in the future so that their stockpiles can be mapped. On the other hand, it has been reported that PCBs have long been used in the electricity industry, and some transformers and capacitors that are used even today contain PCBs. Obsolete equipment and leakage of oils are common problems as stockpile sites. Development of appropriate policies, legislative and administrative measures would ban or control their use in the future. Hence, the action plans presented below would enable better control and management of chemicals that might become future POPs candidates.

The Environmental Contaminant (Pesticide) Regulation 1988 sets the framework for regulation of importation, exportation, use, manufacture and handling of pesticides. However, this regulation is not very explicit about management of hazardous wastes, and is thus being considered for review and amendment. Added to this problem is the lack of a clear policy statement for relevant regulatory agencies of Government to effectively manage chemical through a collaborative mechanism in PNG. Therefore, the current regulation needs to be reviewed in view of the difficulties encountered so that an effective regulatory framework is established either under the new Environment Act 2000, or as a separate Act of Parliament with its subsidiary instruments.

The guidelines for registration and labelling of chemicals in PNG have not been fully enforced and lines of consultation between regulatory agencies are not clear and fully established. In the case of agro-chemicals, the registration, licensing, approval and distribution of chemicals imported for use in the country are done by three Government agencies. There is no central government agency to coordinate all these tasks; instead, the responsibilities are divided for each agency depending on the legislation they have been mandated to administer. For instance, the Department of Agriculture and Livestock has responsibility for screening and approvals of agro-chemicals whereas the licensing of the imports falls under the mandate of the Department of Environment & Conservation while the clearance process falls under the jurisdiction of Customs section of IRC. The confusion over roles and responsibilities between these Government agencies has resulted in situations where some highly hazardous agro-chemicals have entered the country without proper licensing or clearance. Similar problems exist in other line government departments and institutions for other chemicals.

Few agricultural industries in the country have taken necessary measures to protect release of hazardous chemicals into the environment. One such example is large oil palm plantations. However, the lack of training and awareness on chemical use and management and occupational health and safety practices within the various sectors agriculture and livestock companies

is a major concern. Likewise, the lack of comprehensive data and information bank on chemical poisoning and chemical management issues in the country demands the need for the establishment of facilities for diagnosing chemical poisoning. Proper mechanism for reporting chemical related incidences in the health sector also need to be established.

Given these types of inadequacies for the control and management of chemicals, there is potential for misuse or indiscriminate use of certain chemicals in nearly all primary industry sectors. The social and environmental problems associated with their uses can be serious, thus a comprehensive survey needs to be conducted in order to:

(i) register all chemical users in the country;
(ii) register sites of obsolete stockpiles and improve storage facilities;
(iii) establish the necessary chemical management mechanisms;
(iv) identify issues concerning use of safety equipment and protective gears faced by workers and farmers;
(v) monitor health status of workers involved in chemical use, handling & management; and
(vi) Undertake legislative reviews and amendments.

At a national stakeholder workshop in 2004, representatives of relevant organisations with interests in the trade, use and management of chemical in PNG recommended the following issues to be given priority for consideration and implementation:

(i) Build and strengthen capacity for enforcement of Environment Act and Stockholm Convention;
(ii) Develop a database for registration and labelling;
(iii) Establish programmes for awareness and training on the chemical use and management; and
(iv) Establish “Poison Centres” and facilities for dealing with human health issues.

Due to time limitations, a comprehensive analysis was not carried out on the social and economic impacts of POPs and their alternatives in PNG. It is thus necessary to mainstream this aspect in the implementation of the action plans identified in the NIP.

In order to address these pressing issues concerning chemical management, the following Action Plans have been developed:

Objective 1	***To establish legislative and administrative measures to prohibit use and import of POPs Chemicals under Annex A Part I and other such chemicals for future inclusion in the Stockholm Convention***
Activities	1. Prepare concept paper for deliberation by relevant sectoral agencies, NGOs and private sector; 2. Review existing mechanisms and regulations, and establish a technical working committee to prepare appropriate guidelines and policy implications; 3. Prepare Cabinet submissions for consideration of Instruments for the prohibition of chemicals listed under Annex A Part I of the Stockholm Convention. 4. Prepare regulations and guidelines for the management and phase-out of chemicals or equipment in use containing Annex A Part I chemicals.
Duration	2 years
Responsible Organisation	Department of Environment & Conservation
Supporting Agencies	Department of Agriculture & Livestock; Department of Attorney General; Department of Trade & Industry; Department of labour & Employment

Objective 2	**To create awareness and improve knowledge on chemical usage and risks associated with their use and handling**
Activities	1. Conduct a nationwide awareness campaign, and training programmes in chemical use and management in the Agriculture and Livestock sector using the established network of NGOs, church groups, line government agencies, research organisations, health department and other interested parties.
Duration	2 years (June 2007-June 2009)
Responsible organisation	Department of Environment and Conservation
Supporting Agencies	Department of Education; Department of Labour & Employment; Department of Health; universities
Other stakeholders	NGOs; Church groups; other line government agencies and interested parties
Duration	2 Years (2007-2009)

Objective 3	**To establish a comprehensive Registration System for pesticides add hazardous substance regulation**
Activities	1. Establish a fully functional pesticide database system to be administered by a key Government agency responsible for monitoring and management of chemicals in the country. 2. Establish mechanisms for monitoring of pesticides (or hazardous substances). 3. Establish mechanisms for improving pesticide and hazardous substances management including management of empty containers through encouragement of product stewardship
Duration	March 2007 to March 2009

Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Department of Agriculture & Livestock; Department of Health

Objective 4	**To build capacity for monitoring and enforcement of Regulations under the Environmental Act 2000, and the provisions of the Stockholm Convention on POPs**
Activities	1. Carry out training needs assessment for monitoring and enforcement at the Department of Environment & Conservation. 2. Prepare project proposal on institutional strengthening and secure sufficient funding. 3. Prepare programme for capacity building, and strengthen capacities of local research and academic institutions to provide long-term training to government officials. 4. Undertake specially prepared short-courses for officials from regulatory institutions to refresh skills development.
Duration	June 2007 to June 2009
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	DAL, IRC (Customs section)

Objective 5	**Establish "Poisons Information Centres" in major Town Hospitals of the country**
Activities	1. Consult with Department of Health and provincial hospital Boards on setting up such centres. 2. Provide special training to nurses and doctors on how to deal with casualties.
Duration	June 2007 to June 2009
Responsible organisation	Provincial Health Authorities, Department of Health
Supporting Agencies	Provincial Governments

4.2 Action Plan for the Control of Import, Export, Use, Identification, Labelling, Removal, Storage and Disposal of PCBs and Management of Equipment Containing PCBs (Annex A, Part II Chemicals)

Context and Analysis Issues

At present there is no legislative or policy framework governing use and management of PCBs in PNG. There are also no regulations to monitor the import, distribution, re-use or disposal of PCBs and PCB-containing equipment, as well as, labelling and storage of existing PCB equipment.

Given the lack of knowledge about PCBs amongst the community and PNG Power Ltd (PPL) workers, an extensive awareness programme and training on the use of equipment containing PCBs should be developed. Plans for

successful phasing out of their use, and safe disposal is needed. Transformer oils possibly containing PCBs have been drained and used as chainsaw lubricants, marking of playing fields or stored in various places. Hence the need to assess waste management is also critical

Based on information and the findings of the survey conducted on PCBs, the following priority areas were identified for immediate consideration by appropriate Government agencies in order to draw up action plans for implementation:

(i) Completion of inventories of equipment containing PCBs and stockpiles of oils in main centres where PPL and major mining companies are operating;

(ii) Development of appropriate legislative framework, policy and regulations for handling and management of PCBs in PNG;

(iii) Public awareness on the hazards and health risks associated with equipment containing PCBs

In addition to these priority areas, it is also important that all transformers and equipment that could potentially contain PCBs should be tested using the PCB test kits. There are important data gaps where additional and new data is required to provide a comprehensive coverage of PCBs, and these areas are:

- PCB emissions (close and open applications).
- Environmental assessment of the discharge of PCBs from storage sites.
- Assessment of likely toxic effects of PCBs in ecosystems in PNG.
- Assessment of effects of PCBs on human health in PNG.
- Environment monitoring to determine PCB levels in the environment.
- Inventory/data on other potentially PCB containing material.

The following are the action plans for implementation of the above priority areas:

Objective 1	**To develop a regulatory framework for the prohibition of imports of equipment containing PCBs and oils into the country, and also to manage their usage in the country**
Activities	1. Review current environmental legislation. 2. Develop a programme to totally ban equipment containing PCB oils and material as per Article 3 subjected to the provisions of Annex A of the Stockholm Convention. 3. Develop specific policies and supporting regulations to prevent or control illegal trade, reuse or recycling of contaminated oils obtained from retro-filling.
Duration	June 2007 to June 2009
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Department of Trade & Industry; Department of Labour & Employment; ; Industry

Target audience	public servants, politicians, NGOs and students in primary and secondary schools, PCB users (PPL, mining & petroleum companies)

Objective 2	**To raise awareness on the risks of PCBs on human health and the environment**
Activities	1. Establish a public awareness programme and a networking system to inform the public, including school children, on the risks associated with PCBs. 2. Develop a project proposal and secure sufficient funding to support government institutions and NGOs carry out awareness activities. 3. Prepare materials on PCBs, and develop pictorial and "easy-to-read" posters for dissemination in local languages including pidgin and motu.
Duration	June 2007 to June 2009
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Department of Education, University of PNG, NGOs, Church groups, schools
Target audience	public servants, politicians, NGOs and students in primary and secondary schools, PCB users (PPL, mining & petroleum companies)

Objective 3	**To establish programme for proper storage and safe disposal of PCB oils and contaminated equipment**
Activities	1. Update inventory of PCB oil and equipment in the country. 2. Carry out testing of PCB equipment and oils to verify contamination. 3. Mobilize all confirmed PCB contaminated oils and equipment. 4. Build storage facilities to house all PCB containing oils and equipment.
Duration	June 2007 to June 2009
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Department of Education, University of PNG, NGOs, Church groups, schools
Stakeholders/ Target audience	PCB users (PPL, mining & petroleum companies)

Objective 4	**To establish and implement a Capacity Building and Training programme for testing, monitoring and management of PCB oils and equipment**
Activities	1. Develop training schedule for handling, storage, and testing of PCB equipment; and sampling and testing PCB levels in environment and human beings. 2. Develop training on emergency responses and clean operations 3. Identify suitable personnel for training. 4. Identify research opportunities in the country.
Duration	June 2006 and June 2007
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Internal Revenue Commission, PNG Power Ltd; University of PNG, University of Technology
Target audience	PCB users (PPL, mining & petroleum companies), Building and municipal authorities

Objective 5	***To establish and implement appropriate legislative framework, policy guidelines and codes of practice to ensure effective management of PCBs and stockpiles***
Activities	1. Develop appropriate guidelines or Codes of Practice on management and storage of obsolete equipment and hazardous substances in order to prevent leakages and spillages. This should be done immediately (as the first step forward to management of PCBs in the country. 2. Develop appropriate guidelines on storage of obsolete equipment in order to prevent leakages and spillages at corporate level (eg; by PPL and other users) of equipment that may contain PCBs. 4. Establish measures for preventing accidents from storage and contaminated sites
Duration	June 2006-2008
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Internal Revenue Commission, PNG Power Ltd; Power generating industry, University of PNG, University of Technology
Target audience	PCB users (PPL, mining & petroleum companies), Building and municipal authorities; and other potential industrials sites

Objective 6	**To effectively monitor the effects of PCBs on human health, and the natural environment in terms of toxicology and eco-toxicology**
Activities	1. Improve research facilities at local research and learning institutions. 2. Develop a database and network for exchange and analysis of research data between scientists in local institutions and overseas research organisations. 3. Establish independent accredited laboratory facilities.
Duration	June 2006-2008

Responsible organisation	Department of Environment & Conservation; Department of Health
Supporting Agencies	PNG Power Ltd; University of PNG, University of Technology,
Target audience	PCB users (PPL, mining & petroleum companies), Building and municipal authorities; and other potential industrials sites

4.3 Action Plan for the Control of Import, Export, Use and Management of Stockpiles and Wastes of DDT (Annex B Chemicals)

Context and Analysis of Issue

Since the imposition of the total ban on DDT use in the 1980s, the Department of Health has confined the use of DDT for vector control against mosquitoes during major outbreaks. After the ban, a number of options were trialled, and among, these were the insecticide impregnated mosquito bed nets (ITN) which has now become the choice for the vector and parasite management strategy in most parts of PNG. However, its efficacy as an alternative vector control method is yet to be fully established.

The ban on DDT has resulted in storage of large quantities of DDT in stockpiles which is now estimated at about 44 tonnes. These obsolete materials have now been deposited in warehouses and sheds around the country, of which, more than half are reported to be stored in Milne Bay, East and West New Britain provinces. There is an urgent need to dispose these obsolete stockpiles. Some stocks may need to be tested to verify their efficacies for future use in the indoor residual spraying programmes. There is a need for all the obsolete DDT stockpiles to be quantified and packaged into waterproof and rustproof containers as required under the Stockholm Convention. Detailed analysis should also be conducted to determine residual levels of DDT and its breakdown products in the environment and human.

There is general lack of awareness and education of the public regarding chemical risks and safety, and safe storage of chemicals such as DDT. An effective awareness and education programme will need to be established to inform people about the dangers of misuse of DDT (and other public health chemicals) by farmers especially smallholders who often use it for protecting their crops. The long-term effects on human health and the environment should be emphasised under this programme.

The following plans of actions have been developed to improve coordination and to effectively manage DDT stockpiles, and to phase out its use in PNG.

Objective 1	**To establish and implement a programme for the management and disposal of obsolete DDT stockpiles in the country**
Activities	1. Establish mechanism for management and monitoring of DDT. 2. Establish secure facilities for storage of DDT stockpiles. 3. Undertake repackaging and arrange disposal of obsolete stockpiles and wastes.

	4. Undertake testing of stocks for viability
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health
Supporting Agencies	Provincial Governments, Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Programme established and funded for DDT management Programme established and funded disposal Established buildings for DDT storage

Objective 2	**To establish and implement a well coordinated and integrated programme for effective control of malaria and other vector borne diseases in the country**
Activities	1. Establish mechanism for monitoring efficacy and effectiveness of various methods of malaria control and integrate with Integrated Vector Management and Integrated Pest Management Programmes. 2. Establish mechanisms for employing alternative methods for malaria and other vector borne disease control. 3. Review programmes and strategies for effective use of insecticide impregnated mosquito bed nets (ITN). 4. Undertake testing of stocks for viability.
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health
Supporting Agencies	Provincial Governments, Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Programme established and funded for DDT management. Established buildings for storage of DDT. An effective mechanism established and operating.

Objective 3	**To establish and implement an effective monitoring and testing programme**
Activities	1. Establish programme for the sampling and analysis of DDT and organo-chlorines in humans and environment. 2. Establish Programme for appropriate training of personnel in sampling, data analysis and reporting. 3. Identify and assess laboratories in the country or region for analysis of organo-chlorines in human and environment. 4. Build facilities for testing of organo-chlorines in humans and environment.
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health
Supporting Agencies	University of PNG, University of Technology
Performance indicators	Programme established and funded for training of personnel. Facilities established for analysing DDT and organo-chlorine compounds in the country.

Objective 4	To establish and implement a major public awareness programme on DDT and malaria control
Activities	1. Establish programme for carrying out awareness on use of DDT and other public health chemicals illegally. 2. Establish Programme for capacity building and training of personnel for raising awareness including the development of materials in English, Pidgin and Motu languages.
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health
Supporting Agencies	Department of Education, University of PNG, University of Technology, NGOs
Performance indicators	Programme established and funded for training of personnel in awareness raising An operating awareness programme covering at least 80 % of the population by Year 2 A reduction on misuse of DDT and other public health chemicals by Year 3

Objective 5	To identify end employ alternative drugs to manage and reduce incidences of malaria in the country
Activities	1. Establish programme for undertaking ethno-botanical research and studies in finding an alternatives substitute for anti-malarial drugs. 2. Improve facilities at research institutions.
Duration	10 years
Responsible organisation	Papua New Guinea Institute of Medical Research & Department of Health;
Supporting Agencies	University of PNG and University of Technology, NGOs
Performance indicators	Programme established and funded for undertaking research into ethno-botanical studies. Alternative anti-malarial drug developed and possibly tested by end of 5th year.

4.4 Action Plan for the Management of Releases from Unintentional Production of PCDD/PCDF, HCB and PCBs

Context an Analysis of Issue

The important conclusion derived from the assessment of dioxin and furan inventory was that the study was seen only as a “snap shot” at identifying the problems and estimating dioxin and furan (PCDD/PCDF) emissions into the air. Therefore, the data collected so far can not be used to make any conclusions on the extent and magnitude of impact on the natural environment or human health. Nevertheless, the inventory points out that the two major sources of PCDD/PCDF releases are from hospital waste

incineration systems and the uncontrolled burning of landfills, dumpsites and backyard burning. The releases through burning is a real problem and it is likely to get worse in future if no appropriate measures are put in place to regulate these emissions.

Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans are by-products of industrial and combustion processes. These by-products are not produced intentionally by industries or individuals. It is therefore difficult to prohibit or phase-out their usage by law.

Waste generation and proper disposal will continue to be a major task for all urban settings. The management of hospital and urban wastes are placed at the top of the priority list of those sources that require immediate action for emission reduction. On the other hand, biomass burning in rural areas is also found to contribute significantly to air emissions. Due to lack of facilities and the difficulties in policing emission problems at present, the development of mechanisms and actions could remain a low priority for some time.

The following Action Plans are proposed:

Objective 1	**To reduce emissions of unintentional POPs from major sources by 2010**
Activities	1. Install proper incinerators and employ other best available technology. 2. Establish proper system to monitor and dispose medical wastes in all hospitals and medical centres. 3. Develop an effective legislative framework and establish regulatory measures to manage hospital wastes in a systematic and acceptable manner; 4. Establish programmes for proper segregation and disposal of wastes; 5. Establish programme for training of personnel engage in waste management. 6. Raise public awareness on proper waste disposal and management system in the major town hospitals.
Duration	10 years
Responsible organisation	Department of Health & Department of Environment & Conservation
Supporting Agencies	Urban and Provincial hospitals, NGOs
Performance indicators	Adopt Guidelines for Best Available Techniques and Best Environment Practices into the national waste management programmes including the environmental management framework and Environment Impact Assessment process. Increase in number of hospitals and medical facilities with proper incineration facilities applying BAT/BEP initiatives.

Objective 2	To prohibit improper incineration of hazardous wastes including PCBs
Activities	1. Establish training programme for personnel dealing with unintentional POPs and waste management. 2. Develop mechanisms for regulation of hazardous wastes and management in the major cities and towns and industrial settlements of the country. 3. Gazettal of waste disposal sites using appropriate regulations. 4. Adopt Best Available Techniques and Best Environmental Practices in hazardous waste management.
Duration	10 years
Responsible organisation	Department of Environment & Conservation, Department of Health; Municipal Authorities and industry
Supporting Agencies	Department of Educations, universities, NGOs , Churches
Performance indicators	Programme established and funded for construction of hazardous waste landfills. Adopt Guidelines for Best Available Techniques and Best Environment Practices into the national waste management programmes such as the Environment Impact Assessment process. Number of municipals with proper waste management applying BAT/BEP initiatives.

4.5 Action Plan for Identification, Assessment and Mitigation of Releases from Stockpiles and Wastes: Pesticides, DDT, PCBs and HCB (Annex A, B and C Chemicals)

Context and Analysis of Issue

Due to lack of a well coordinated and regulated system for management of chemicals and wastes in the country, there are number of sites in the country where stockpiles of POPs and POPs-like chemicals exist. Some of these stockpiles are as old as 20 years and need immediate action for their disposal and management.

4.5.1 Pesticides and DDT

Since the ban on the use of DDT in 1983 in Papua New Guinea, substantial amounts of DDT stocks have been left in many provincial health warehouses, sheds and buildings. Proper control mechanisms need to be in place to minimise or avoid exposure of humans and the environment during the life cycle of DDT in the country.

4.5.2 PCBs/HCB and other hazardous substances

Improper storage of obsolete equipment and waste oils are major problem in all PPL centres as well as major mining and petroleum operations that were surveyed. The storage areas for the power company are usually situated at the back of workshops where the materials are often subject to rust attack and

fast deterioration due to high rainfall. The situation is much worse at most coastal centres.

There are no proper records of the transformers including those that have undergone retro-filling creating difficulties in the identification of equipment on-line particularly those manufactured before 1986 and analysis for determining their PCB contents. Waste PCB oils drained from transformers during equipment service or maintenance are normally stored in steel drums or tanks. These are sometimes poured into drains, given to schools or other sports organizations for field markings or deliberately left in steel dumps which are then left in the open environment or burned. It is only recently that PPL maintenance workers have been educated about proper storage of waste oils and health risks associated with PCBs. It is important that proper training of personnel is provided to cover storage, handling and management of PCB wastes.

PNG has a major problem in managing PCB containing equipment the releases of PCB contaminated oils from obsolete equipment. It is therefore necessary to review and revise the existing legislation so that appropriate regulations are developed to identify, assess and manage equipment that contain PCBs.

Like any other toxic and hazardous chemicals, the sound management of PCBs should be based on effective legislative controls and associated monitoring programmes and enforcement mechanisms. This would also require trained experts who would be well versed with chemical hazards, control systems, technologies and substitutes, emergency responses and clean up operations. This should be supported with increased public awareness on PCBs and the hazards they present which is vital for effective control and minimization or elimination of illegal uses of PCB equipment and oils.

While efforts have been made under the GEF/UNEP Pilot NIPs Project to educate the general public on the chemicals issues including PCBs, this needs to continue to ensure the wider community receive and understand the information to have any impact on their behaviour.

The following activities should be undertaken to address disposal and management of DDT, PCBs and other hazardous wastes in the country:

Objective 1	**To establish and implement a registration and monitoring system for stockpiles and releases of DDT, PCB and other pesticides and empty containers of hazardous substances**
Activities	1. Carryout field surveys of all possible storage and disposal sites 2. Establish multi-stakeholder committee. 3. Prepare relevant instruments for the establishment of the systems 4. Develop a monitoring system to ensure disposal sites are free from any human habitation, and water pollution.
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health

Supporting Agencies	Department of Education, University of PNG, University of Technology, NGOs
Performance indicators	System established and operating Database on contaminated sites and the releases

Objective 2	**To establish a database and monitoring system for stockpiles and releases of DDT, PCB and other pesticides**
Activities	1. Carryout field surveys of all possible storage and disposal sites 2. Establish multi-stakeholder committee 3. Prepare relevant instruments for the establishment of the systems
Duration	5 years
Responsible organisation	Department of Environment & Conservation & Department of Health
Supporting Agencies	Department of Education, University of PNG, University of Technology, NGOs
Performance indicators	System established and operating Database on contaminated sites and the releases

Objective 3	**To establish and implement a programme for the mobilization and safe storage of obsolete DDT, PCB and other hazardous chemicals stockpiles in the country**
Activities	1. Prepare project proposals for the construction of secure storage sheds in provincial centres. 2. Secure funding for the constructing the sheds. 3. Construct secure storage sheds in Alotau to store obsolete DDTs from Alotau, Esaala, Misima and Rabaraba and Bolobolo. 4. Construct a storage shed in Kimbe to store obsolete DDT from East and New Britain province. 5. Construct a secure shed in Goroka to store any obsolete stockpiles of DDT and repackage usable stocks for use in the IRS Programme. 6. Repackage obsolete DDT/chemicals into waterproof and rustproof containers and transfer to storage sites. 7. Construct proper storage facilities for PCB wastes and obsolete equipment and oils with improved security measures to prevent access by unauthorized persons.
Duration	2 years
Responsible organisation	Department of Environment & Conservation; Department of Health; PNG Power Ltd; relevant sector departments
Supporting Agencies	Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Secure sheds constructed and housing DDT, PCB and other hazardous chemical stockpiles and wastes

Objective 4	**To develop a regulation for the control of totally ban equipment containing PCB oils and material in the country pursuant to Article 3 and subject to the provisions of Annex A of the Stockholm Convention**
Activities	1. Carryout information gathering and consultation with relevant organizations and business houses. 2. Prepare cabinet submission. 3. Undertake drafting of instrument. 4. Get Cabinet endorsement.
Duration	2 years
Responsible organisation	Department of Environment & Conservation; Department of Health; PNG Power Ltd; relevant sector departments
Supporting Agencies	Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Have an operable regulation on PCBs

4.6 Action Plan for Identification and Management of Contaminated Sites (Annex A, B and C Chemicals)

According to the findings of the Task Team reports of 2005, there are about 6-8 DDT storage sites around the country which are believed to be contaminated due to problems of leakages. The old stockpiles in Milne Bay and New Guinea Islands are just being kept in old medical sheds. Similarly, PNG Power Limited (PPL) has similar problems of contamination at its centres due to inappropriate disposal of equipment containing PCBs and oils leaking from old transformers in over 99 centres in PNG. This poses a major health risk and environmental concern.

The various sector reports have indicated cases of groundwater contamination at these sites which are mainly caused by oils leaking from abandoned stocks at various locations at the back of power plants, plantations and/or logging sites. There have also been reports of other persistent chemicals that have been left unattended for number of decades at these sites without much concern for safe disposal.

Out of about 44 tonnes of DDT more than 35 tonnes are stored in located in the coastal areas, many under unsecured and rundown sheds and broken packages and containers. The situation is similar to the PCB contamination in the backyards of power generating company which has leakages taking place all year round from the old transformers.

Contamination of soils and groundwater can be accelerated through improper disposal of old ballasts and other equipment containing PCBs in buildings. Many dumpsites are expected to be contaminated by hazardous substances from industries, institutions and households, and from unintentional by-products of combustion when the same dump sites are used for multiple purposes such as for the disposal of parts of old machinery, and burning of all kinds of wastes.

Like any other toxic and hazardous chemicals, the sound management of contaminated sites should be based on effective legislative controls and associated enforcement mechanisms. This would require trained personnel who are versed with chemical hazard management experience to deal with rehabilitation of contaminated sites. The following Action plans have been proposed to address the problems of contaminated sites:

Objective 1	**To Conduct a Site Identification Study of contaminated sites in the country**
Activities	1. Consult with relevant Government organisations, private sector agencies and Town Authorities, and collate information on contaminates sites in each province and town. 2. Establish a programme to determine the levels, fate and impacts of POPs chemicals including PCB and DDT from contaminated sites.
Duration	2 years
Responsible organisation	Department of Environment & Conservation, Department of Health, PNG Power Ltd, Town Authorities
Supporting Agencies	Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Contaminated sites will be registered.

Objective 2	**To develop an appropriate legislative and policy framework for safe management of contaminated sites**
Activities	1. Based on the outcomes of Objective 1, prepare proposal for the establishment of a programme for the safe management of contaminated sites. 2. Develop and enforce a policy for re-exportation of all old containers of pesticides and hazardous substances for re-cycling and/or disposal of empty containers of hazardous materials in an environmentally friendly manner. 3. Consult with relevant stakeholder and develop appropriate policy direction for safe management of contaminated sites.
Duration	2 years
Responsible organisation	Department of Environment & Conservation; Department of Health; PNG Power Ltd; relevant sector departments
Supporting Agencies	Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Have an operable regulation on PCBs

Objective 3	***To establish a programme to carryout a comprehensive study on contaminated sites caused by unsafe storage or disposal of DDT, pesticides, PCB equipment and oils, and landfill or dumpsites contaminated with dioxin and furans from the burning of wastes***
Activities	1. Gather data and information on contaminated sites and identify sources of pollution. 2. Consult with relevant authorities in province and also at the headquarters, and develop a programme to inform people about the risks to human beings and water resources. 3. Prepare necessary guidelines to deal with the problem of soil and water contamination and possible risks to people.
Duration	2 years
Responsible organisation	Department of Environment & Conservation; Department of Health; PNG Power Ltd; relevant sector departments
Supporting Agencies	Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Have an operable regulation on management of contaminated sites.

4.7 Action Plan for Public Awareness and Training

Public awareness is the key to informing the public about the risks associated with chemical usage and handling, thus every effort should be made by those dealing with export and application of chemicals in the country to develop appropriate mechanisms to create more awareness on the harmful effects of chemicals. A collaborative approach should be taken so that all relevant parties are equally informed about the dangers associated with the use and handling of chemicals in PNG.

Context and Analysis of Issue

The level of understanding on chemicals, and the hazards associated with their usage in Papua New Guinea is generally very low mainly due to lack of information dissemination and awareness raising at all levels of community. To date, no effort has been made to address these constraints which can again be attributed to the lack of resources and infrastructure in the education system. Public awareness is the key to addressing this problem, and this can be achieved by improving curriculum development in schools, in-service training for teachers and establishing proper awareness raising programmes in the country. This is important for addressing some of the problems with substance abuse such as misuse of chemicals by youths as alcohol.

The laws that are expected to govern chemicals management in the country do not appear to have any provisions for awareness or public information,

information sharing between line agencies and stakeholders and this has made it difficult to police illegal uses and proper application of hazardous chemicals in the country. Responsibility more-or-less rests with those dealing directly with the import and application of chemicals in the country. A collaborative approach should therefore be taken, and an effective information exchange mechanism established as outlined in Subsection 4.8 so that all relevant parties are equally informed about the dangers associated with the use and handling of chemicals in PNG.

The following actions should be undertaken to increase awareness in the community on the import, export, use and management of chemicals in PNG:

Objective 1	***To establish a proper framework for public awareness and education on chemicals and hazards in the country***
Activities	1. Review existing legislation and develop appropriate policies for creating awareness on the import, use and management of chemicals in the country. 2. Establish an effective mechanism for awareness raising on chemicals.
Duration	2 years
Responsible organisation	Department of Environment & Conservation
Supporting Agencies	Department of Health; PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Effective public awareness programme established.

Objective 2	***To establish a training programme for awareness raising and education on chemical risks and hazards***
Activities	1. Develop programme for upgrading the science courses at teachers colleges and learning institutions to accommodate subjects relating to POPs and hazardous substances. 2. Provide adequate awareness and training to those dealers and importers of chemicals on proper registration, labelling, handling and reporting procedures so that the chemicals entering the country are regulated and volumes of the different chemicals are managed at a controlled level by appropriate agencies of Government. 3. Industries importing or handling chemicals should be informed about the harmful effects of obsolete chemicals so that the old stocks can be disposed of in an environmentally sound manner. 4. Establish a programme to provide adequate training to personnel within the line regulatory agencies of Government on proper use and management of chemical in PNG. 5. Establish programmes or projects for the production of public education materials on POPs and hazardous substances such as posters, booklets, bulletins and dissemination of these materials through schools, public media programmes such as

	through radios and newspapers to inform the public about the use, management and effects of pesticides, DDT, PCBs/HCB, and other hazardous chemicals used in the agricultural, industrial and municipal establishments.
Duration	2 years
Responsible organisation	Department of Environment & Conservation, Department of Education
Supporting Agencies	Department of Health; PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock; Internal Revenue Commission, University of PNG, University of Technology
Performance indicators	Have an operable regulation on PCBs

4.8 Action Plan for Information Exchange, Research and Development

Context and Analysis of Issue

(a) Research & Development:

There is little research into the development of substitute of hazardous chemicals currently being imported into the country. Limited research is being undertaken on pesticides use and application by the Coffee Research Institute (CRI), Oil Palm Research Association (OPRA) and National Agriculture Research Institute (NARI). In fact, NARI has done a lot of research, but this has concentrated on specific food crops of subsistence and commercial importance. The oil palm industry is also leading the way in carrying out research into finding alternatives to waste management and adopting best farming practices that will result in minimisation of wastes streams, as well as, undertaking specific research on control of pests through integrated pest management practices.

Proposed Action plans include the following:

Objective 1	***To establish an integrated programme for research and development of environmentally friendly alternatives and integrated pest management techniques in the country***
Activities	1. Establish programme for upgrading or establishment of research facilities at selected universities and research institutions. 2. Prepare project proposals for research on alternatives waste management practices and integrated pest management. 3. Develop systems for close dialogue and coordination between regulatory government agencies and research institutions.
Duration	5 years
Responsible organisation	Department of Environment & Conservation, Research Institutions, University of PNG, University of Technology
Supporting Agencies	Department of Health, PNG Power Ltd, Provincial Governments, Department of Agriculture & Livestock, NGOs
Performance	Closer dialogue established with key stakeholders.

indicators	Research facilities upgraded to carry out specific research.

Objective 2	***To establish a research programme to identify the effects of chemicals like DDT applicators and PCBs on the environment and workers who have been exposed to handling them***
Activities	1. Develop a process for regulatory government agencies to liaise with enterprises whose workers have been in the past, and/or are currently subject to exposure to hazardous chemicals like DDT and PCBs, and develop a programme for awareness, handling of chemicals at work place, and safe disposal. 2. Undertake field research and consult with those people who could possibly be exposed to DDT, PCBs, and develop a programme for personal health care and rehabilitation. 3. Prepare policy paper for consideration by relevant government agencies on how to deal with health issues of people who have been affected due to many years of exposure.
Duration	5 years
Responsible organisation	Department of Environment & Conservation; University of PNG, University of Technology; NGOs
Supporting Agencies	Department of Health; PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock;
Performance indicators	Have number of research projects funded

(b) Sharing of Information Exchange & Dissemination:

Article 10 of the Stockholm Convention requires parties to exchange information on POPs matters. The collaboration between organizations in PNG is done on ad hoc basis and no clear protocols or procedures are in place for information exchange.

The following strategies will lead to PNG meeting its obligation under Articles 9, 10 and 15 of the Stockholm Convention:

(i) Develop a nationwide Media Strategy to position the Department of Environment and Conservation as the driving force in the country to produce relevant programmes for awareness raising, information dissemination, and research and development in the country.

(ii) Identification of entry points such as NGOs, schools, women groups, and media organisations to produce materials for dissemination at community level;

(iii) Develop an effective network for collaboration between line agencies of Government, NGOs, private companies, universities and research organisations to establish modules in schools or systems for effective training and awareness on the import, use and

application, handling, labelling and management of chemicals in the country.

In order to implement these strategies, the following action plans and activities are proposed.

Objective 1	***To establish a central database on chemical imports and exports, usage by sectors or industries, distribution and handling and disposal and management constraints.***
Activities	1. Consult with stakeholders and establish a central database to store information. 2. Establish training programme for data collection, input and management 3. Provide training to people who will be involved in the storage and analysis of data and information. 4. Provide training on software applications and information management.
Duration	5 years
Responsible organisation	Department of Environment & Conservation, Internal Revenue Commission (Customs Section)
Supporting Agencies	Department of Health, PNG Power Ltd, Department of Agriculture & Livestock, University of PNG, University of Technology, Institutions of the different enterprises
Performance indicators	A fully updated database system established with connections to other agencies and institutions.

Objective 2	***To establish a mechanisms or systems for networking with all stakeholders for coordinating information dissemination***
Activities	1. Prepare proposal for the establishment of a chemical networking system such as the Chemical Information Exchange Network under the SAICM Quick Kit programme 2. Facilitate training of personnel to manage the website
Duration	5 years
Responsible organisation	Department of Environment & Conservation; University of PNG, University of Technology; NGOs
Supporting Agencies	Department of Health; PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock;
Performance indicators	Have a website for the exchange of information under the CIEN programme.

4.9 Action Plan for Monitoring and Reporting

The absence of a clear legislative and policy framework for chemical management in PNG has made it difficult for regulatory agencies of government to effectively enforce registration, licensing and approval processes. Only guidelines exist for licensing of pesticides, but again, the process of approval is still unclear for those industries dealing directly with

them in the field. No reporting system exists for industrial chemicals and unintentional POPs emissions.

No clear guidelines exist at present on the type of license that should be obtained and from what agency of Government the license should be obtained, and for how long. There is no structured and coordinated system at present to ensure imports of chemicals (whether these are POPs or POPs-like) are correctly registered and licensed from port of entry to the retailer before it is sold to the user. This is an area that needs to be improved, and transparent systems and guidelines should be developed to ensure hazardous chemicals are not entering the country without full diligence and assessment.

Furthermore, at the field level, it has now become very difficult for the Department of Environment and Conservation (DEC) to regularly monitor the use and application of chemicals or pesticides by agricultural industries. Even at major dump sites, it is common to see materials that contain chemicals and oils being burnt. For instance, at major PNG Power Ltd power stations, old transformed are left at back of the sheds, and oil leaking from these equipment that potentially contain PCBs have not be monitored by regulatory agencies of the government due t lack of resources. The main reason for lack of monitoring and enforcing is financial constraints and lack of skilled personnel to collect samples and report on magnitude and nature of impact, and identify best practices and measures to mitigate the chemical residuals and wastes.

Objective 1	***To establish Systems for Effective Monitoring and reporting of POPs and POPs-like chemicals in the country***
Activities	1. Develop clear procedures for registration, licensing and approval of chemicals (be it POPs or POP-like) and establish a transparent system for reporting that should be coordinated by a central agency of Government. 2. Develop clear guidelines for monitoring stockpiles, and assessing environmental and social impacts; 3. Build and strengthen capacity for monitoring and enforcement at Department of Environment and Conservation; 4. Allocate sufficient budgetary assistance to establish reporting and monitoring facilities, as well as, to facilitate compliance by chemical users; 5. Develop an appropriate system for communicating impacts between the polluter/user and the Department of Environment and Conservation monitoring officers. 6. Develop a process or a mechanism to deal with emergency spillages, health issues, and social impacts.
Duration	5 years

Responsible organisation	Department of Environment & Conservation.
Supporting Agencies	Department of Health; PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock; University of PNG, University of Technology; NGOs
Performance indicators	Have a website for the exchange of information under the CIEN programme

It is important that an effective monitoring and reporting system is in place to check on PNG's performance in order to comply with the requirements of the Stockholm Convention. Skilled personnel are needed to conduct monitoring work, hence proper training programmes have to be in place to build or strengthen the capacity of inspectors. The recurrent funding allocated by the PNG Government to Department of Environment and Conservation is inadequate to conduct the types of monitoring work envisaged under this Plan. Additional funding from outside donors will be needed to supplement government funding.

4.10 Action Plan for Strengthening Legislative and Policy Framework

The main legislative framework that exists at present to regulate the import of chemicals into the country is the Environment Act 2000. Environment Impact Assessment Procedures are clear for project proponents to follow and adhere to regulatory requirements. However, in terms of regulating POPs and POPs-like chemicals, the process is quite complicated because the key regulatory tool; namely the Pesticides Regulation of the (repealed) Contaminants Act is not ready for implementation – it is currently being reviewed and updated for application unde the new Environment Act 2000.

Regulatory frameworks are crucial for the control of chemicals in the country and administrative systems should be established to administer the import, export, formulation, distribution, sale and disposal of chemicals. The Environment Act 2000 provides an enabling framework so where there is no specific provision on POPs or POPs-like chemicals, the provision that relates to "contaminants" will have to apply pending enactment of the regulation on Chemicals.

The management of chemicals in many industries has not been regulated in a coordinated manner due to lack of clear legislative and policy environment, and this is further complicated by the fact that provisions in existing legislation overlaps. These issues have been highlighted in the existing National Chemical Profile (2000-2004).

A number of key actions need to be undertaken by the PNG Government to strengthen and enable a legislative and policy framework in PNG to address the issue of chemical management in the country. Some of the main actions that are crucial in ensuring proper regulation and management of POP and POPs-like chemicals in Papua New Guinea are described below:

Objective 1	***To establish a comprehensive and effective legislative framework for the management of POPs and POPs-like chemicals in the country***
Activities	1. Conduct a comprehensive review of existing Acts of Parliament, and the legislative framework that have been established to control and manage export and import of chemicals into the country, and monitor its usage by commodity, service and extractive industries in the country. 2. Based on the outcome of (1) above, undertake necessary legislative reviews and amendment of laws and regulations to manage all types of chemicals including POPs and POPs-like chemicals. 3. Review, assess and develop procedures to increase the capacity in key regulatory government agencies to effectively enforce the laws on management of chemicals in the country 4. Develop policy framework and mechanisms for effective coordination between line Government agencies dealing directly or indirectly with chemicals (POPs and POPs-like) in the country. 5. Develop regulations and procedures for obtaining environment permits or licenses for various types of storages, discharges, spills or disposal of chemicals. 6. Develop regulations for rehabilitation and management of contaminated sites.
Duration	5 years
Responsible organisation	Department of Environment & Conservation;
Supporting Agencies	Department of Health; Department of Labour & Employment, Department of Finance, Department of National Planning, Department of Trade & Industry, PNG Power Ltd; relevant sector departments; Provincial Governments, Department of Agriculture & Livestock; University of PNG, University of Technology; NGOs
Performance indicators	An effective legislation and supporting tools developed and approved by parliament

An enabling legislative and policy environment is necessary for effective monitoring and management of chemical that are imported, stored and used in the country. All studies by the Task Teams recommended the setting up of a framework as pre-requisite to implementation of the other action plans discussed above. This is necessary to ensure effective management of POPs and POP-like chemicals in Papua New Guinea.

CHAPTER 5 STRATEGY AND PRIORITIES FOR IMPLEMENTATION OF ACTION PLANS

The key to implementing action plans prescribed in the previous Chapter of this report is an enabling legislative framework and policy environment that is conducive and practical for implementation in Papua New Guinea. The fourth Goal and Directive Principle of the National Constitution of PNG already allows for protection of our bio-physical environment, and wise use and management of our natural resources for the collective benefit of the present and future generations.

A general undertaking has already been granted, but this is not possible if there is no political support and continuous financial assistance provided to the Department of Environment and Conservation which is the principal regulatory agency of Government to implement the action plans proposed in this report in relation to either ban, minimise or manage of POPs and POPs-like chemicals in Papua New Guinea in accordance with the Stockholm Convention and other related conventions.

5.1 IMPLEMENTATION STRATEGIES

A number of strategies will need to be developed to implement the action plans proposed in Chapter 4, and these strategies will have to be developed to address the following:

(i) To protect human health and the environment from Persistent Organic Pollutants and other persistent toxic substances;

(ii) To implement the provisions of the Stockholm Convention on Persistent Organic Pollutants and other supporting regional and international conventions in order for PNG to meet its global obligations as a Party to the Stockholm Convention on POPs;

(iii) To restrict, eliminate and phase out intentional uses of DDT and PCBs, and reduce and eliminate where possible unintentional POPs such as dioxins and furans;

(iv) To identify manage and dispose stockpiles and wastes and manage contaminated sites; and

(v) To improve information exchange and public education and awareness, research development and monitoring

5.2 POLICY ENVIRONMENT FOR IMPLEMENTATION OF ACTION PLANS

The initiatives of the NIP will be implemented in various aspects of project and policy development including:

5.2.1 Planning

The inclusion of best practice and best available techniques for minimizing or eliminating POPs and other hazardous substances in processes and chemical and waste management systems become a requirement. This will be a parameter for assessing projects and proposals in the Environment Impact Assessment process and the application of Level 2 activities under the Environment Act 2000 and other related instruments.

5.2.2 Monitoring

The performance indicators will include the number of establishments that have taken measures to mitigate, reduce or eliminate the releases of POPs and other hazardous substances.

5.2.3 Advocacy

Information on POPs and other hazardous substances will be available to all individuals, organizations and corporate citizens of the country and stakeholders will participate in the decision-making process on chemicals where the health and environment issues are concerned. The various responsible organizations will develop and make available information materials for dissemination to schools, institutions and interested parties. All available media will be used to relay information on POPs and other chemicals to the community.

5.2.4 Partnership

Special working partnerships will be strengthened or established with line government agencies, non-government organizations, media, academia and industry for the development of policies and mechanisms for chemicals management.

5.3 PRIORITIES FOR IMPLEMENTATION OF ACTION PLANS

Below are list of some of the priority areas that need financial support and an enabling political will to develop appropriate systems for effective management of chemicals in PNG.

5.3.1 PRIORITY 1: REVIEW AND AMENDMENT OF EXISTING LEGISLATION

The new Environment Act, its procedures and guidelines for environmental impact assessment, and enforcement and monitoring has been developed to provide for, and give effect to recognition to the Fourth National Goal and Directive Principles of the National Constitution of PNG, which calls for: “Papua New Guinea’s natural resources and environment to be conserved

and used for the collective benefit of all, and be replenished for the benefit of future generations*".* An interesting principle that follows from this overarching statement "*"wise use of our natural resources and the environment in and on the land or seabed, under the land, and in the air, in the interests of our development and in trust for future generations; and any conservation initiatives targeted at sacred, scenic, and historical qualities should be undertaken for the "benefit of ourselves and (for our) prosperity".* It concludes that all necessary steps should be taken to give adequate protection to the natural environment. This is a commitment given in principle, but the challenge that is often missing is political commitment to make this come into reality. Unfortunately, this is not the case today, and many development project that cause adverse environmental impacts have not been monitored for over 10 years also due to lack of coordination, regulatory and information exchange mechanisms, skilled personnel and insufficient funds to carry our field monitoring and enforcement work.

The action plans proposed in chapter 4 should be reviewed and necessary steps taken to address the following priority actions:

(i) Review, amend and develop specific legislation to address POPs and POPs-like chemical import, use and management in Papua New Guinea;

(ii) Strengthen capacity in the regulatory agencies of the Government to monitor and enforce provisions relating to chemical import, sale and use by industries;

(iii) Develop systems for inter-agency or departmental coordination and management; and

(iv) Improve systems for reporting and compliance with relevant Conventions on chemical management.

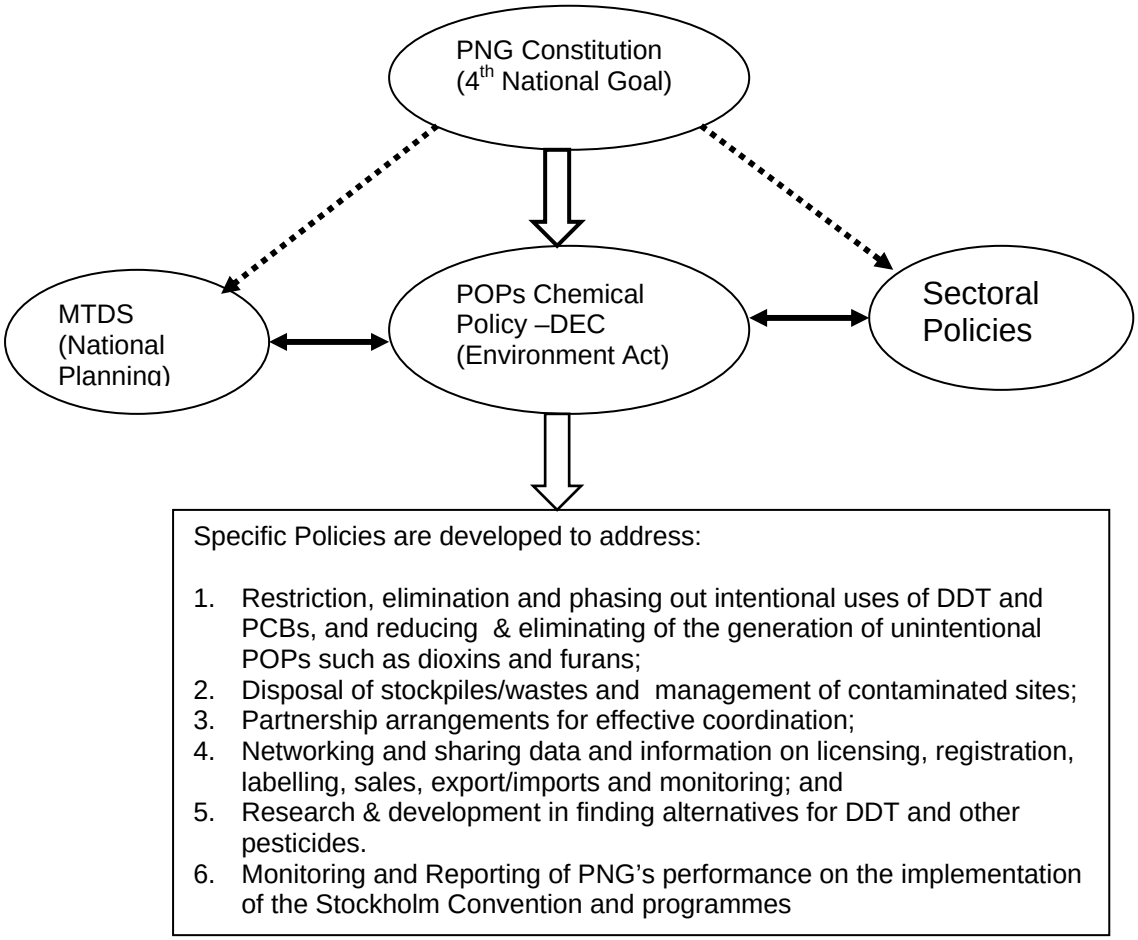
5.3.2 PRIORITY 2: ESTABLISHMENT OF AN ENABLING POLICY FRAMEWORK

An integrated approach will have to be taken to deal with chemicals that enter the country or are exported to other countries that PNG has developed trading partners with in order to minimise impacts on humans and the natural environment. This would essentially mean review of existing policies, regulatory framework and coordinating mechanisms so that the import and export, use, manufacture, distribution, transportation, storage and disposal of chemicals is controlled and managed in a systematic and coordinated manner. Similarly, policy direction would need to be developed and implemented in line with the National Constitutional Goals and Directive Principles, and key sectoral government policies and initiatives.

The National Constitution sets the framework for review of all the relevant legislation and policies. Networks should also be established with line agency that deal with national planning and development policy (MTDP) and the sectoral agencies. The focal point for this should be the Department of Environment and Conservation.

Figure 8 shows a proposed conceptual framework for development of appropriate policies to deal with POPs and POPs-like chemical management in PNG.

Figure 8: Conceptual Policy Framework for Addressing Chemicals in Papua New Guinea



The adoption of the 10 Guiding Principles of the Medium Term Development Strategy (MTDS) is necessary for effective integration of POPs and chemical management with national economic and social initiatives and policies. In addition, the sustainability of the programmes is paramount in achieving the overall objectives of environment protection and human health and safety. It is important to have in place supporting systems and programmes for chemical and environment management to sustain the initiatives of the National Implementation Plan (NIP). This can be attained through the use of existing mechanisms using available resources and soliciting external financial and technical assistance.

5.3.3 PRIORITY 3: ESTABLISHMENT OF AN EFFECTIVE INSTITUTIONAL FRAMEWORK FOR MANAGEMENT OF CHEMICALS IN PNG

The Department of Environment and Conservation is the focal point for regulation and management of chemicals in the country. It will also be the principal regulatory agency of the Government that will be involved for overall implementation of the NIP.

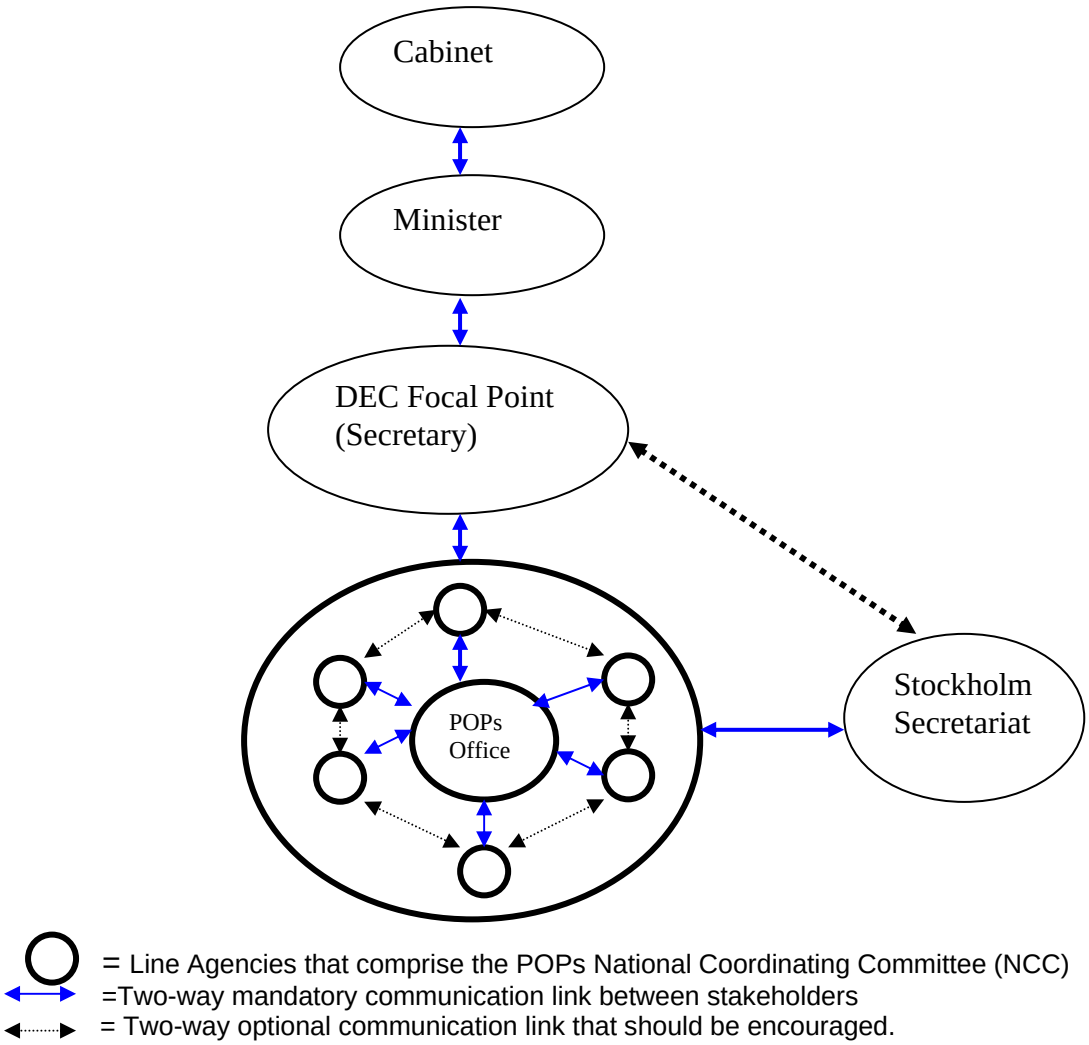
As soon as the National Executive Council (NEC) has approved the NIP, it would send positive messages globally about the Government's commitment towards meeting its obligation under the Stockholm, Rotterdam, Basal,

SPREP and Waigani Conventions. This Plan will form part of the overall implementation of environmental management efforts and will be integrated into core government business through the DEC Corporate Plan and other supporting policies. Networks would have to be established and capacity with the line agencies of the Government that deal with chemicals would have to be developed. A coordinating body will need to be established to support the government's current strategy on sustainable development, and policy direction on export based economic recovery and poverty alleviation.

Establishment of a permanent POPs Coordination Office within DEC will be necessary to network and coordinate all line agencies of the Government, establish and strengthen relationships with non-government organizations, media, academia and industry for the development of policies and mechanisms for chemicals management in the country. This body will also facilitate investigations and studies into disposal of stockpiles, and develop procedures for rehabilitation and management of contaminated sites. Importantly, it will ensure reporting to the Government and the Stockholm Convention Secretariat on a timely and efficient manner. **Figure 9** shows a conceptual framework for consultative relationship between the Coordination body and other stakeholders on POPs matters and the implementation of the Stockholm Convention and the NIP.

The most important agencies are those line Government Departments who are represented in the National Coordinating Committee. The members of the NCC would be encouraged to communicate and network with each other and the POPs Office would link them to the Stockholm Secretariat and the Cabinet through the Secretary of DEC and the Minister for Environment and Conservation where appropriate.

Figure 9: Conceptual Framework for Dialogue and Consultation Between relevant Stakeholders



The Government agencies that are important in supporting DEC in implementing the National Implementation Plan, and the Action Plans and Strategies highlighted in the report include: Department of Health, Department of Agriculture & Livestock, PNG Power, Department of Attorney General, Internal Revenue Commission (Customs), Department of National Planning & Rural Development, Department of Labour & Employment, Department of the Prime Minister & National Executive Council, University of PNG representing the academia, National Environmental Watch Group representing NGOs, and Oil Palm Research Association representing the private sector.

These line agencies will form the core of the National Coordinating Committee, and each agency will be required to consult with the POPs office at Department of Environment & Conservation office in Port Moresby. The arrows in the diagram show two-way mandatory communication linkages between these agencies. These linkages are important to allow approval processes for the programmes proposed in this report. BY engaging in proactive communication, PNG will be able to meet its obligation under the Stockholm Convention.

An adoption of an integrated approach is necessary for building linkages with other related programmes such as the National Communication programmes of the United National Framework Convention on Climate Change (UNFCCC). Such an approach would allow for clearly distinguishing and coordinating sector-specific activities to avoid duplication of functions and responsibilities. It will also allow for opportunities for streamlining policies and filling data and information gaps based on lessons learned.

5.3.4 PRIORITY 4: Capacity Building and Training

Capacity building and training of personnel involved in the different stages of the chemicals life in the country is now of paramount importance as the country goes further into increasing production in the agricultural and other economic sectors as part of the Government's medium term development strategy. In fact, it is becoming increasingly important as a matter of concern as chemicals usage is increasing in the oil palm, coffee, tea, forestry, mining and petroleum and construction industries.

Training is needed for personnel from the IRC (Customs) office who are at the point of entry and need to develop knowledge and skills on assessment and clearance of chemical imported into the country and need to be informed on the various type of chemicals and the health hazards and environmental risks associated with them. The officers from the Department of Environment responsible for the registration of chemicals also need specific training on toxicity and long-term impacts of chemicals on humans and the natural environment and various aspects of chemical management. Staff should also be trained on aspects of chemical spills, and monitoring and management of contaminated sites. Sectoral agencies should be taught various analytical and enforcement skills.

The actions plans highlighted in section 4.8 in the previous Chapter need to be prioritised, and strategies for long-term training, institutional strengthening, in-house training, or short-term workshops should be developed by the National Coordinating Committee so the personnel from key regulatory agencies, private sector organisations, and NGOs are given basic training on the human and environmental risks associated with chemical handling, storage, use and storage and skills for awareness raising and education relating to chemical safety.

Capacity for monitoring and reporting should be built or strengthened especially the establishment of analytical facilities and reporting skills.

5.3.5 PRIORITY 5: Awareness/Education Programmes

Public awareness programmes should be developed, and specialised NGOs should be engaged to facilitate awareness programmes at the community level so that chemicals are not misused or disposed of in unsafe locations. Particular effort should also be made to include awareness for vulnerable groups such as women, children and those least educated on chemicals.

CHAPTER 6 IMPLEMENTATION PLAN

6.1 Proposed Plan for Implementation

It is understood that POPs and other chemicals pose a risk not only to health and the environment as they move within the various media and contaminate the resources and foods that the people depend on, they can become a barrier for trade potentials as the standards for residue levels become more and more stringent in response to the demands of the international community. The policy on chemicals particularly those listed in the Stockholm Convention referred to as “Persistent Organic Pollutants” is a challenge taken to protect human health and the environment from the harmful effects of these substances and to protect PNG’s chances as a player in international trade, hence supporting the government’s Export Driven Policy. Having ratified the Stockholm Convention on 07 October 2003, it is also a show of Papua New Guinea’s commitment as a Party in meeting its obligations under these Conventions.

A holistic approach is needed to deal with chemical management as some of the chemicals not immediately listed as POPs may have POPs-like characteristics and so may become candidates for action in the future. This is a proactive measure taken to avoid any impacts of such chemicals to the environment and human health. Awareness and education of the public is perceived as the way to inform the public about unwanted exposure or emission of chemicals and their wastes.

External assistance would be needed initially to establish processes and systems for management of chemicals in PNG, and this will have to be done with the context of the country’s legislative and policy framework. Additional assistance from within the country is necessary to ensure environmental sustainability and ownership of the programme.

PAPUA NEW GUINEA NATIONAL IMPLEMENTATION PLAN

Project Implementation Schedule (2006 -2011)

YEAR	2006				2007				2008				2009				2010				2011
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1
PROJECT ACTIVITIES																					
1.0 Establishment of NIP Office	x																				
1.1 Recruitment of Project Director		x																			
1.2 Recruitment of other Project Personnel		←	→																		
2.0 Recruitment of Short-term Experts																					
2.1 Public Awareness Specialist (PA)					PA	PA															
2.2 Legal Consultant (LC)						LC	LC											LC			
2.3 Policy Specialist (PS)										PS	PS							PS			
2.4 POPs Waste Disposal Expert (WE)																WE					
2.5 PCB Inventory Expert (IE)															IE						
2.6 DDT Specialist (DT)														DT							
2.7 Chemical Expert (CE)											CE										
2.8 Pesticide Specialist (PE)														PE							
2.9 Environment Specialist (ES)											ES	ES									
3.0 Legislative Review & Development																					
3.1 Develop Specific Laws & Regulations						LC	LC			LC											
3.2 Development of Policy Framework										PS	PS							PS			
3.3 Development of Codes of Practice for POPs											ES	ES						PS			
3.4 Preparation of Cabinet Submissions																			DEC		
3.5 Enactment of Legislation on POPs																				DEC	
4.0 Public Awareness on POPs Chemicals																					
4.1 Development of Awareness Materials					PA	PA															
4.2 Awareness Workshops							←	→													
4.3 Dissemination of Information, etc							←	→													
5.0 Capacity Building & Training																					
5.1 Conduct training for Regulatory Bodies																PS					
5.2 Conduct training for Health & PPL Workers																	WE				

5.3 Teacher Training on POPs Chemicals																							
6.0 Research & Development																							
6.1 Develop Central Database for Chemicals																	CE						
6.2 Inventory of Contaminated Sites												CE	EC		DT	PS							
7.0 Disposal of Obsolete Material																							
7.1 Disposal of DDT & Pesticides																	WE						
7.2 Disposal of Transformers at PPL centres																	WE						
7.3 Construction of Storage Sheds (x3)																							
8.0 Monitoring & Reporting																							
8.1 Updates to NCC																							
8.2 Quarterly Reports to POPs Secretariat																							
8.3 Weekly Reports to UNEP Focal Point																							
8.4 Quarterly Reports to Environment Council																							

CHAPTER 7 RESOURCE REQUIREMENTS

External assistance would be needed initially to establish processes and systems for management of chemicals in PNG, and this will have to be done within the context of the country's legislative and policy framework. Additional assistance from within the country is necessary to ensure environmental sustainability and ownership of the programme.

Main areas that were identified by the Task Teams for external donor funding include the following:

1. Skilled and Experienced Experts (national and international personnel);
2. Public Awareness on the risks associated with use and handling of POPs and POPs-like chemicals;
3. Disposal and rehabilitation of stockpiles;
4. Training and capacity building of enforcement and monitoring agencies;
5. Legislative, institutional and policy review;
6. Establishment of facilities for data collection, storage, information exchange, research and monitoring; and
7. Establishment of a separate POPs Office within Department of Environment and Conservation.

Based on the field assessments conducted by the sectoral Task Teams, a total of K42,488,472 has been estimated for carrying out the above activities in order to manage POPs and POPs-like chemicals in Papua New Guinea. The breakdown of budget for the respective sectors is shown below on Table 8.

Table 8: Budget Estimates for the key sectors

No.	Main Sectors Identified by the Task Teams	Estimated Budget (K)
1	Legislative Review and Amendments	80,000
2	PCBs (no budget est)	150,000
3	National Profile	330,000
4	Agriculture	832,000
5	Forestry & Industry	2,718,749
6	Awareness (3-parts)	5,293,025
7	Unintentional POPs (Dioxin & Furans)	11,522,700
8	DDT	21,541,000
	TOTAL	**42,488,472**

It is envisaged that the above activities will be implemented over 5 year period between 2006 and 2011.

VOLUME 2– Copies of Original Survey Reports Produced by Sectoral Task Teams

LIST OF ANNEXES

Annex 1: Inventory and Assessment of POPs and POPs-like Chemicals used in the Agriculture and Livestock Sector in Papua New Guinea. A Task Team report by Noel Yori Kuman (2005).

Annex 2: National Profile of Chemical Management in Papua New Guinea 200-2004. A Report produced by David Mombray.

Annex 3: The Inventory and Assessment of DDT in the Health Sector in Papua New Guinea. A Task Team Report by Stewart Wossa Zamzai Sinikupa (2005).

Annex 4: Inventory and Assessment of PCB Containing Equipment, Oils and Contaminated Sites in Papua New Guinea (PNG Power. A Task Team Report by Ben Tolimanaram (2005)

Annex 5: Dioxin and Furan (Unintentional POPs) Inventory in Papua New Guinea A Task Team Report by Peter Petsul & Robin Totome (2005).

Annex 6: Evaluation and Assessment of the Legislative Framework for Chemical Management in Papua New Guinea. A Task Team Report by Benedict Yaru (2005).

Annex 7: Inventory of POPs and POP-like Chemicals in the Industrial Processes and the Forestry Sector including the Building Industry in Papua New Guinea. A Report Compiled by Lois Nakmai and members of Task Team 3 & 6 (2005).

Annex 8: The Evaluation and Assessment of Education, Training, Research and Awareness Raising Capabilities, Mechanisms, Programmes and Infrastructure in Papua New Guinea. A Task Team Report produced by Vele Ila'ava (2005).