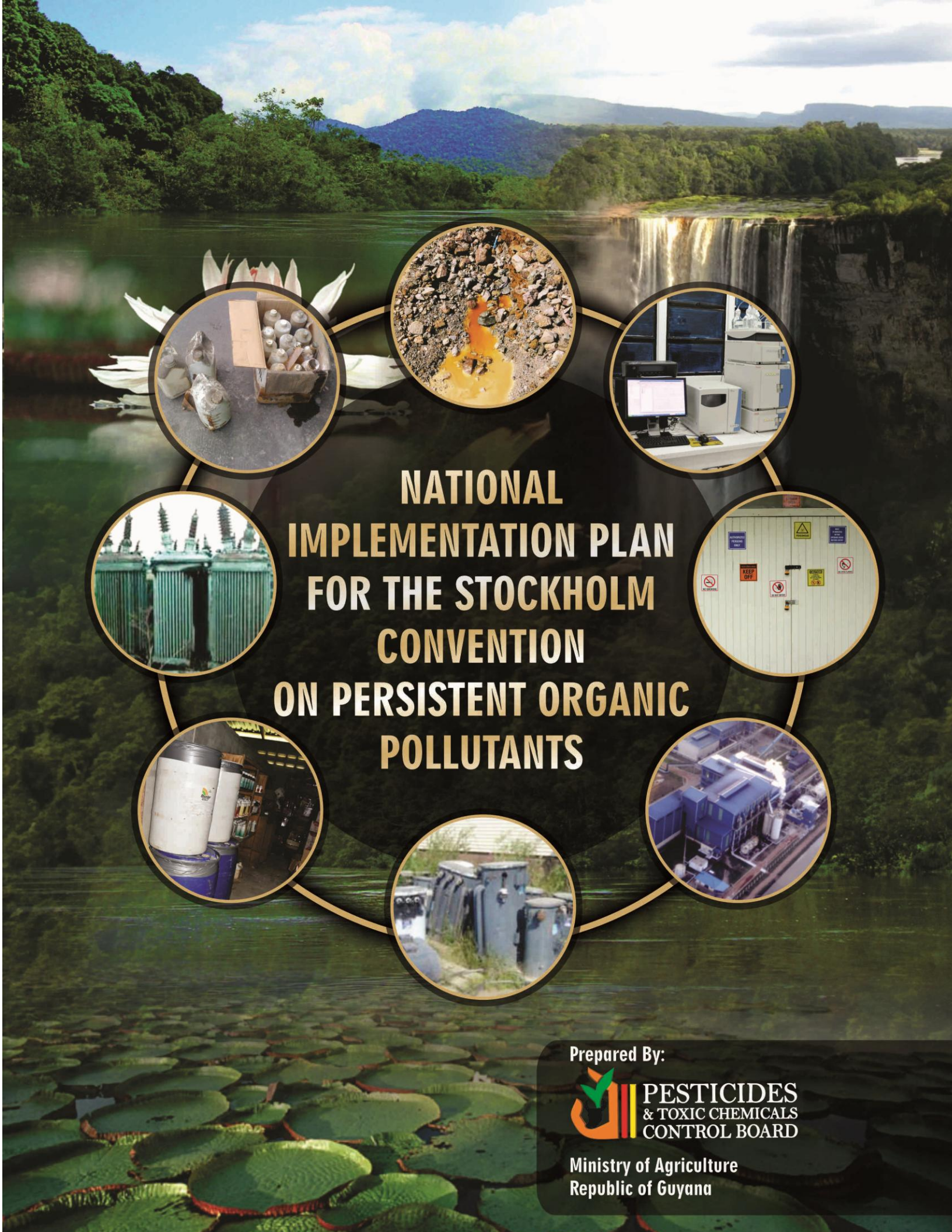

NATIONAL IMPLEMENTATION PLAN FOR THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

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PESTICIDES & TOXIC CHEMICALS CONTROL BOARD

Ministry of Agriculture
Republic of Guyana

Republic of Guyana

National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants

Final Pre-Endorsement Discussion Draft

Prepared by:

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Executive Summary

This Stockholm Convention National Implementation Plan (NIP) has been prepared by the Pesticide and Toxic Chemicals Control Board (PTCCB) in the Ministry of Agriculture for the Government of Guyana, acting as the national focal point for the Stockholm Convention on Persistent Organic Pollutants (POPs). Guyana acceded to the Convention in September 2007 and the preparation of the NIP has been undertaken in fulfillment of the country's obligations under Article 7 of the Convention. The support of an enabling activity grant from the Global Environmental Facility (GEF) for its preparation is gratefully acknowledged.

The preparation of this NIP follows the guidance issued by the Stockholm Convention and GEF, and systematically covers the country's present situation with respect to the presence and release of POPs in the country, the status of compliance relative to each provision of the Convention, and the national response adopted in the near and long term to the issue in the form of an Action Plan. The NIP has been prepared to cover all POPs current addressed by the Convention effective of its last amendment of annexes in 2011. This has been done within the overall framework of a strategic approach being pursued by Guyana respecting sound chemicals management and its national environmental and sustainable development strategies as imbedded in the National Development Program. It has been formally endorsed by the Government of Guyana in this context.

Guyana has never been a producer of chemicals defined under the Convention as POPs. However, it did import and use POPs either as chemicals or as contained in products and equipment. Similarly it would be expected to have sources of unintentional POPs release and POPs legacies in the form of stockpiles, waste and contaminated sites. As a consequence, it has a number of POPs related issues that require addressing, including: i) ensuring that all necessary legal and regulatory measures are in place to fulfill compliance requirements; ii) current national inventories of POPs in use and remaining as stockpiles waste or in contaminated sites are established; and iii) measures necessary to address the phase out of POPs in use and their environmental sound management in the form of stockpiles, waste and/or POPs contaminated sites are identified and implemented.

In general, Guyana is well advanced in addressing sound chemicals management generally and POPs issues specifically. It has a stable and well established institutional structure for chemicals management, notably a dedicated agency in the form of the PTCCB with responsibility in for chemicals management and use as well as the Convention, the Environmental Protection Agency (EPA) providing environmental regulatory control in relation to waste management and emissions, and a network of stakeholder Ministries, agencies and organizations that have related and synergistic responsibilities. Common supervision and direction is provided by membership on the PTCCB board and specifically for implementation of this NIP through an Inter-Agency Coordinating Committee. Similarly the existing legal and regulatory framework as provided by law and regulation administered by PTCCB, EPA and

other Ministries provides the basic tools for implementing the Convention, although a number of gaps requiring priority action have been identified in this NIP. These include i) ensuring the most recently added POPs chemicals are covered by import, export and use control primarily in the form of bans, but where appropriate restrictions and/or exemptions as provided for by the Convention and ii) final implementation of the pending Hazardous Waste Law.

The only POPs remaining in use in the country are PCBs, largely associated with operating electrical equipment. This primarily involves 15 larger transformers in service in Guyana Power and Light facilities and which require replacement before 2025. Given the age of this equipment, the NIP notes a near term opportunity as the national electrical system is upgraded and converts to renewable power generation to eliminate this equipment, an action that would require environmental sound disposal of approximately 50 t of contaminated equipment and dielectric oil.

With respect to POPs stockpiles and wastes, the priority issue identified in the NIP also relates to PCBs. Approximately 15 t of out of service PCB contaminated larger transformers with approximately 5 t of contaminated dielectric oil have been identified along with a preliminary estimate of 20 t of PCB immediately recoverable contaminated soil. There is also approximately 500 t of discarded distribution transformers stockpiled which should be evaluated for PCB contamination prior to export as scrap metal. Environmentally sound management of these materials first by capture and secure storage, and then by export for destruction represents a priority activity under the NIP.

The other highest priority POPs issue identified in the NIP is addressing the relatively high per capita unintended release estimated for the country (119g TEQ/year). This is mainly (97%) in the form of PCDD/PCDF released to air and land by open burning processes and within this source category, burning of waste is the largest contributor, followed by burning of biomass from agricultural activities.

A secondary POPs related stockpile issue relates to a small quantity (6 t) of obsolete pesticides, including some old POPs pesticides, mainly held by PTCCB and GUYSCO in secure facilities. The NIP Action Plan provides for their environmental sound disposal by export, something most efficiently done in association with the priority activity addressing PCB stockpiles and wastes. The NIP also provides for development of a product stewardship based return system for currently generated expired agricultural chemicals (approximately 20 kg/year) to minimize future accumulation of obsolete pesticides.

The NIP also places some emphasis on the development of contaminated site assessment and management capability, particularly POPs contaminated sites. This includes implementation of programs involving training, site assessment of identified sites particularly related to PCBs, undertaking clean ups as required and as may be justified development of low cost national treatment and disposal capability for contaminated soil.

In support of the above activities, the NIP also identifies a number of capacity strengthening measures related to training, development of targeted national R&D capability, upgrading POPs environmental and health monitoring capability and upgrading national laboratory capability, specifically for PCBs. Other activities related to information exchange and participation in the regional POPs monitoring next work, institutional and general public awareness/education, and reporting capacity is identified.

The detailed Action Plan developed covers the period 2014-2018 and defines specific outcomes, outputs and responsibility as well as indicative base and incremental costs by Action Plan item. A total incremental funding requirement of US$7.65 million is estimated for this period with identified sources of this funding being identified as national budgets, industry/private sector contribution, and international donors through multi-lateral and bi-lateral organizations and international financial institutions. After consultation with the GEF Secretariat PTCCB has initiated the development of a full scale project proposal that will target the main priority activities identified in the NIP with a target for initiating this work in 2014.

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Abbreviations used in the Text

A/C	Alternating current
BAT/BEP	Best Available Technique/Best Environmental Practice
CEHI	Caribbean Environmental Health Institute
COP	Conference of the Parties
DDT	Dichlorodiphenyltrochlorethane
EPR	Extended Producer Responsibility
FAO	United Nations Agricultural Organization
g	gram
GoG	Government of Guyana
GEA	Guyana Energy Authority
GEF	Global Environmental Facility
GENCAPD	Guyana Environmental Capacity Development Programme
GGMC	Guyana Geology and Mines Commission
GPL	Guyana Power and Light Inc.
GUYSUCO	Guyana Sugar Corporation
HCB	Hexachlorobenze
HCH	Hexachlorocyclohexane
HFO	Heavy fuel oil
l	litres
IA	GEF Implementing Agency
ICC	Chemicals Convention Inter-Agency Coordinating Committee
ICCM	International Conference on Chemicals Management
IDB	Inter-American Development Bank
IFI	International Financial Institution
kg	kilogram
IAST	Institute of Applied Sciences and Technology
LEC	Linden Electric Company Incorporated
LFO	Light fuel oil
LPC	Linden Power Company
LUSCSL	Linden Utility Services Cooperative Society Limited
M&E	Monitoring and Evaluation
MLGRD	Ministry of Local Government and Regional Development
NNRE	Ministry of National Resources and Environment
MoA	Ministry of Agriculture
MoH	Ministry of Health
MoF	Ministry of Finance
NARI	National Agricultural Research Institute
NDS	National Development Strategy
NEAP	National Environmental Action Plan
NIP	National Implementation Plan
OP	Obsolete Pesticides
PIF	Project Information Form

PCBs	Polychorinated Biphenyls
PCDD/F	Polychlorinated dibenzo-*p*- dioxins and dibenzofurans
PeCB	Pentachlorobenzene
PFOS	Perfluorooctane sulfonic acid
PFOS-F	Perfluorooctane sulfonyl fluoride
ppm	Parts per million
PRTR	Pollutant Release and Transfer Register
PTCCB	Pesticide and Toxic Chemicals Control Board
ROC-GRULAC	Regional Organization Group of the Group of Latin American and Caribbean Countries
SAICM	Strategic Approach to Integrated Chemicals Management
SWM	Solid Waste Management
t	Metric ton
TEQ	Toxic Equivalent
TJ	Terajoule
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Program
UG	University of Guyana
WHO	World Health Organization
WWF	World Wildlife Fund

1. Introduction

This Stockholm Convention National Implementation Plan (NIP) has been prepared by the Pesticide and Toxic Chemicals Control Board (PTCCB) in the Ministry of Agriculture for the Government of Guyana (GoG), acting as the national focal point for the Stockholm Convention (the Convention). Guyana acceded to the Convention in September 2007 and the preparation of the NIP has been undertaken in fulfillment of the country's obligations under Article 7 of the Convention. The support of an enabling activity grant from the Global Environmental Facility (GEF) for its preparation is gratefully acknowledged.

Guyana is a relatively small country in terms of population and industrial activity. However, its economy has historically and currently is heavily oriented toward agriculture with associated high chemicals usage, and to resource extraction, particularly bauxite and gold mining, both of which involve chemicals management issues. Recognition of these connections has led to the passage of the Pesticides and Toxic Chemicals Control Act in 2004 that provides for a national chemicals management framework and the formation of the PTCCB as the focal regulatory agency for chemicals management. Additionally, various environmental regulatory initiatives related to the management of hazardous chemicals waste and control of releases to air and water were initiated by the Environmental Protection Agency (EPA) during the same period. The overarching framework initiative on chemicals management is the National Chemicals Profile[1] which was completed and endorsed in 2010. This document provides a comprehensive analysis of chemicals trade and use in the country and a menu of issues and actions that should be pursued. Based on this document and its adoption, the country is proceeding to implement a national sound chemicals management strategy based on principles derived from the Strategic Approach for International Chemical Management (SAICM) initiative and International Conference on Chemicals Management. A high priority identified in this work as a key part of this strategy was the need to complete the Stockholm Convention NIP, particularly in relation to obsolete pesticide (OP) and elimination of polychlorinated biphenyls (PCBs).

Guyana has never been a producer of chemicals defined under the Convention as Persistent Organic Pollutants (POPs). However, while a relatively small country in terms of population and industrial activity, it can be expected to have imported POPs either as chemicals or as contained in products and equipment. Similarly it would be expected to have sources of unintentional POPs release and POPs legacies in the form of stockpiles, waste and contaminated sites.

This NIP has been prepared under the policy level supervision of the PTCCB Board of Directors which is made up of representation from major national institutional and external stakeholders having an interest in chemicals management issues including, the Ministry of Agriculture, Environmental Protection Agency (EPA), Ministry of Health, Research and Academic Institutions, Medical Practitioners, and agricultural producers. The day to day coordination and supervision of the NIP preparation was provided by the Registrar, PTCCB and the work was undertaken by the staff of the Board and a team of five national experts supported by an international consultant. Through PTCCB, a coordinating network of working

[1] http://www.ptccb.org.gy/

level institutional and external stakeholders was established at the outset of NIP preparation. This included all major institutional interests (i.e. Ministry of Agriculture, National Agricultural Research and Extension Institute (NAREI), EPA, Ministry of Health, Ministry of Trade, Guyana Revenue Authority; Guyana Geology and Mines Commission, Guyana Energy Authority) and external representatives of the principle economic sectors – sugar, rise, aluminum and gold mining, Guyana Power and Light (GPL), national academic institutions – University of Guyana, relevant environmental and waste management service providers, and public interest groups. This provided a basis for both advisory direction in planning the NIP scope and preparation work, and access to data/information on which the NIP is built. All administrative functions including financial management, procurement, and reporting obligations were undertaken directly by PTCCB in accordance with national standards. This included the management of GEF funding on a delegated basis from the United Nations Environmental Programme (UNEP) who have acted as the GEF Implementing Agency for acquisition of GEF support and as financial intermediary for transfer of funds to PTCCB from the GEF.

The work was undertaken included the following stages:

i) Establishment of supervisory and coordinating mechanisms, development of a work plan and identification of technical staff and resources, culminating in an inception workshop, along with the National Coordinating Committee and Board of Directors approval of the work plan
ii) Development of factual data and information related to POPs, inventories, national, legal and regulatory framework definition, POPs management infrastructure and capacity assessment, and associated gap analysis.
iii) Development of POPs management and Convention compliance strategies, priorities and a NIP Action Plan,
iv) Drafting of the NIP document and associated consultation
v) NIP endorsement and submission

This process follows the phases of NIP development set out in the various guidance materials provided by the Convention[2], particularly what was approved at the second conference of the Parties (COP-2) in 2006 as documented in UNEP/POPS/COP.2/INF/7. The scope of the NIP covers the original POPs covered by the Convention as well as the "new" POPs added by amendments at COP-4 (2009) and COP-5 (2011). As a result, the NIP also utilized guidance from the Convention (see above reference) and GEF[3] covering updating of NIPs and inclusion of new POPs.

The structure of the document generally follows the three Part format that is recommend in Appendix 5 of UNEP/POPS/COP.2/INF/7 with some adaptation to local conditions and issues. Part 2 provides the national baseline including a country profile, description of the institutional, policy and regulatory framework relevant to POPs, assessment of the POPs issue in the country in the form of inventories linked to Convention annexes, specific convention articles and associated aspects, all culminating in a gap analysis with respect to the Convention implementation. Part 3 covers the strategy and action plan elements of the NIP including an overall policy statement, implementation strategies, issue/subject specific activities and action plans, capacity strengthening priorities and plans, an implementation

[2] http://chm.pops.int/Implementation/NIPs/Guidance/tabid/587/Default.aspx
[3] http://www.thegef.org/gef/GEF_39_Inf5

schedule with associated performance indicators, and estimated resource requirements and financing initiatives.

2. Country baseline

2.1 Country profile

2.1.1 Geography and population

Guyana is a country in Northern South America and part of Caribbean South America, bordering the North Atlantic Ocean with a 430 kilometer coastline on the northeast. Guyana is bounded by Venezuela on the west, Brazil on the west and south, and Suriname on the east. The land area of the country is approximately 214,970 square kilometers and is situated between 1^{o} & 9^{o} North Latitude and 57^{o} & 61^{o} West Longitude (Bureau of Statistics, Guyana).

Guyana, an Amerindian word meaning "land of many water", is a water-rich country. Numerous rivers flow into the Atlantic Ocean, generally in a northward direction. A number of rivers in the western part of the country, however, flow eastward into the Essequibo River, draining the Kaieteur Plateau. The Essequibo, the country's major river, runs from the Brazilian border in the south to a wide delta west of Georgetown. The rivers of eastern Guyana cut across the coastal zone, impeding east-west travel to some extent and provide limited access to inland locations.

Drainage throughout most of Guyana is considered inadequate in many areas while river flow in most cases is sluggish because the average gradient of the main rivers is only one meter for every five kilometers. Swamps and areas of periodic flooding are found in all but the mountainous regions.

All new land projects require extensive drainage networks before they are suitable for agricultural use. The average square kilometer on a sugar plantation, for example, has six kilometers of irrigation canals, eighteen kilometers of large drains, and eighteen kilometers of small drains. These canals occupy nearly one-eighth of the surface area of the average sugarcane field. Some of the larger sugar estates have more than 550 kilometers of canals; Guyana has a total of more than 8,000 kilometers of drainage canals.

Georgetown, Guyana's capital and Guyana's only city, is below sea level and depends on dikes for protection from the Demerara River and the Atlantic Ocean.

Geographical Zones

The land mass of Guyana comprises four main geographical or natural zones: i) low coastal plain; ii) hilly sand and clay regions; iii) interior savannahs; and iv) highland region.

i) **Low Coastal Plain**: The low coastal plain, which occupies about 6% of the country's area, is home to more than 90% of Guyana's population. The plain ranges from five to six kilometers wide and extends from the Corentyne River in the east to Point Playa in the northwest and borders the Atlantic Ocean, a seaboard of approximately 430 kilometers with a width variance of 16 – 64 kilometers.

Guyana's extensive river system and water cycle is important for agriculture

The low coastal plain is made up largely of alluvial mud swept out to sea by the Amazon River, carried north by ocean currents, and deposited on the Guyanese shores. A rich clay of great fertility overlays the white sands and other clays formed from the erosion of the interior bedrock and carried seaward by the rivers of Guyana. Historically, due to flooding of the coastal plain during high tides, efforts to dam and drain this area have been ongoing since the 1700s.

Guyana has no well-defined shoreline or sandy beaches. Approaching the ocean, the land gradually loses elevation until it merges with many areas of marsh and swamp. Seaward from the vegetation line is a region of mud flats, shallow brown water, and sandbars. Off New Amsterdam, Berbice, these mud flats extend almost twenty-five kilometres (outwards or along the shoreline?). The sandbars and shallow water, being major impediments to shipping, results in incoming vessels having to unload parts of their cargoes offshore in order to reach the docks.

A line of swamps forms a barrier between the white sandy hills of the interior and the coastal plain. These swamps, formed when water was prevented from flowing onto coastal croplands by a series of dams, serve as reservoirs from which water could be accessed during periods of drought.

ii) **Hilly, Sand and Clay Region:** The white sand belt lies south of the coastal zone and takes up approximately 25 % of the country's area. This area is 150 to 250 kilometres wide and consists of low sandy hills interspersed with rocky outcroppings. The white sands support a dense hardwood forest. These sands cannot support crops, and if the trees are removed erosion is rapid and severe. Most of Guyana's reserves of bauxite, gold, and diamonds are found in this region.

iii) **Interior Savannahs:** The interior savannahs account for almost 6% of the country's area and is vegetated mostly by grasses, scrub and low trees. The human population is largely of the

Kurupukari Ferry crossing on the Linden-Lethem Road in Guyana

indigenous peoples living mostly in remote villages, with Lethem being the only town.

Sunset at the Oasis in Annai

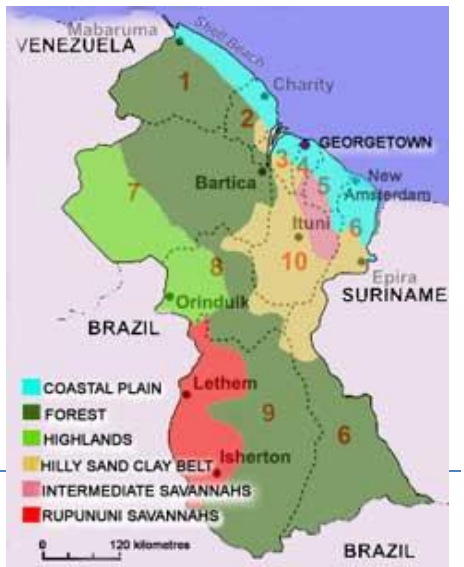
Much of the interior savannahs, as the name suggest, consist of grassland. The largest expanse of grassland, the Rupununi Savannah, covers about 15,000 square kilometres in southern Guyana. This savannah also extends far into Venezuela and Brazil. The Rupununi Savannah is split into northern and southern regions by the Kanuku Mountains. The sparse grasses of the savannah in general support only grazing. Amerindian groups engage in agricultural cultivation in a few areas along the Rupununi River and at the foothills of the Kanuku Mountains.

iv) **Interior Highlands:** The largest of Guyana's four geographical regions is the interior highlands, a series of plateaus, flat-topped mountains, and savannahs that extend from the white sand belt to the country's southern borders and covers approximately 63 % of the country. The Pakaraima Mountains dominate the western part of the interior highlands. In this region are found some of the oldest sedimentary rocks in the Western Hemisphere. Mount Roraima, on the Venezuelan border, is part of the Pakaraima range and, at 2,762 metres, is Guyana's tallest peak. Farther south lies the Kaieteur Plateau, a broad, rocky area about 600 metres in elevation; the 1,000-metre high Kanuku Mountains; and the low Acarai Mountains situated on the southern border with Brazil.

Administrative Regions

In addition to the four natural regions, Guyana has ten Administrative Regions in keeping with legislation enshrined in the Constitution of Guyana. Some regions are divided into sub-regions, while others are divided into Neighbourhood Democratic Councils for the purpose of facilitating local governance.

The primary purpose of this division is to provide Guyanese with the opportunity to work for, and share in, the economic well-being of the respective Administrative Regions throughout the country. Guyanese are empowered to be involved in every stage of development, such as decision-making, planning and implementation. This is meant to create confident, self-reliant and productive communities managing their own affairs. These independent administrative bodies perform functions in accordance with the associated policy decisions of the central government. The ten Administrative Regions are as follows:



i) **Barima – Waini (Region 1):** This region got its name from its two main rivers. The region is predominantly forested highland, bordered at the north by a narrow strip of low coastal

plain. Approximately 18,590, who live mainly in Amerindian settlements, inhabit Region 1.

Logging is this Region's main economic activity. The largest logging operation is run by the Barama Company, which transports timber to Demerara to be processed into plywood. Many smaller timber operations exist in this Region, since the tropical rainforest yields vast amounts of many species of hardwood and other useful types of lumber.

Mining for gold and diamond is also done in some of the forested areas, mostly with the use of dredges.

The coast of Region 1 is known for its beaches, particularly Shell Beach, the only beach in the world to host four species of sea turtles, including the "Giant Leatherback" (the world's largest turtle), during their nesting period i.e. March to July each year. Among the sea turtles which visit Shell Beach is the "Olive Ridgley" which is almost extinct. The Scarlet Ibis, the national bird of Trinidad and Tobago, is also a common sight on this beach.

ii) **Pomeron - Supenaam (Region 2):** This region comprises forested highland and low coastal plain, in addition to a small portion of the hilly sand and clay region. Approximately 42,769 people of this region live in established villages concentrated along the coast and in some Amerindian settlements. The town of Anna Regina, on the west bank of the Essequibo River, grew out of a government land development scheme and is made up of former plantations including Henrietta, Lima and La Belle Alliance. The Tapakuma Project in this Region links the Tapakuma, Reliance and Capoey lakes into one large conservancy, which supplies irrigation water for rice cultivation, this being the dominant agricultural/economic activity in Region 2. Besides rice farming, some people cultivate coconuts and rear beef and dairy cattle. Timber production is conducted on a very small scale in this region.

iii) **Essequibo Islands-West Demerara (Region 3):** This region is made up of the islands in the Essequibo River such as Leguan, Hogg Island and Wakenaam, and the Western portion of mainland Demerara. These have a low coastland, hilly sand and clay, and a small portion of forested highland regions.

This Region has a population of approximately 91,328 people who live in established villages along the coastland. There is large scale rice and sugar cultivation in this Region with coconut cultivation being done to a minimal extent.

The Boerasirie Extension Project converted the Boerasire Conservancy and the Canals Polder Conservancy into a single reservoir, thus resulting in thousands of hectares of land suitable for farming being reclaimed. The water from the conservancy is used during the dry seasons for irrigation purposes. Beef and dairy farming is also being done on a small scale commercial basis.

iv) **Demerara-Mahaica (Region 4):** This region extends east of the Demerara River to the Western bank of the Mahaica River, and is predominantly low coastal plain, with a small portion of the hilly sand

and clay region further inland. The population is concentrated along the coastland, particularly in Georgetown, Guyana's capital city, which has a population of approximately 56,095. The population of Region 4r is approximately 297,162, concentrated in and around Georgetown, the centre of Guyana's administrative and commercial activities. There are many sugar estates, such as Diamond, Enmore and La Bonne Intention (LBI), owned and operated by the Guyana Sugar Corporation (GUYSUCO). Some residents of this region work on coconut plantations, while many engage in cash crop farming. Cattle are reared in small amounts for beef and dairy purposes.

MAHAICA-BERBICE – REGION V

v) **Mahaica-Berbice (Region 5):** This region extends east of the Mahaica River to the west bank of the Berbice River. A large part of the region is low coastal plain. Further inland lie the Intermediate Savannahs and hilly, sand and clay region.

The population of Region Five is approximately 49,498.

Rice farming is the main economic activity of this region, followed by sugar cultivation, coconut farming, and beef and dairy cattle ranching. The Region has a water conservancy project aimed at improving the drainage and irrigation of the area. Massive dams were erected across the headwaters of the Mahaica, Mahaicony and Abary Rivers to prevent flooding of the farmlands, being drained by them, during the rainy seasons. During the dry seasons, the dams are opened to allow the lands to be properly irrigated.

Amerindians living in inland settlements engage in the production handicraft items e.g. nibbi furniture, tibisiri baskets, which they sell to earn their living.

vi) **East Berbice-Corentyne (Region 6):** This region is the only one to include parts of all the four natural geographic regions i.e. coastal plain, intermediate savannah, hilly and sandy clay area and forested highland. It is also the only Region with three towns i.e. New Amsterdam, Rose Hall and Corriverton. The population of the Region is approximately 142,839. This Region, an important rice-producing, cattle-rearing and sugarcane-producing area, is very difficult to drain and irrigate. Because of this, the Torani Canal was dug to join the Berbice River and the Canje Creek thereby providing adequate water supply for irrigating the agricultural lands. The area of Black Bush Polder, which was formerly a large swamp, was established through a land development scheme. The Government of Guyana gave people land for housing and for cultivating rice and cash crops. Herds of cattle are reared for beef and dairy in the Intermediate Savannahs. Many of the other resources of this Region are not fully exploited. Logging is only conducted on a small scale, although the seasonal and mundane forests of this Region can yield a variety of timber.

vii) **Cuyuni-Mazaruni** (Region 7): This region contains two of the four natural regions i.e. forested highlands and a small portion of the hilly sand and clay region. This Region brings to mind

the majestic Pakaraima mountain range. Mount Roraima (2,810 metres high, standing at the point where Guyana, Brazil and Venezuela meet) and Mount Ayanganna are in this mountain range. Most of the (approximately) 15,342 people living in this Region are involved in mining for gold and diamonds.

There are eight Amerindian settlements in the Pakaraimas area. The inhabitants of these settlements grow crops which they use internally as well as to supply the gold and diamond mining operations in the Region.

viii) **Potaro-Siparuni (Region 8):** This region gets its name from the Potaro and Siparuni Rivers, which are tributaries of the Essequibo River. Predominantly forested highland with a small portion of hilly sand and clay, this Region is home to the famous Kaieteur and Orinduik Falls. The Kaieteur is one of the highest single-drop waterfalls in the world, and it is one of the premier tourist attractions in Guyana. The people of this region, merely 5,737 in approximation, are involved in gold and diamond mining and forestry. Mazda Mining Company Ltd has the largest mining operation in this Region. The Iwokrama Rainforest Project is partly located in this Region. This Project studies how the rainforest can be utilized in the country's development (e.g. timber extraction) without the forests being depleted or destroyed.

ix) **Upper Takutu-Upper Essequibo (Region 9):** The Kanuku and Kamoa highlands and the vast Rupununi savannahs make up the Upper Takutu-Upper Essequibo Region. The forested Kanuku Mountains divide this Region in two. The north savannahs are about 2,000 square miles in area, and the south savannahs are 2,500 square miles. The population of approximately 15,087 people lives in scattered Amerindian villages and land settlement schemes.

The Rupununi, because of the grassy savannahs, is considered to be 'cattle country'. Most of the cattle are farmed to produce beef, while a small percentage is reared for milk. There exist large ranches at Aishalton, Annai, Dadanawa and Karanambo. Much of the beef produced here is sold in neighboring Brazil, because transportation cost to the other Regions of Guyana, especially Region Four, is very expensive. The people of this Region also mine semiprecious stones among the foothills of the Kamoa Mountains and among the Marundi Mountains. A wide variety of handicraft is produced in many of the seventeen Amerindian villages, and sold mainly to Brazil.

x) Upper Demerara-Upper Berbice (Region 10): The inland region of Upper Demerara-Upper Berbice contains the largest portion of the hilly sand and clay area. Guyana's principal bauxite deposits are found in the White Sands area. Approximately 39,106 people who inhabit this Region work mainly with bauxite companies, Linmine (at the Linden and Ituni locations) and Bermine (at the Everton and Kwakwani locations). The extracted bauxite is exported to be processed into aluminum. A small portion of the Iwokrama Rainforest Project is located in this Region. Cattle-rearing and forestry are also done on very small scales.

Language

The official language in Guyana is English, which is spoken mostly with a creole flavor. It is the language of education, commerce and government. Hindus and Moslems ritually use Hindi, Urdu and Arabic. The majority of Amerindians in the hinterland still adhere to one or more of the nine recognized tribal dialects namely, Akawaio, Arawak, Arecuna, Carib, Macusi, Patamona, Wai Wai, Warrau and Wapishana.

Population

The 2002 Population and Housing Census shows that the population of Guyana has risen to 751,223 persons – higher than the 1991 census - by a little more than 27,500 persons.

The population is concentrated in Regions 4 and 6, with 41.3 percent located in Region 4. Region 3 is the third most populous with almost 14%. Nationally, males outnumber females by a small percent (0.1). The sex distribution of the population of the Regions is similar to the national distribution with the exception of Region 4, where the proportion of males to females is higher than the other Regions.

2.1.2 Political and economic profile

Guyana became an independent member of the Commonwealth in 1966 and in 1970 became a Cooperative Republic. Under the Constitution of October 6, 1980, executive power is vested in the President, who leads the majority party in the unicameral National Assembly and who holds office for the assembly's duration. The president appoints the Cabinet, which is responsible to the National Assembly. The minority members of the Assembly elect an Opposition Leader. The Assembly comprise members, who are elected in keeping with conditions associated with universal adult suffrage, for a term of five years.

The right to vote belongs to all Guyanese citizens 18 years of age or older. Voting is carried out by secret ballot under a system of proportional representation. Votes are cast for lists of candidates compiled by the political parties, and seats are allocated proportionally among the lists.

Local government is administered principally through the Regional Democratic Councils (RDCs), each led by a Chairman. The RDCs are elected for terms of up to five years and four months in each of the country's ten Regions.

Guyana has two legal traditions, the British common law and the Roman-Dutch code, the latter now largely relegated to matters of land tenure. The Constitution is the supreme law of the land. The structure of the Judicature consists of magistrate courts for civil claims of small monetary value and minor offenses; the High Court, with original and appellate jurisdiction in civil and criminal matters; and the Court of Appeal, with appellate authority in criminal cases. The Court of Appeal has the authority to conduct further hearings on matters dealt with by the High Court.

2.1.3 Profiles of economic sectors

Immediately before independence in 1966, Guyana was in the early stages of developing its resources. This development continued under an economic plan drawn up by British, American, and Canadian experts. Manufacturing, which was on a small scale in the late 1960s, was expanded in the 1970s, but in the early 2000s the economy of Guyana was dominated by agriculture, mining, and service industries.

TABLE 1. GUYANA: GDP AT CURRENT BASIC PRICES (G$MILLION)

ISIC 4								
						Revd	Actual	Budget
Section	Industry	2006	2007	2008	2009	2010	2011	2012
A	**Agriculture, Fishing and Forestry**	**62,779**	**65,406**	**78,366**	**73,953**	**73,282**	**85,788**	**87,627**
	Sugar	15,317	16,497	12,740	15,633	9,186	15,499	15,258
	Rice	6,811	8,072	21,700	13,711	15,873	21,878	22,451
	Other Crops	13,162	13,505	14,231	14,553	15,727	12,840	14,124
	Livestock	7,181	7,800	9,717	10,059	10,614	11,963	13,218
	Fishing	9,349	7,749	8,073	7,344	7,573	9,884	10,478
	Forestry	10,958	11,784	11,905	12,653	14,308	13,725	12,099
B	**Mining and Quarrying**	**28,066**	**39,631**	**49,543**	**50,993**	**64,046**	**87,920**	**90,713**
	Bauxite	5,172	7,932	9,905	6,872	8,346	10,054	10,296
	Gold	13,859	22,249	30,170	36,573	50,169	71,656	74,835
	Other	9,035	9,450	9,468	7,548	5,531	6,211	5,581
C	**Manufacturing**	**20,169**	**22,975**	**28,856**	**27,706**	**27,282**	**29,728**	**31,210**
	Sugar	4,072	4,888	3,387	4,155	2,471	4,169	4,104
	Rice	4,255	4,338	10,330	8,092	8,573	8,257	8,938
	Other Manufacturing	11,842	13,748	15,139	15,459	16,238	17,302	18,167
	Services	**159,207**	**187,064**	**203,967**	**219,997**	**251,880**	**274,765**	**307,423**
D&E	**Electricity & Water**	**4,724**	**6,643**	**7,354**	**8,287**	**10,620**	**6,021**	**5,769**
F	**Construction**	25,976	31,597	35,043	36,344	41,605	43,996	50,156
G	**Wholesale and Retail Trade**	32,003	39,298	42,591	50,517	59,487	72,894	83,828
H	**Transportation and Storage**	**19,715**	**20,819**	**19,062**	**21,268**	**25,228**	**27,451**	**34,315**
J	**Information and Communication**	14,054	17,461	18,661	19,049	21,548	21,747	22,400
K	**Financial and Insurance Activities**	9,475	11,726	14,887	14,763	16,609	18,827	21,087
O	**Public Administration**	25,334	27,829	32,181	32,929	34,843	39,274	42,809
P	**Education**	**11,851**	**12,852**	**13,909**	**15,017**	**16,819**	**16,036**	**17,054**
Q	**Health and Social Services**	**3,802**	**4,374**	**4,693**	**5,537**	**6,446**	**7,360**	**7,790**
L	**Real Estate Activities**	3,340	3,697	3,967	4,260	4,486	4,592	4,821
	Other Service Activities	8,933	10,767	11,618	12,026	14,191	16,567	17,395
	less adjustment for FISIM	*(7,340)*	*(9,286)*	*(11,257)*	*(13,101)*	*(15,568)*	*(18,094)*	*(18,817)*
	TOTAL	**262,880**	**305,789**	**349,475**	**359,549**	**400,922**	**460,108**	**498,155**

Memo Items	2006	2007	2008	2009	Revd 2010	Actual 2011	Budget 2012
Growth Rate of Nominal GDP		**16.3**	**14.3**	**2.9**	**11.5**	**14.8**	**8.3**
Growth Rate of Real GDP		**7.0**	**2.0**	**3.3**	**4.4**	**5.4**	**4.1**
Implicit Deflator		**9.3**	**12.3**	**-0.4**	**7.1**	**9.3**	**4.2**
Gross Domestic Product at Current Basic Prices	**262,880**	**305,789**	**349,475**	**359,549**	**400,922**	**460,108**	**498,155**
Add: Taxes on Products net of subsidies	29,084	46,362	42,031	53,565	59,150	65,563	71,249
= Gross Domestic Product at Purchaser Prices	**291,964**	**352,151**	**391,505**	**413,114**	**460,072**	**525,672**	**569,404**

Source: Bureau of Statistics

2.1.4 Environmental overview

Guyana's environmental resources are abundant, but the need for an more proactive environmental policy is becoming progressively more apparent, especially in light of the contamination of water resources that originates from industries, agriculture and households; the problem of coastal erosion; the increasing danger of flooding in part induced by climate change; the deforestation of some areas close to the country's main concentrations of population; evidence of the need to regulate the wildlife trade; and the decline of some coastal marine species.

At the same time, national environmental policy is founded in the belief that economic growth and environmental sustainability are compatible, that indeed the latter is one of the bases for ensuring that enduring prosperity can be achieved for all Guyanese. To promote economic growth in a sound environmental context requires objective efforts to identify and diagnose environmental problems, courage in identifying solutions, and a willingness on the part of all the population to participate in developing and implementing corrective measures. Within Government, the Environmental Protection Agency created in 1996 takes the lead in identifying problems and proposing solutions, but all agencies will participate in implementing them, and the private sector's cooperation is also considered critical to successful implementation in all areas.

Environmental issues arise because of the impact of human activities on natural resources, affecting both their quantity and their quality, and the consequent impact in the reverse direction that a degraded environment has on human health and on the economic costs of human activities. In general, environmental problems can be divided into the following two broad concerns:

(i) Resource degradation, or reductions in the availability of natural resources; and

(ii) Resource contamination, or reductions in the quality of natural resources.

Examples of resource degradation include overfishing stocks of certain species; deforestation of mangrove areas, which in turn leads to problems of reduction of stocks of some marine species and also of increased danger of flooding; overcutting of inland forests, which leads to loss of natural habitats and loss of soils and hence also to loss of water supplies in watersheds; and overcutting of selected forest species, which leads to loss of that economic resource over the longer run and a reduction in the nation's biodiversity.

The most common examples of resource contamination in Guyana are those related to water pollution: mercury, cyanide and other wastes from mining; untreated human and animal wastes in water supplies; and wastes from many industries in water bodies. Air quality is also a public health concern, especially in the case of Linden, where suspended mineral particulates can affect public health.

The national natural resource base is dominated by forests, which cover 80 percent of the country's 215,000 square kilometers. These rainforests contain great biodiversity with a rich variety of plant and animal life, including endangered wildlife and several unique species endemic to the country. Guyana is one of only thirteen

countries in the world that retain their tropical forests virtually intact. The vast tropical rainforest influences temperature, precipitation and air turbulence, and it is an important factor in mitigating global warming. The rainforest also shelters watersheds, areas of remarkable beauty, and potential for scientific research and tourism. Mineral deposits are also extensive and include mainly bauxite, gold, and diamonds. The other principal elements of the natural resource base include the abundant quantities of freshwater itself; agricultural land, distributed mainly along the coast and in hinterland savannahs; and extensive fisheries resources.

2.2 Institutional, policy and regulatory framework

2.2.1 Environmental policy, sustainable development policy and general legislative framework

The 1980 Constitution of Guyana, Chapter II outlines the principles for the country's political, economic and social system. Specifically, Articles 2:25 and 2:36 of the Constitution provides the base for a national environmental policy and emphasizes its role as key principles in Guyana's social and economic systems. Environmental policy established for Guyana has its foundations in the National Development Strategy (NDS) [4]of 1997 released by the President and administered by the Ministry of Finance. Chapter 18 contained in Volume 3 sets out the overarching national environmental policy framework and priorities. This has since been revised and updated for the period 2001-2010 and remains the current basis for environmental and sustainable development policy[5].

The preparation of a National Environmental Action Plan (NEAP) in 1994 was one of the first systematic efforts towards integrated environmental planning and outlines the focus of GoG as it relates to environmental management. A second NEAP (2001-2005) was prepared and adopted in 2001he NEAP for the period 2001-2005 [6]. This elaborates a national environmental policy, strategy, gaps, priorities and an action plan. While not an explicit policy on sustainable development the NEAP does state the country's commitment to the principles of sustainable development consistent with the NDS. Relevant to the POPs issue and the Stockholm Convention, the NEAP highlights the following:

- National commitment to international multilateral agreements generally;
- Promotion of implementation tools including i) environmental education and public awareness, (ii) human resources development, (iii) institutional capacity building, (iv) inter-agency collaboration, (v) public participation, (vi) information management and networking, (vii) acquisition of appropriate technology and (viii) environmental legislation, all of which serve to guide preparation of this NIP;
- Focus on cross sectoral issues related to (i) land Use, (ii) environmental health, (iii) integrated water resource management and waste management; and
- Development of cross sectoral programs covering regulatory standards, controls and monitoring in relation to: i) environmental health; ii) environmental pollution; iii) integrated waste management; and iv) Pesticides and toxic chemicals;

[4] http://www.guyana.org/NDS/NDS.htm
[5] http://www.ndsguyana.org
[6] Guyana – National Environmental Action Plan 2001-2005, Environmental Protection Agency, 2001 http://www.guyana.org/NDS/chap18.htm

With respect chemicals management generally and the POPs issue in particular, two main pieces of legislation govern. One is the Pesticides and Toxic Chemicals Control Act (2000) and along with its 2007 amendment. The other is the Environmental Protection Act (1996).

- *The Pesticides and Toxic Chemicals Act (2000)*[7] covers the control and regulation of all chemicals with potential environmental and health impacts with respect to their import, export and use. In practical terms it establishes the PTCCB with the legal authority to exercise powers to: i) register pesticides and toxic chemicals; ii) license persons to import or manufacture registered pesticides and toxic chemicals; iii) authorize persons to sell restricted pesticides; iv) register premises in which a restricted pesticide may be sold; v) license pest control operators; vi) consider and determine applications made pursuant to the Act and to deal with all aspects of the importation, manufacture, transportation, storage, packaging, preparation for sale, sale, use and disposal of pesticides and toxic chemicals; and vi) advise the Minister on matters relevant to the making of regulations under this Act, and to monitor the implementation of such regulations. Part IV of the Act (Registration and Licenses) provides the specific powers required for registration, storage, sale, import, licensing, prohibition and restriction of pesticides and chemicals. Section 9 empowers the Board to act on the improvement of management practices related to pesticides and chemicals while Section 34 provides for dealing with offences and penalties and includes fines and imprisonment commencing from five thousand dollars and three month imprisonment for a first offence and ranging to five hundred thousand dollars and three years imprisonment for subsequent offences. The 2007 Amendment to the Act[8] provides for the regulating of exports and for accession to international agreements governing pesticides and chemicals by providing for the adoption of obligations assumed under them. This effectively provides legal authority to enforce provisions and obligations under the Stockholm and Rotterdam Conventions as well as facilitate implementation of the Basel Convention noting that it would also link more directly to the management of hazardous waste under the Environmental Protection Act. As described in Section 2.2.4 below regulations under this Act are applied.

- *The Environmental Protection Act (1996)*[9] provides for the formation of Environmental Protection Agency (EPA) and a legal mandate to administer and implement the national environmental policies which were set out in the NDS, NEP, and as may be adopted by the government from time to time. Relevant to the POPs issue this Act provides the legal basis for the government to direct the management of environmental pollution inclusive of explicit functions "to prevent and control environmental pollution" and "to formulate standards and codes of practice to be observed for the improvement and maintenance of the quality of the environment and place limits on the release of contaminants into the environment". This is elaborated in Part V of the Act that deals with the prevention and control of pollution through any means that discharges or permits the entry of any contaminant into the environment whether it is solid, liquid or gas and covers the amount and concentration of the contaminant. In practical terms this covers the management of POPs chemicals in the form of stockpiles and wastes and, where they are released into the environment, the setting of maximum allowable levels of contamination. This legal authority is given practical implementation

[7] http://www.ptccb.org.gy/documents/Pesticide_Act_2000.pdf
[8] http://www.ptccb.org.gy/documents/Pesticides%20and%20Toxic%20Chemicals%20Amendment%20Bill%202007%20(I).pdf
[9] *Environmental Protection Act* (No 11, *1996*)

basis through three Environmental Protection Regulations made effective in 2000 covering hazardous waste, air protection, water quality, and noise. These are further described in Section 2.2.4 below.

Two other two pieces of legislation cover activities involving chemicals management including POPs are relevant to actions taken with respect to the Convention and its implementation.

- *The Food and Drugs Act 1971*[10] is administered by the Food and Drug Department in the Ministry of Health. The Act provides for the control of chemicals used in the disinfection of premises or control of vermin in food premises; and in the control of plants and disease pests although the latter is largely superseded and given over to the latter Pesticides and Toxic Chemicals Act. This Act also covers importation, standards and misleading representation which also are now more comprehensively addressed under the Pesticides and Toxic Chemicals Act. The main relevance of this legislation to the POPs issue is its role authorizing Ministry of Health's participation in policy decision making in respect to chemicals that might be allowed or disallowed for import and use. This specifically relates the situation regarding to maintaining the option of using DDT for vector control and consequential requirements under the Convention for a specific exemption.

- *Occupational Safety and Health Act (1997)*[11] makes provision for registration and regulation of industrial establishments and for occupational safety and health of persons at work. The Act covers hazardous chemicals in workplaces which can endanger the health of workers, and allows for the limited or restricted use of such chemicals. It also covers the introduction of new chemicals in the workplace. A specific relevant provision that operates alongside the provisions of the Pesticide and Toxic Chemicals Control Act is the requirement that employers maintain a hazardous material inventory and appropriate documentation and procedures covering the following: i) toxic properties, both acute and chronic health effects; ii) chemical and physical characteristics of the chemical; iii) corrosive and irritant properties; iv) allergenic and sensitizing effects; v) carcinogenic effects; vi) teratogenic and mutagenic effects; vii) effects on the reproductive systems; viii) labeling of the chemical; ix) provision of material safety data sheets; and x) instruction and training in the chemicals used. Implementation of this Act is the responsibility of the Occupational Safety and Health Department of the Ministry of Labor.

One piece of pending legislation should be noted as potentially being of significant within the national legislative framework related POPs, is the proposed Solid Waste Management Act that will establish a national Solid Waste Management Authority under the Ministry of Local Government and Regional Development. This is anticipated to be passed during the current parliament. Its significance in relation to the POPs issue is to establish national standards for solid waste disposal, including limitations on access to disposal facilities that may currently be used for POPs disposal.

While the above legislation provides the fundamental legislative framework available to address the POPs issue, a number of other pieces of legislation exist that relate to control of other chemicals of various types and categories (i.e. drugs and narcotics, petroleum products, sulphuric acid, ozone depleting

[10] *legalaffairs.gov.gy/information/...**guyana**/doc.../207-chapter-3403.html.*
[11] *legalaffairs.gov.gy/.../**law**s-of-**guyana**/doc.../448-chapter-9910.html*

substances). A description of these and references are provided in the National Chemicals Profile referenced above and available on the PTCCB web site.

2.2.2 Roles and responsibilities of stakeholder ministries, agencies and other governmental institutions

The principle government agencies with legislative and regulatory authority directly related to the implementation of the Stockholm Convention and other associated multi-lateral agreements are the PTCCB and EPA. PTCCB acts as the Stockholm and Rotterdam Convention focal point while EPA is the focal point for the Basel Convention. Each administers elements of the principle legislation and regulations that currently or potentially would control POPs chemicals. In the case of PTCCB this applies in relation to POPs chemicals import, export, handling, storage and use, and in the case of EPA it applies in relation to POPs waste disposal, management of contaminated site, and unintentional releases. The following provides a profile of these principle agencies:

- *Pesticide and Toxic Chemicals Control Board:* The PTCCB operates as an autonomous agency under the Ministry of Agriculture and the legal authority of the Pesticide and Toxic Chemicals Control Act. It has regulatory authority over the management (import, export, production, transportation, use, disposal and storage) of pesticides as well as chemicals having environmental and health impacts. By definition, this encompasses all chemicals such as pesticides, industrial chemicals, disinfectant, detergents, and paints and paint products. It is supervised by a Board of Directors representing a range of major national institutional and external stakeholders having an interest in chemicals management issues including, the Ministry of Agriculture, Environmental Protection Agency (EPA), Ministry of Health, research and academic institutions, medical practitioners, and agricultural producers. Operationally, the PTCCB conducts its work with a staff of 8 under the direction of the Registrar. It is organized into two sections, the inspection and registration section and the enforcement and training section. It also operates a laboratory in support of its functions (See Annex 3) which is generally considered to have the main chemical management support capability in the country. Further technical support is provided by National Agricultural Support Institute (NARI) with whom it shares a common office location. In addition to the registration, assessment, and permitting functions defined elsewhere (Sections 2.2.1 and 2.2.4) in the description of the Pesticide and Toxic Chemicals Control Act and subsidiary regulations, the PTCCB acts as the focal point for the Stockholm and Rotterdam Conventions as well as the national activities associated with the International Conference on Chemicals Management and associated initiatives relating to the Strategic Approach to Integrated Chemicals Management (SAICM). In addition, it undertakes public awareness, training and other education programs for farmers, extension agents, vendors, students, pest control operators and Customs and Trade Administration Officers throughout Guyana. The Board maintains a public awareness program through the development and distribution of training manuals and the publication of a quarterly newsletter. Further, the Board participates frequently at national exhibitions and television programmes featuring agriculture issues, in addition to hosting website with a comprehensive range of topics pertinent to its mandate.

- *Environmental Protection Agency:* The EPA operates under the Ministry of Natural Resources and Environment with a specific mandate from the Environmental Protection Act described above. Implementation of this part of the Environmental Protection Act is assigned to the Environmental

Protection Division with EPA. It has an overall staff of 23 with 20 professionals within the Environmental Management Division that administers the relevant parts of the legislation, namely those associated with hazardous waste, air pollution and water quality. 3 staff is directly involved with hazardous waste regulatory issues. Two responsibilities relevant to the POPs issues that this Division handles are maintenance of a national hazardous waste generation inventory and acting as the national focal point for the Basel Convention. Summaries of both hazardous waste generation and in transit waste[12] through Guyana based on EPA data are provided in Chapter 2 of the National Chemicals profile. It should be noted that for the mining sector, the Guyana Geology and Mines Commission, in compliance with a Memorandum of Understanding with the EPA, is responsible for the implementation of some sections of the Environmental Protection Act and the associated regulations, namely this associated with mine tailings and mercury issues.

Other ministries and agencies having a significant role in the POPs issue and its management are:

- Ministry of Health through the Food and Drug Department under the Food and Drug Act and responsibility for chemicals use in food related applications and in public health protection such as sanitation and vector control.
- Ministry of Labour through its authority over work place health and safety issues under the Occupational Safety and Health Act,
- Customs and Trade Administration of the Guyana Revenue Authority who act as the front line enforcement authority for import and export transactions related to controlled chemicals, products containing such chemicals and wastes.

Similarly, ministries and /or agencies with oversight responsibility either through a regulatory role or administration of public assets that supervise enterprises using, holding stockpiles or releasing POPs represent stakeholders. These may include the Guyana Geology and Mines Commission (through regulation of the mining industry), Guyana Energy Agency (through regulation of electrical power generation), Ministry of Local government and Regional Development (municipal waste management responsibility though municipalities and Democratic Neighbourhood Councils).

The Ministry of Finance and executive branch of the government generally are also stakeholders recognizing the fiscal and public good implications to the country involved in addressing the POPs issue and meeting national obligations under the Convention.

2.2.3 Relevant international commitments and obligations

Guyana is a Party to a wide range of international agreements and conventions related to the environment as well as an active participant in activities under the International Conference on Chemicals management

[12] Transit hazardous waste has historically originated in French Guiana and shipped for disposal in France via Guyana, including approximately 270 t of PCB contaminated materials and 20 t of obsolete pesticides in accordance with Basel Convention documentation.

and the INC which is currently seeking to address the use of mercury both nationally and internationally. The principle ones with some relation to POPs and chemicals management generally are listed below.

Convention/Agreement	Ratification/ Accession (a)	National Authority
Stockholm Convention on Persistent Organic Pollutants	Dec. 11/2007 (a)	MoA/PTCCB
Basel Convention on the Trans-boundary Movement of Hazardous Waste and their Disposal	April 4/2001 (a)	MNRE/EPA
Rotterdam Convention on Prior Informed Consent for Certain Chemicals and Pesticides in International Trade	June 25/2007 (a)	MoA/PTCCB
Vienna Convention	Aug. 12/1993 (a)	MoA-Hydrometeorlogical Division
Montreal Protocol	Aug. 12/1993 (a)	MoA-Hydrometeorlogical Division
– **London Amendment to the Montreal Protocol**	July 23/1999 (a)	MoA-Hydrometeorlogical Division
– **Copenhagen Amendment to the Montreal Protocol**	July 23/1999 (a)	MoA-Hydrometeorlogical Division
– **Montreal Amendment to the Montreal Protocol**	July 23/1999 (a)	MoA-Hydrometeorlogical Division
– **Beijing Amendment to the Montreal Protocol**	June 23/2002 (a)	MoA-Hydrometeorlogical Division
INC – Mercury Convention	n/a	MnRE – Environmental Protection Agency
International Conference on Chemicals Management	n/a	MoA/PTCCB
UN Framework Convention on Climate Change	Aug 28/1994	MoA-Hydrometeorlogical Division
– **Kyoto Protocol**	Aug 5/2003 (a)	MoA-Hydrometeorlogical Division
UN Convention to Combat Diversification	June 27/1997	Guyana Land & Surveys Commission
Convention on Biological Diversity	May 7, 1993	EPA
– **Cartenga Protocol on Bio-safety**	Mar. 18, 2008 (a)	EPA

2.2.4 Description of existing legislation and regulations addressing POPs

Under the two principle pieces of legislation described in Section 2.2.1 (Pesticide and Toxic Chemicals Control Act as amended and the Environmental Protection Act) the following describes the scope of relevant regulations applicable to POPs chemicals and their control that would apply to implementation of the Stockholm Convention:

- *Pesticide and Toxic Chemicals Regulations (2004)and Amendment 2007*[13]*:* The 2004 regulations were established under the Act and provide the instruments and requirements for the implementation of the Act in the following areas: i) pesticide and chemical registration and classification procedure; ii) pesticide labeling; iii) certification of pesticide applicators; iv) pesticide manufacturing (formulation) and distribution certificates; v) experimental pesticides and chemicals studies; vi) transportation, storage, disposal and recall procedures for pesticides and chemicals; vii) ministerial emergency registration and exemptions; viii) management of pesticide residues and obsolete pesticides; and ix) pesticide worker protection. The 2007 amendment served to elaborate and clarify detailed requirements for import and export of chemicals generally including schedules and documentation required

  Under these regulations, the basis for control of chemicals use in the country is the registration provisions that initially focused just on pesticides which constitute the main category of controlled chemicals in use but now extends more broadly to any chemical potentially constituting a risk to the environment and human health. All such chemicals pesticides used in Guyana must be registered by the Board and only the registrant of a chemical is allowed to import that chemical. Registration of a chemical or pesticide requires the submission of the complete formula and a full description of the tests made and the results upon which the potency claims of the pesticide are made. Data submitted includes the following: i) physical characteristics; ii) chemical characteristics; iii) chemical composition; iv) toxicological properties; v) certified limits of the ingredients; vi) environmental fate; vii) toxicity data; viii) foliar dissipation; and ix) soil dissipation data. Under the Regulations, all information submitted is treated as confidential and can only be shared with the public with the written authority of the registrant, noting that material safety data sheets and associated information is public and must be available.

  Controlled chemicals and pesticides are classified under the following categories; i) Registered – approved as registered for import; ii) Restricted – chemicals registered but subject to a certificate of import, sale and use as well as life cycle record keeping; iii) Prohibited – chemicals banned from import, sale and use; and iv) Pending – chemicals whose registration is in process and under assessment.

  In general, prohibited chemicals are those judged to be unacceptable based on toxicity, use pattern under local conditions, experience in other countries (particularly OECD countries) and the bans/recommendations adopted by international organizations such as the World Health Organization (WHO) and United Nations Food and Agricultural Organization (FAO), and multi-lateral Conventions including the Stockholm and Rotterdam Conventions. As elaborated in more detail below, bans and restrictions contained in the Stockholm Convent are generally but not entirely covered under this regulation. The PTCCB web site maintains current lists of chemicals in each of the above categories[14].

  In the case of restricted pesticides, permitting for use is limited to certain crops, application conditions and locations taking into consideration the following factors: i) the pesticide, as

[13] http://www.ptccb.org.gy/index-2.html
[14] http://www.ptccb.org.gy/index-4.html

formulated, has an acute oral LD_{50} of 50 mg/kg or less; ii)the pesticide, as formulated, has an acute dermal LD_{50} of 200 mg/kg or less; iii) the pesticide, as formulated, has an acute inhalation LC_{50} of 0.05 mg/l or less, based upon a 4-hour exposure; iv) the pesticide, as formulated, is corrosive to the eyes or causes corneal irritation persisting more than 21 days; v) the pesticide, as formulated, is corrosive to the skin causing scarring or tissue destruction; vi) the pesticide, as diluted for use, has an acute dermal LD_{50} of 15 g/kg or less; vii) when used in accordance with label directions or widespread and commonly used practice, the pesticide may cause significant sub-chronic toxicity, chronic toxicity or delayed toxic effects on man, as a result of single or multiple exposures to the product ingredients or residues; viii) under normal conditions of label use or widespread and commonly recognized practice, the pesticide causes discernible adverse effects on non-target organisms such as significant mortality or effects on the physiology, growth, population levels or reproductive rates of such organisms, resulting from direct or indirect exposure to the pesticide, its metabolites or degradation products; or ix) any other factor that poses a serious risk of causing human injury or environmental harm despite the normal labeling restrictions, packaging requirements and other cautions as determined by the Board.

Under the Regulations, chemicals can only be sold from certified premises while the sale of restricted chemicals must be carried out only at premises approved for the sale of such types of chemicals. Similarly, applicators must be registered on an annual basis. In both cases, PTCCB maintains lists of certified premises; those approved for sale of restricted chemicals, and approved applicators,

Enforcement of the Act and its associated Regulations is done through the inspectorate of the Board. The enforcement mechanisms available under the Regulations are notice of warning, civil penalties, stop sale, use or removal order, seizure, injunction and criminal proceedings.

- *Environmental Protection (Hazardous Waste Management) Regulations 2000*: These Regulations covers the management of waste including chemical waste deemed to be hazardous under a definition [15] generally aligned with that adopted under the Basel Convention including waste classification. It encompasses hazardous waste generation from industrial, commercial and any other activity that produces waste as well management activities associated with handling, storage, transportation, and disposal at a general level. The following notes specific relevant aspects of the regulations.

    - Disposal is defined as "the discharge, deposit, injection, dumping or placing of any hazardous waste into or on any land so that it may enter the environment, be emitted into the air or discharged into any waters, including groundwater". It is noted that this definition does not encompass disposal by means that may be considered environmentally sound and in the case of POPs wastes there destruction or irreversible transformation per the Stockholm Convention.

    - Hazardous waste is defined as any "waste or combination of wastes which, because of its quantity, concentration or physical, chemical or infectious characteristics, may pose a

[15] Hazardous waste is defined as any "waste or combination of wastes which, because of its quantity, concentration or physical, chemical or infectious characteristics, may pose a substantial hazard to human health"

substantial hazard to human health, and belong to any category contained in Schedules I, unless they do not contain any of the characteristics contained in Schedule II and includes waste that is hazardous industrial waste, acute hazardous waste chemical, hazardous waste chemical, severely toxic waste, flammable waste, corrosive waste, reactive waste, radioactive waste, clinical waste, leachate toxic waste or polychlorinated biphenyl waste".

- Permits are required for the generation of hazardous waste and a requirement exists that such wastes be monitored throughout the production, storage, transport and release phases. It is noted that no explicit permitting requirements apply to facilities intended for storage, treatment and disposal, or competence certification of those involved handling or transport.

- The waste streams on which focus is centered for control are as set out in Schedule I, namely: i) clinical wastes from medical care in hospitals, medical center and clinics; ii) wastes from the production and preparation of pharmaceutical products; iii) wastes from the production, formulation and use of biocides and phytopharmaceuticals; iv) waste pharmaceuticals, drugs and medicines; and ii) wastes from the manufacture, formulation and use of wood preserving chemicals.

- Additionally Schedule I specifies wastes containing the following constituents for control; i) metal carbonyls; ii) beryllium, beryllium compounds; iii) hexavalent chromium compounds; iv) copper compounds; v) zinc compounds; vi) arsenic, arsenic compounds; vii) selenium, selenium compounds; viii) cadmium, cadmium compounds; ix) antimony, antimony compounds; x) tellurium, tellurium compounds; xi) mercury, mercury compounds; xii) thallium, thallium compounds; xiii) lead, lead compounds; xiv) inorganic fluoride compounds excluding calcium fluoride; xv) inorganic cyanides; xvi) acidic solutions or acids in solid form; xvii) basic solutions or bases in solid form; xviii) asbestos (dust and fibres)\organic phosphorous compounds; xix) organic cyanides; xx) phenols, phenol compounds including chlorophenols; xxi) ethers; xxii) halogenated organic solvents; xxiii) any congener of polychlorinated bibenzo-furan; xxiv) any congenor of polychlorinated dibenzo-p-dioxin; and; xxv) other organohalogen compounds. It is noted that the regulations have not directly or by reference adopted any quantitative limits with respect to the above that would more specifically differentiate waste containing the above as hazardous in practice. Relative to POPs waste as controlled under the Convention, they do explicitly cover dioxins and furans and could be deemed to cover other POPs waste under coverage of halogenated substances, although it would likely be appropriate to expressly cover polychlorinated biphenyls (PCBs).

As a general practice, these regulations are read and construed as being in addition to, and not in contravention of the Pesticides and Toxic Chemicals Control Act 2000. Based on the definition above all chemical wastes including POPs waste as specified are covered under these Regulations for the purposes of management.

- *Environmental Protection (Air Quality) Regulations 2000:* These Regulations were formulated to protect the air quality and promote the necessary infrastructure for controlling the amount of contaminants by stipulating specific allowable levels of emissions that are released into the atmosphere at any given time.

Parameters are specified for the following basic contaminants: i) smoke; ii) particulate; iii) sulphuric acid mist or sulphuric trioxide; iv) fluoride compounds; v) hydrogen chloride; vi) chlorine; vii) hydrogen sulphide; viii) nitric acid or ix) nitrogen oxides ; and x) carbon monoxide. While providing the basic framework for air quality regulation, this regulation does not extend to setting actual air quality standards for those parameters listed. It is noted that the scope of controlled emissions which does not extend to any emissions relevant to the Stockholm Convention and specifically unintentional release covered in Convention Annex C. Of these dioxins and furans would appropriately be listed for Guyana.

- *Environmental Protection (Water Quality) Regulations 2000:* These Regulations were developed to manage the discharge of waste matter into inland and coastal water bodies. They provide for minimizing the contamination of potential and existing water supply sources. The regulation provides for discharge limits being applied to the following substances and characteristics: i) ammonical nitrogen; ii) sulphate; iii) chloride; iv) cobalt; v) colour; vi) detergents, anionic; vii) fluoride (as F); viii) molybdenum; ix) phosphate (as P); x) polychlorinated biphenyls; xi) selenium; xii) silver; xiii) beryllium; xiv) vanadium; xv) radioactive material; xvi) nitrate nitrogen; xvii) temperature; xviii) pesticides, fungicides, herbicides, insecticides, rodenticides, fumigants or any other biocides or any other chlorinated hydrocarbons; and xix) a substance that either by itself or in combination with other waste or refuse may give rise to any gas, fume or odour or substance which causes or is likely to cause pollution. While relatively comprehensive, no actual discharge limits have yet to be provided for under these regulations. One POPs chemical (PCBs) is named and the wording likely allows any other annexed Convention to be addressed as required.

2.2.5 Key approaches and procedures for POPs chemical and pesticide management including enforcement and monitoring requirements

These aspects are generally covered in the above sections. The basic approach to chemicals and pesticide management generally is to control imports through the registration system and use through registration and certification of those handling and them as well as associated infrastructure. With direct reference to POPs chemicals, the country has the legislative and regulatory tools to ban or as may be permitted restrict POPs chemicals upon import and use under the Pesticide and Toxic Chemicals Control Act. Primary enforcement powers and capacity is provided for through the PTCCB and Customs authorities, and the PTCCB undertakes monitoring within the resources available to it. As is elaborated in Section 2.3 below, there remain some deficiencies in the detailed coverage offered by the Pesticide and Toxic Chemicals Control regulations in terms of bans and restrictions to some annexed POPs chemicals, although most are effectively covered. Similarly, the coverage of products containing POPs, specifically in respect to recently introduced annexed POPs chemicals requires clarification.

Similarly with respect POPs chemicals in waste form or as unintentional releases, the basic legislative and regulatory framework for management exists, except in relation to waste exports as is discussed below. However, as noted above a number deficiencies in terms of their practical application and the actual coverage they provide for POPs wastes exists that will need to be addressed through the NIP. These include; i) more explicit specification of POPs as waste, discharge or release contaminant; ii) adoption directly or by reference to a recognized international standard of quantitative limits, at least for priority POPs chemicals (i.e. PCBs, PCDD/F); iii) standard and permitting provision for hazardous waste management facilities and operations; and iv) explicit waste tracking and stockpile reporting requirements generally and potentially specific to priority

POPs (i.e. PCBs). Likewise, there is no specific coverage of contaminated sites under the current regulations although this could be incorporated under the hazardous waste regulation. In relation to the POPs issue this is important such that action and cleanup standards can be set when POPs contaminated site legacies are addressed. In terms of enforcement and monitoring, EPA's capacity is limited and in practical terms is in practice allocated to other agencies in specific areas of competence, the management of obsolete pesticides by PTCCB being an example. The one additional gap in the regulatory framework related to hazardous waste generally that exists relates to regulations governing the import, transit and export of hazardous waste in compliance with Basel Convention requirements and procedures. A specific and regulation addressing this was developed in 2001 and offers relatively comprehensive coverage[16]. However it has not been formally enacted as a legal regulatory instrument. Completing this process will be important in the context of implementing Convention obligations and this NIP, given that export of POPs wastes may be required and there additionally needs to be controls on scrap metal exports that may have POPs contamination.

2.3 Assessment of the POPs issue in the country

This section of the NIP provides the main POPs related information base on which the gap analysis is developed, and from which priorities and subject/issue specific action plans are identified in Part 3. As per the above referenced guidance and the practice generally adopted followed by other countries, this follows the principle Convention provisions roughly by Article, starting with historical data and inventories applicable to specific chemicals listed in Annex A, Annex B and Annex C with the modification that the analysis of Annex A is separated into POPs pesticides and industrial chemicals excluding PCBs and a sub-section for PCBs, also an Annex A chemical but with specific elimination requirements (Annex A Part II). This differentiation between PCBs and Annex A chemicals better suits the inclusion of new POPs included under Annex A as well as national conditions in Guyana. The Annex specific analysis is followed by inventories of POPs stockpiles, wastes and contaminated sites, noting where linkages with the Annex specific inventories may exists. This is followed by assessments of various aspects of POPs management, associated impacts and issues, capacities and relevant chemicals management procedures.

It should be noted that the material in this section is substantially based on four national consultant inventory and capacity studies prepared as part of the NIP preparation work. They cover:

i) Obsolete pesticides;
ii) PCBs;
iii) POPs contaminated sites and capacity assessment; and
iv) Unintentional POPs releases.

Access to these documents is provided through the PTCCB web site (http://www.ptccb.org.gy).

2.3.1 Assessment with respect to use of Annex A Chemicals other than PCBs

Annex A covers 18 POPs pesticides and industrial chemicals that are subject to elimination of production and use except as provided for under specific exemptions. All of these except PCBs which is covered separately in

[16] Draft Environmental Protection (Export and In-transit Import) Regulation (2001)

the following sub-section are listed in Table 2.1 along with an assessment of the historical and current status of import and use in Guyana.

Guyana has never had any direct production of basic or complex chemicals generally and chemicals production has been limited to small quantity formulations of imported basic chemicals into consumer products such as paint, detergent, soap and pharmaceutical products. Historical records of chemicals imports are very limited prior to the enactment of the Pesticide and Toxic Chemicals Control Act in 2000 and associated formation of the PTCCB. Similarly, actual controls in the form of registration approvals, restrictions and bans were limited and sporadic prior to that time. As a consequence only anecdotal and un-quantified information on what was imported and used is available. Since that time the regulatory process has been put in place to approve and register chemical imports. Detailed data on imports of pesticides and industrial chemicals is prepared annually and are available from the PTCCB with data from 2006, 2007 and 2008 being available on the agencies web site, along with a list of currently approved chemicals. Schedules to regulations under The Pesticides and Toxic Chemicals Control Act cover those that are explicitly banned. This data base along with data for 2009, and 2010 is summarized graphically in Annex 4. This illustrates the initial focus on applying controls to pesticides (herbicides, insecticides, fungicides, rodenticides) which until 2009 typically made up over 85% of imports with the remaining imports classed as potentially harmful industrial chemicals subject to registration and control. In 2009 and 2010, registration and import control reporting was extended to a broader range of industrial chemicals such as disinfectants, detergents, chlorine, caustic soda and other industrial products. As a result, the proportion of registered chemicals under import control which were classed as pesticides declined to 54% in 2009 and 34% in 2010, although the absolute volume of pesticides imported showed some growth. A detailed current analysis of chemicals imports and listing of controlled, banned and restricted chemicals is provided in the support national consultant report on obsolete pesticides referenced above.

This assessment concludes that there never has been any production of any Annex A POPs pesticides and industrial chemicals under consideration in this assessment in Guyana. As summarized in Table 2.1, most of the Annex A POPs are specifically banned from import and use under the Pesticides and Toxic Chemicals Control Act regulations. These are Aldrin, Chlordane, Dieldrin, Heptachlor, Hexachlorobenzine, Lindane, Mirex, Toxaphene, Endrin, Alpha Hexachlorocyclohexane, Beta Hexachlorocyclohexane isomers. The only Annex A POPs covered in this section which is currently registered and for which there is a record of import since 2006 is endosulfan. However, one pesticide (Chlordecone) and four industrial chemicals (Hexabromobiphenyl, Hexabromodiphenyl/ Heptabromodiphenyl ether, Pentachlorobenzene (PeCB), Tetrabromodiphenyl/ Pentabromodiphenyl ether do not have specific import and use controls, restrictions, or bans to date, something that is identified as a required regulatory action along with addressing the current allowance of endosulfan.

Table 2.1: Annex A Chemicals Requiring Elimination other than PCBs

Chemical	Status in Guyana
POPs Pesticides	
Aldrin	Import/use ban No recorded use or evidence of use
Alpha hexachlorocyclohexane	Import/use ban No recorded use or evidence of use
Beta hexachlorocyclohexane	Import/use ban No recorded use or evidence of use
Chlordane	Import/use ban No recorded use or evidence of use

Chlordecone	No explicit import/use ban to date No recorded use or evidence of use
Dieldrin	Import/use ban No recorded use or evidence of use
Endrin	Import/use ban Historical use for sugar production
Endosulfan	No explicit import/use ban to date Small historical recorded import/use Remains registered Possible current use of illegal imports
Heptachor	Import/use ban No recorded use or evidence of use
Hexachlorobenze (HCB)	Import/use ban No recorded use or evidence of use
Gamma hexachlorocyclohexane (HCH) Lindane	Import/use ban Historical use as pharmaceutical feedstock No current use
Mirex	Import/use ban No recorded use or evidence of use
Toxaphene	Import/use ban No recorded use or evidence of use
POPs Industrial Chemicals	
Hexabromobiphenyl	No explicit import/use ban to date No recorded use or evidence of use Potential historical presence in imported products
Hexabromodiphenyl/ Heptabromodiphenyl ether	No explicit import/use ban to date No recorded use or evidence of use Potential current presence as a flame retardant in imported products
Pentachlorobenzene (PeCB) • **also a fungicide**	No explicit import/use ban to date No recorded use or evidence of use Potential current presence in imported products
Tetrabromodiphenyl/ Pentabromodiphenyl ether	No explicit import/use ban to date No recorded use or evidence of use Potential current presence as a flame retardant in imported products

The investigations during the preparation of the NIP by the PTCCB staff and national experts involved a survey of all potential current and as possible historic importers, distributors and users of POPs pesticides and industrial chemicals. Recognizing the national predominance of pesticide chemical use now and in the past this also solicited information on pesticide use generally and collected inventory information on current obsolete pesticide stockpiles and on any associated contaminated sites (Sub-section 2.3.5). The scope of this survey work involved direct contact with all registered importers, distributors and significant retailers of pesticides and chemicals as well as major known users, particularly the sugar and rice producers[17] which in fact account for 85% of historical and current chemical import and use by volume.

The following anecdotal information on historical import and use of Annex A POPs chemicals other than PCBs was collected:

- There is no evidence of historical or current import or use of any Annex A POPs pesticides and industrial chemicals in Guyana except endrin, lindane and endosulfan.

[17] As represented by Guysuco and Guyana Rice Producers Association

- While no details of endrin use are available from customs or trade records, it was known to have historically been used on in sugar production operations as evidenced by the presence of 750 kg of old stock held by Guysuco in their centralized OP storage bond in Ogle. This was reported to be material collected from the various sugar estates during GUYSUCO's program of consolidation in the period 1988-89. The materials themselves date from at least the previous several decades. .
- Lindane has been used in small quantities in Guyana as a pharmaceutical feedstock and in the local formulation of an insecticide, both applications being discontinued before 2000. No import records are available for lindane.
- Endosulfan was imported as a registered pesticide in 2006 under the brand name Thionil 35EC (869 l) from Venezuela all of which was sold and used. A further import was initiated in 2008 but never completed. The original importer has indicated that some use still continues with illegal (unregistered) imports through Suriname.
- Of the Annex A POPs pesticides and industrial chemicals not currently controlled in the country listed in Table 2.1, no likely applications in Guyana existed for chlordecone. Similarly, while there may have been some historical import of products containing Hexabromobiphenyl as flame retardant, its significant use is generally understood to date to the 1970s and not likely either significant or traceable in products imported into the country. On the other hand, Hexabromodiphenyl/ Heptabromodiphenyl ethers and Tetrabromodiphenyl/ Pentabromodiphenyl ethers are of more recent application and in some continuing use as flame retardants in consumer products that potentially have and still could be imported into the country. Likewise, Pentachlorobenzene (PeCB) with a variety of applications could be present in such imported products. However, no information or regulatory framework yet exists to control products that contain these chemicals yet exists.

In summary, the only current Annex A POPs chemicals other than PCBs that would potentially continue in use either directly or in products imported into the country are the POPs pesticide Endosulfan and the four industrial chemicals listed in Table 2.1 used as additives, mainly as flame retardants. Action to be in compliance with the Convention with respect to these chemicals is required in terms of including them as banned for import and use in the Pesticide and Toxic Chemicals Control Regulations and under applicable trade regulations where contained in products. In the case of Endosulfan for which the applicable amendment to Annex A came into effect on October 27, 2012, the option exists for the GoG to notify the Convention that is does not accept the amendment. However, given the very limited historic use of the POPs pesticide and only alleged current use as involving illegal imports, the course of action being pursued is to institute a ban and take regulatory enforcement and public information initiatives to address any current import and use.

2.3.2 Assessment with respect to PCBs use

As is the case in all countries, there is a high probability that PCBs have been imported into Guyana, particularly as a dielectric fluid in electrical equipment manufactured prior to the mid 1980s, but also potentially in other applications such as an additive to paint, lubricating oil and other applications. However, the practical ability to trace PCB such imports is very limited except in electrical equipment given the absence of awareness of the issue at the time and difficulty identify the substance in finished products. Similarly, the relatively low historical level of industrialization in Guyana would mean that such closed applications would be few and the absolute amounts of PCBs would be small. For this reason, the NIP assessment undertaken in Guyana as documented herein has focused on the potential presence of PCBs in electrical equipment and specifically on equipment

utilized in the power generation, transmission and distribution system. Industrial applications involving larger equipment potentially utilizing PCBs are few in the country and those that do exist are characteristically relatively new.

In this sub-section the focus is on developing a profile of the current electrical system in the country and how it has developed, and on the current and past efforts to identify PCB use or presence in equipment remaining in service. This work was undertaken as part of an overall inventory study led by a national consultant that is referenced above and available from PTCCB. Other parts of this work reported in Sub-section 2.3.5 below that addresses PCB containing stockpiles, wastes and contaminated sites noting that the actual field work involved evaluation of both in-service and stockpiled retired equipment as well as site contamination was undertaken at the same time and using a similar methodology.

The national electrical system in Guyana developed over the last century in a fragmented fashion with local generation, typically based on heavy fuel oil or diesel powered generation, serving individual population centers or specific industrial/agricultural developments such as sugar estates and ore processing facilities. The process of integrating and modernizing this capacity continues although a relatively well integrated national grid exists for most of the coastal regions with the main population and major commercial/industrial consumers, albeit with remaining conversions to common A/C frequencies and commercial arrangements still continuing. The main future development anticipated is the development of large scale hydro-electric power generation in the country's interior with a 165 MW development from the Amalia Falls Hydro Project currently being constructed, and connection of this into the main national grid. One effect of this might be the elimination of a significant part of the current generation capacity and associated infrastructure, something that has implications relative to the NIP action plan in that it may increase stockpiles of older electrical equipment.

The main electrical system operator is Guyana Power and Light Inc. (GPL) which is a state owned utility having generation, transmission and distribution facilities serving 90% of demand in the country. It operates a number of relatively small heavy fuel oil and diesel based generation facilities ranging from a recently completed modern replacement facility at the Kingston power station in Georgetown and modern diesel generation sets to smaller and older facilities elsewhere dating back as many as 88 years. GPL also buys power from various private suppliers. This is distributed in its grid. For example, GUYSUCO supplies power to the grid during its seasonal operations which is generated from burning of the bagasse in the production of sugar.

In the Linden area, a number of local operators generate, broker and distribute electricity for the general market. Originally, this was generated by a facility last operated by the Linden Power Company (LPC) but this facility has been closed and power is now supplied by a modern generating facility operated by BOSAI Minerals Inc at their bauxite processing plant in Linden although LPC have retained a sub-station and maintenance operation in Wismar. Through LPC, this power is currently supplied to two distributers who supply consumers via a local distribution network. The Linden Electric Company Incorporated (LEC) was supplies electricity to the Linden, McKenzie and the Demerara areas. Linden Utility Services Cooperative Society Limited (LUSCSL) supplies the Wismar Christiansburg area and its settlements.

Elsewhere in the country and where distribution infrastructure is absent, private businesses and individuals generate small amounts of power for their personal consumption which is not networked to the grid. Small power generators are found scattered in the interior regions of Guyana. These unconnected networks that generally of recent origin using new materials and equipment (manufactured after 1990) and in most cases do not use transformers or capacitors that might be of interest in this assessment.

Based on the above and as a result of the NIP development's consultations with stakeholders in the electrical sector, particularly GPL, the following assessment has focused on the overall GPL system and local transmission/distribution systems in the Linden area. This focus is adopted recognizing that this is where older equipment potentially based on PCBs or cross contaminated with it would be found. At one time such equipment could have existed at old industrial operations, particularly mines, but these were all closed and stripped of any equipment by the 1970s. However such sites could contain PCB contamination and will be addressed in that context in the NIP.

Discussions with GPL indicated that the primary electrical equipment in the country that might be interest were transformers. The nature of the distribution system was such that three general types of transformers were in service in their system and elsewhere, namely larger power transformers, typically in the 69 KV range, and grounding transformers both located at generation facilities and main sub stations, and smaller pole mounted and customer based distribution transformers located throughout the distribution network. While some of the power and grounding transformers are relatively modern (post 1990), a significant number were installed in the 1960s and 1970s. In the case of distribution transformers, these are generally of recent manufacturer although some older units dating before the mid-1980s remain in service particularly in distribution systems operated by small distributors. In that regard, the recent programs to upgrade the distribution systems have resulted in significant inventories of older distribution transformers being stockpiled for disposal as well as past programs for scrapping these and destroying the mineral oil characteristically used in them. It was further noted that no current or historical use of power capacitors at facilities in Guyana had ever been identified.

In general, GPL's records show that all current and past transformer equipment was manufactured primarily in the United States and Canada with some older units from the 1960s being manufactured in the United Kingdom. GPL's official records indicated that all electrical equipment, specifically transformers that were ever used in their system employed only mineral oils, rather than PCB based oils as the dielectric fluid. Given the age of most large transformers, most units have in fact had their dialectic oil changed a number of times, always with mineral oil. However, a survey apparently done around 2001 did identify the presence of PCB contamination in some mineral oil power and grounding transformers suggesting the presence of cross contamination in the system's equipment and those identified were so labelled. Unfortunately, GPL were unable to locate any formal reports or other technical documentation of this survey work.

Table 2.2 below provides an master inventory list of station and grounding transformers provided by GPL.

Table 2.1: Master List of Operating Station Service, Grounding & 69 KV Transformers at various locations within the GPL System

Sophia Distribution Station

Type	Serial #	Name Plate Oil Volume	Manufacturer	Year	Country
T1	B-357307	2380 Gallon	Westinghouse	1974	Canada
T2	63918-2	1890 Gallon	Federal Pioneer	1974	Canada
T3	HCB 1621-1	2369 Gallon	ABB	1996	USA
ST1	56263-2	945 Liters	Hawker Sidley Brush	1976	England
ST2	56263-1	945 Liters	Hawker Sidley Brush	1976	England
ST4	56264-1	945 Liters	Hawker Sidley Brush	1976	England
GT1	62.07.60002	1890 Gallon	Federal Pioneer	1974	Canada
GT2	T60002-7	1890 Gallon	Federal Pioneer	1974	Canada
GT3	T60002-10	1890 Gallon	Federal Pioneer	1974	Canada
GT5	T60002-9	1890 Gallon	Federal Pioneer	1974	Canada
	A3S 7306	Drained	Westinghouse	1974	Canada

Garden of Eden

Type	Serial #	Name Plate Oil Volume	Manufacturer	Year	Country
T1		2380 Gallon	Westinghouse	1974	Canada
T2	HCB 1621-02	2369 Gallon	ABB	1996	USA
ST1	55170-1	1400 Liters	Hawker Sidley Brush	1975	England
ST2	55170-2	1400 Liters	Hawker Sidley Brush	1975	England
GT1	T60002-5	1890 Gallon	Federal Pioneer	1974	Canada
GT2	62-07-60002-1	1890 Gallon	Federal Pioneer	1974	Canada

Onverwagt Power Station

Type	Serial #	Name Plate Oil Volume l	Manufacturer	Year	Country
T1	C-3S7307	2380 Gallon	Westinghouse	1974	Canada
ST1/GT1	A-354416	2380 Gallon	Westinghouse	1974	Canada
ST2/GT2	B-357307	2380 Gallon	Westinghouse	1974	Canada

Canefield Power Station

Type	Serial #	Name Plate Oil Volume	Manufacturer	Year	Country
T1	A-3S 7307	2380 Gallon	Westinghouse	1974	Canada
ST1	55170-4	1400 Liters	Hawker Sidley Brush	1975	England
ST2	55170-3	1400 Liters	Hawker Sidley Brush	1975	England
GT1	T60002-11	1890 Gallon	Federal Pioneer	1974	Canada

GT2	T60002-6	1890 Gallon	Federal Pioneer	1974	Canada

Versailles Power Station

Type	Serial #	Name Plate Oil Volume	Manufacturer	Year	Country
ST1	842240002	680Q	Aichi Electric Company Ltd.	1985	Japan
GT1	T60002-8	220 Imperial Gallon	Federal Pioneer	1974	Canada

Kingstown Power Station

Type	Serial #	Name Plate Oil Volume	Manufacturer	Year	Country
Interbus Substation Transformer	T 439877	1630 Gallons	Associated Electrical Industries	1962	England
ST1	T439879	470 Gallons	Associated Electrical Industries	1962	England
GT1	T439878	470 Gallons	Associated Electrical Industries	1962	England

With the above knowledge base, an inventory survey was undertaken of in-service equipment that was accessible for purposes of acquiring oil for testing. The methodology used was to undertake field inspections at all GPL operational sites as well as the sites operated by LPC, LEC and LUSCSL. At each site any in service transformer that was manufactured prior to 1985 was evaluated. In the absence of safe access or some definitive indication as to whether it had been previously tested positive for PCBs (Figure 2,1) or was certified PCB free by the original manufacturer (Figure 2.2), a screening test to indicate PCB oil content above or below the Convention POPs content level (50 ppm) was undertaken. The 1985 cut off date was selected noting the above origins of transformers and the fact that the use of PCBs was eliminated by regulatory action in North America in 1980 and in the United Kingdom in 1985. The screening test used was that provided by the Dexsil Clor-N-Sol test kits [18], which provides a colour change indication when PCB content exceeds 50 ppm. This technique is a widely accepted method for screening and establishing base PCB inventory data. In Guyana where no PCB laboratory capacity for PCB analysis currently exists this provides a cost effective method that has been validated against high resolution analytical techniques[19].

[18] www.dexsil.com
[19] http://www.dexsil.com/uploads/docs/dtr_0701.pdf

Figure 2.1: Historical PCB Positive Labelling **Figure 2.2: Manufacturers Certification Label**

In total 24 screening tests were performed on in-service equipment with the results at each site being is summarized as follows:

- *Sophia Power Generating Station and Maintenance Facility:* This site currently does not generate any power but distributes 58.3 MW of power produced at Kingstown via three (3) 69 KV power transformers, three station service transformers, and four grounding transformers connected to the power generating units. The earlier GPL testing program resulted in the station transformers being labelled "PCB free" and the four grounding transformers being labelled "PCB positive. The current survey work validated the latter result but the power transformers were not accessible.
- *Kingston Power Station (Georgetown)*: This facility consists of an old and partially dismantled power generating facility and a new recently opened 58.3 MW facility along with port based fuel handling infrastructure, and scrap and equipment storage (see Sub-section 2.3.5). Only 3 older transformers are present and all tested negative for PCBs although one inter-bus sub-station transformer was associated with an oil spill that did test positively for greater than 50 ppm suggesting it may have had contamination at some point.
- *Garden of Eden Power Station:* This 2.5 MW facility houses three 69KV station transformers, four grounding transformers connected to the power station and other grounding transformers connected to the mobile Caterpillar generators. The facility currently is supplied with 22 MW of power from Kingston that is distributed via its grid. One of the 69KV transformers was tested for PCBs and not found to be PCB positive. The other two transformers were not accessible but are understood to be serviced and refilled with the same oil so it may be that they are all PCB free. However, this should be verified in the future. Only one of the main station grounding transformers was confirmed as PCB contaminated when the oil was tested. The remaining units were said to be PCB free but should be considered potentially contaminated subject to testing. It was not necessary to test the grounding transformers attached to the mobile generator as these were new transformers certified as "Non PCB".
- *Canefield Power Station (Berbice):* This 16.2 MW station has one 69 KV station power transformer and

two grounding transformers. The oil in the transformer was not tested as the technician was hesitant to interfere with the live transformer in order to collect the oil sample. The live 69 KV Station Transformer had oil in soil around it which tested positive for PCBs. One of the grounding station transformers was labelled "PCB Positive" by GPL. Given that both these units are the same in age and manufacturer as other units with PCB contamination (Federal Pioneer manufacturered in 1974) the second grounding transformer was considered likely PCB positive in the absence of a test otherwise.

- *Onverwagt Power Station:* This 8.6 MW power station has a 69 KV and two (2) grounding transformers. All were tested and none were positive. However, the 69KV station transformer (a Westinghouse Canada unit from 1974) had a visible oil spill on the soil which tested positive for PCBs over 50 ppm. This suggested that the transformer contained oil contaminated with PCBs at some point.
- *Versailles Power Station:* This 6 MW station is currently running on caterpillar mobile generators each with a modern "Non PCB" type station transformer. One of the grounding station transformers was labelled "PCB Positive" based on earlier GPL testing but was not tested due to access.
- *Linden Power Company:* LPC's power generating facility (now closed) at Wismer has 3 live grounding transformers which were not tested for PCB due to access restrictions. These transformers were enclosed in a steel cage from which the serial numbers and other details were not visible. Eight (8) other idle old station transformers were labelled "Non PCB" but a soil test reported in sub-section 2.3.5 suggested PCB contamination over 50 ppm. As a consequence all these units should be considered potentially PCB contaminated in the absence of testing indicating otherwise.
- *Linden Electric Company:* LEC operate an equipment maintenance and storage site which includes servicing distribution transformers. No in-service equipment was available for testing but stored and discarded equipment was tested with no positive results, although positive soil tests were noted (Sub-Section 2.3.5).
- *Linden Utility Services Cooperative Society Limited:* LUSCSL also operate distribution transformer maintenance site at Wismar that again offered no available in-serve equipment for testing. No soil tests were possible due to heavy hydrocarbon soil contamination.

In summary, it is apparent that while no actual PCB based electrical equipment was identified in service, there is cross contamination in larger and older model mineral oil transformers, although this is not universal. While this does not appear to be excessively high it calls for additional screening and supplemental analytical work to define the levels of contamination. In total the above results suggest that 15 larger transformers either are or can be suspected to have PCB contamination in excess of 50 ppm subject to additional testing. With one possible exception they all are either 69 KV power transformers manufactured in Canada by Westinghouse or three phase grounding transformers manufactured by Federal Pioneer in 1974. One unit of earlier British manufacture was identified requiring further evaluation. Table 2.3 below provides a list of units confirmed by current screening tests, earlier labelling or suspected due to circumstantial reasons (age/manufacturer) or associated oil spill positive PCB testing to have in excess of 50 ppm PCB contamination.

Table 2.3: List of In-Service Large Transformers – PCB Contaminated or Potentially Contaminated

Location	Equipment Type	Equipment Identification#/ Manufacturer	Oil Volume (Liters)	Remarks
Kingstown	Interbus	T 439877	7416	In service, visible leak

	Substation Transformer	Associated Electrical Industries, England, 1962		Tested oil not positive for PCBs Soil Positive for PCBs Potentially contaminated
Sophia	Three Phase Grounding Transformer	62-07-60002-2 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible Labeled PCB Positive, Tested PCB positive
	Three Phase Grounding Transformer	T-60002-7 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible Labeled PCB Positive, Tested PCB positive
	Three Phase Grounding Transformer	T-60002-10 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible Labeled PCB Positive, Tested PCB positive
	Three Phase Grounding Transformer	T-60002-9 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible Labeled PCB Positive, Tested PCB positive
Garden of Eden	Three Phase Grounding Transformer	62-07-60002-1 Federal Pioneer, Toronto, Canada,1964	1000.14	In service, no leaks visible Tested PCB positive
	Three Phase Grounding Transformer	T60002-5 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible, No test due to access Potentially contaminated
	Three Phase Grounding Transformer	55170/1 Federal Pioneer, Toronto, Canada, 1974	1400	In service, no leaks visible, No test due to access Potentially contaminated
	Three Phase Grounding Transformer	55170/2 Federal Pioneer, Toronto, Canada, 1974	1400	In service, no leaks visible, No test due to access Potentially contaminated
Canefield	Three Phase Grounding Transformer	60002-6 Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible Labeled PCB-positive, No test due to access
	Three Phase Grounding Transformer	T-60002-11, Federal Pioneer, Toronto, Canada, 1974	1000.14	In service, no leaks visible No test due to access Potentially contaminated
	69KV Substation Transformer	A 3S 7307 Westinghouse, Canada 1974	10829	In Service No test due to access Soil PCB contaminated Potentially contaminated
Versailles	Three Phase Grounding Transformer	Not Available, Federal Pioneer, Toronto, Canada	1000.14	In Service Labeled PCB-positive Manufacturer's label not accessible No test due to access Potentially contaminated
Onverwagt	Substation transformer	C-3S 7307, 1974, Westinghouse, Canada Coolant – Oil	10829	In service, visible leak Oil tested not PCB positive Soil at leak tested positive Potentially contaminated
Linden Power Company	Grounding transformer	ST030058879, Sunbelt, USA, Coolant – Non PCB Mineral Oil	2574	In service No test due to access Soil tested positive Potentially contaminated

No direct testing of distribution transformers in-service or units undergoing maintenance was undertaken due to access and availability. However, as reported in Section 2.3.5 below there is some limited evidence exists of cross contamination over 50 ppm in residual oils, associated soil contamination in storage areas and positive labelling dating from manufacture. Extrapolating this to in-service equipment it is anticipated that few if any distribution transformers in GPL's system would have potential for cross contamination as most have been

replaced over the last decade (reason for substantial stockpiles of discarded units), although a recommendation from this work is all units being discarded be tested with screening kits when the oil is drained so that contaminated oil and cases can be segregated for environmentally sound management. A large portion of the discarded equipment appears to be of US manufacture from a period where a proportion (15 to 30%) of such units were cross contaminated at the time of original filling, based on experience in North America. The distribution system operated by LEC and LUSCSL retains a substantial amount of old equipment and as such might have greater cross contamination. Again at the time of maintenance or replacement, screening tests should be mandatory.

While addressed in Section 2.3.5, one out of service but apparently potentially operational General Electric (USA) transformer considered to have come from distribution service elsewhere was located at Garden of Eden power station and was found to be partially filled with a PCB based dielectric oil (Pyrano). This unit apparently came from Timehri where three other such units had been installed but they could not be located. This appears to the only evidence that equipment actually designed for the use of PCBs were used in the country.

The only other potential source of PCBs in electrical equipment that would likely exist in the country is in small electrical components, specifically small capacitors and switches. The most likely specific type of equipment containing these would be the ballast devices in fluorescent light fixtures dating prior to the 1990s. However, attempting to develop inventories of these in-service is not practical and this would be best addressed through measures to segregate such equipment for assessment when they enter the general waste stream for disposal,

The principle recommendations that comes out of the assessment of the PCBs in use in Guyana and which should be addressed in the NIP action plan are:

- Undertake confirmatory screening tests on all in-service or standby large transformers manufacturer prior to 1985 in the GPL and smaller utilities systems,
- Support the above program by archiving oil samples for individual transformers and subsequently undertaking laboratory verification analysis on all units that tested positive to determine the level of contamination, and for reference similar analytical tests on a selection of non-positive units as determined by screening tests.
- Initiate a mandatory practice of applying screening tests to all transformers during servicing particularly distribution transformers inclusive of consistent documentation and reporting of results.
- Apply a common and consistent labelling system to transformers tested and returned to service inclusive of a regulatory registration number for units exceeding 50 ppm such that their status can be monitored in a national PCB inventory and ultimately a national PCB Phase out Plan
- Initiate the tracking of the three additional General Electric pyranol filled distribution transformers and ensure that they are secured and if in service removed as soon as possible.

2.3.3 Assessment with respect to Annex B chemicals (DDT, PFOS/PFOS-F)

Annex B of the convention covers two chemicals that are subject to restrictions as opposed to formal bans as is the case for Annex A chemicals respecting production and use. These are two lised Annex B chemicals: the pesticide DDT, and the family of industrial chemicals Perfluorooctane sulfonic acid

(PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F). The following provides an assessment of current and historic use of each of these in Guyana.

Historically, DDT was used exclusively by the Ministry of Health for vector control, primarily against the mosquito that carries the agent that causes malaria and dengue fever during the late 70's and most of the 80's especially in the interior regions of Guyana. During the this period, DDT was applied to domiciles in the rural areas by spray applicators traveling from District to District applying DDT to all the houses in each community. As with the other POPs pesticides that were present in Guyana, no record exists about quantity imported and amount used. After that time, the usage pattern of DDT has changed with the different strategies employed to control the incidence of malaria and the Ministry of Health has since discontinued the use of DDT, replacing it with Malathion for their fogging programs. However, officially the country had retained the option of using DDT as administered solely by the Ministry of Health. As a result DDT is not formally banned under PTCCB regulations. In practice however it is understood that no such use has occurred since the 1990s and likewise no known imports have occurred, no inventories of the chemical exist in the country and there is no registration of it that would allow legal import or use under PTCCB regulations. The process of registration of a specific exemption as required under Article 4 and Annex B Part 2 was initiated when Guyana became a party to the convention and the Convention Secretariat have confirmed that such an exception remains in place subject to periodic review by the COP on its continuation in general.

There is no known use or likely applications of PFOS and PFOS-F in the country although it is possible that it could be contained in products and components imported into the country. As such, an action plan item under the NIP would be to add these chemicals to the list of banned chemicals under PTCCB regulations.

2.3.4 Assessment of releases from unintentional production of Annex C chemicals (PCDD/PCDF, HCB, PCBs, PeCB)

This sub-section provides an assessment of unintentional releases of Annex C POPs covered under Article 5 of the Convention. The currently listed Annex C chemicals of potential interest are Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/PCDF), Hexachorobenze (HCB), Pentachloebenze (PeCB), polychlorinated biphenyls (PCB).

Of the three POPs pesticides or industrial chemicals also covered under Annex A with respect to production and use, only PCBs would have a significant potential to also result in unintentional release in Guyana. There is no known import or use of either HCB or PeCB in Guyana, although as noted in Sub-Section 2.3.1 products containing PeCB could be imported and as waste this chemical could be released unintentionally into the broader environment during the decomposition of such products in landfills or as randomly disposed of through processes such as leaching. However, the amount of such release would be anticipated to be minor and not controllable except through improvement in waste management practice. PCBs on the other hand would be subject to unintentional release based on its presence in operating equipment and waste stockpiles transformer oils as well as contaminated soils, all as assessed in Sub-sections 2.3.2 and 2.3.5. This release could occur to air, possibly as a result of heating or combustion of contaminated material and to surface or ground water and/or to sediments in water bodies. Again at this point it is not possible to quantify such releases and, given the

relatively low level of PCB contamination, would not be anticipated to be major issue. Similarly minimization and prevention of such release in the future would largely be related to the effectiveness of actions to manage stockpiles, waste and contaminated sites in an environmentally sound manner. Future ambient environmental monitoring should also include these three chemicals as appropriate as capacity develops to do so.

The principle unintentional POPs release (U-POPs) issue in Guyana, like most countries, is anticipated to PCDD/PCDF and the remaining assessment in this sub-section relates to this Annex C chemical. As part of the NIP preparation a detailed assessment of PCDD/PCDF emissions was undertaken by the responsible national consultant and the report on this work has been referenced above as being available on the PTCCB web-site. In the following these results are summarized and conclusion relevant to the NIP and Action Plan are provided.

The methodology applied in undertaking the PCDD/PCDF U-POPs inventory involved the following steps:

- Review of existing literature addressing POPs; in particular to U-POPs identification and quantification;
- Identify key stakeholders to be involved (generation sources of U-POPs);
- Interface with national agencies within sectors regulating and managing facilities that generate and release U-POPs;
- Development of a list the potential PCDD/PCDF sources utilizing source categories defined in UNEP standardized Toolkit, 2005[20] and the updated emission factors developed internationally[21].
- Conduct field visits at relevant entities to identify and quantify PCDD/PCDF releases from identified sources;
- Apply the Tool Kit and emission factors to develop the PCDD/PCDF U-POPs inventory.
- Analyze data and prepare U POPs inventory report for integration into the NIP.

The UNEP Tool Kit groups emission sources into ten source categories and 54 subcategories. All 10 categories and 26 subcategories within them were identified as applicable in Guyana and inventoried, as specified in Table 2.4 below. To collect and analyze the data, the year 2010 was used as the baseline in the subcategories, because it provided more complete statistical information. Where 2010 data was not available the most recent year of availability was used.

Table 2.4: Unintended Release Source Categories and Sub-categories Indentified and Inventoried

Source Category	Sub-Category
1. Waste Incineration	Medical Waste Incineration
2. Ferrous & Non-Ferrous Metal Production	Secondary Aluminum production
	Thermal wire reclamation
3. Heat & Power Generation	Fossil fuel power plants
	Biomass powered plants
	Household cooking with Biomass
	Household cooking with fossil fuels

[20] http://www.chem.unep.ch/Pops/pcdd_activities/toolkit/Toolkit%202-1%20version/Toolkit-2005_2-1_en.pdf
[21] http://chm.pops.int/Implementation/ToolKit/ProcessesProcedures/tabid/196/Default.aspx

	Biogas combustion
4. Mineral Production	Asphalt mixing
	Brick production
5. Transport	4 Stroke engines
	2 Stroke engines
	Diesel engines
	Heavy Oil Fired engines
6. Open Burning Processes	Burning Biomass
	Waste burning & accidental fires
7. Production & Use of Chemical and Consumer Goods	Pulp & paper production
8. Miscellaneous	Drying of Biomass
	Smoke houses
	Tobacco Smoking
	Crematoria
9. Disposal / Landfill	Landfills & waste dumps
	Sewage disposal
	Composting
	Open Water dumping
10. Hot Spots	PCB-filled transformers & capacitors
	Dumps of waste / residue from Categories 1 – 9.
	Dredging of sediments

The above referenced report provides a detailed analysis of the specific sources considered under each of the above source categories and sub-categories. In Figure 2.3 below the overall results by source category for all medium are summarized graphically. Table 2.5 provides the numerical results by sub-category are provided for each release medium. Annex 1 provides a compendium of data for the specific sources evaluated including applicable emission factors, applicable production measures and corresponding annual releases by medium.

The results indicate that the total estimated annual release of PCDD/PCDF is 119 g TEQ, noting that this is likely a conservative estimate. The majority of these releases are to air (36%, 42,952 g TEQ) and to land (64%, 76.65 g TEQ) with release to other medium being minor. In terms of the principle sources, 97% of the estimated emissions come from Source Category 6 involving open burning processes that release to both air and land. Within this source category open burning of waste is the dominate sub-category with contributions from burning of biomass from agricultural activities. The only other source category with significant estimated emissions is Category 3 (Heat and power generation). Within this category, energy generation from biomass (wood and agricultural residues) from GUYSUCO are the main source.

In summary, Guyana does have significant PCDD/PCDF releases and efforts under Article 5 of the Convention should focus on reducing open burning, particularly of wastes and potentially measures to improve power generation from biomass.

Figure 2. 3: Dioxins and Furans released by Categories g-TEQ/Year

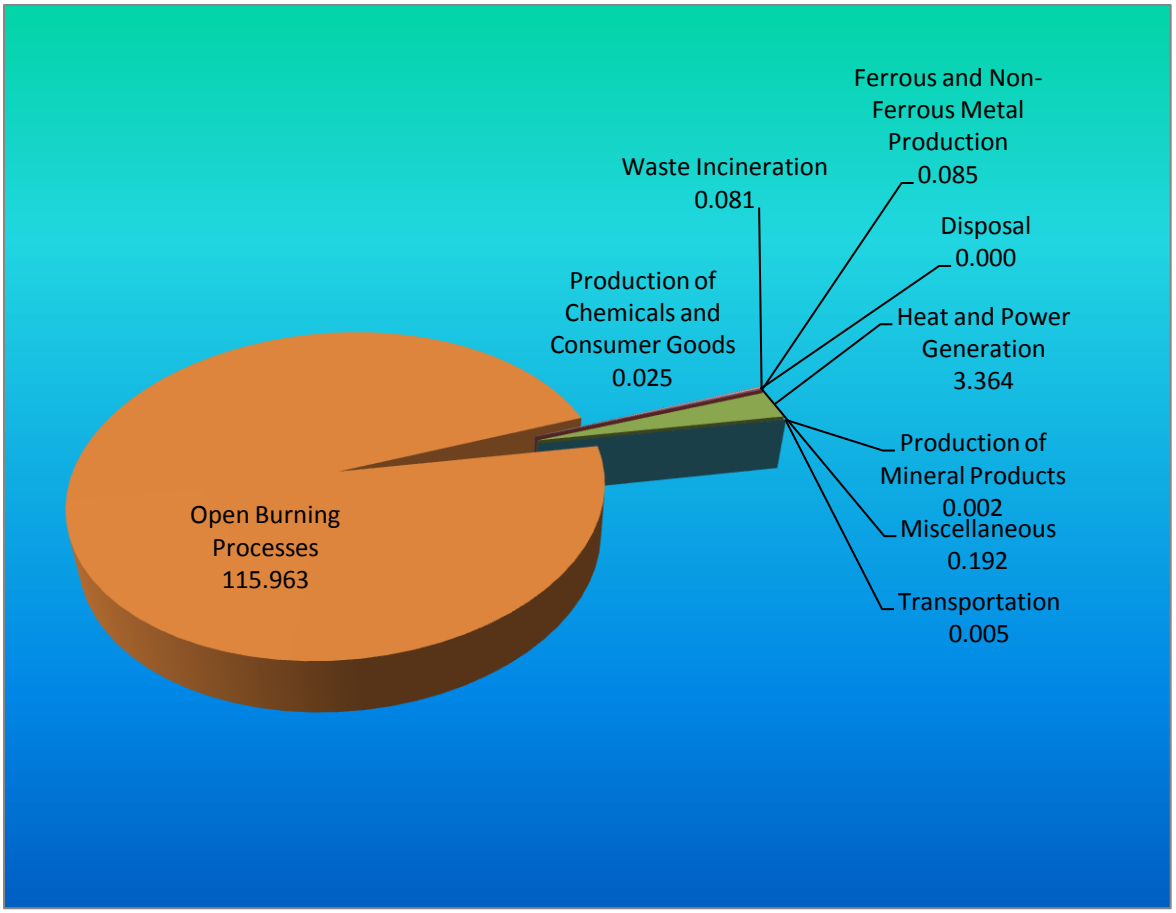


Table 2.5: Results of the Calculated Release of Furans and Dioxins by Category and Sub-Category Identified (g-TEQ).

Category/ Subcategory	Air	Water	Land	Product	Residue
(1) Waste Incineration					
Incineration of medical waste	0.079	0	0	0	0.002
Sub-Total	**0.079**	**0**	**0**	**0**	**0.002**
(2) Ferrous & Non-Ferrous Metal Production					
Secondary Aluminum Production	0.007	0	0	0	0.031
Zinc Production	0.012	0	0	0	0
Thermal wire reclamation	0.035	0	0	0	0
Sub-Total	**0.054**	**0**	**0**	**0**	**0.031**
(3) Heating and Power Generation					
Fossil fuel powered plants	0.01	0	0	0	0
Biomass powered plant	0.437	0	0	0	0.159
Household cooking with biomass	2.919	0	0	0	0

Category/ Subcategory		Air	Water	Land	Product	Residue
	Biogas combustion*	0	0	0	0	-
	Sub-Total	**3.366**	**0**	**0**	**0**	**0.159**
(4) Mineral Production						
	Asphalt mixing	0	0	0	0	0.002
	Brick production	0	0	0	0	0
	Sub-Total	**0**	**0**	**0**	**0**	**0.002**
(5) Transportation						
	4-Stroke engines	0.002	0	0	0	0
	Diesel engines	0.003	0	0	0	0
	Sub-Total	**0.005**	**0**	**0**	**0**	**0**
(6) Open Burning Processes						
	Fires/burning biomass	4.192	0	6.491	0	0
	Fires, waste burning, landfill fires, industrial fires, accidental fires	35.121	0	70.160	0	0
	Sub-Total	**39.313**	**0**	**76.651**	**0**	**0**
(7) Production/Use of Chemicals/Consumer Goods						
	Pulp and paper mills	0	0	0	0.025	0
	Total	**0**	**0**	**0**	**0.025**	**0**
(8) Miscellaneous						
	Drying of biomass	0.056	0	0	0.056	0
	Crematoria	0.080	0	0	0	0
	Smoke houses*	0	0	0	0	0
	Tobacco smoking*	0	0	0	0	0
	Sub-Total	**0.136**	**0.000**	**0.000**	**0.056**	**0.000**
(9) Disposal						
	Sewage/sewage treatment					
	Sub-Total	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
(10) Identification of potential hotspots						
	PCB containing equipment*	0	0	0	0	0
	Sub-Total	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

*Annual cumulative emissions negligible

2.3.5 Stockpiles, wastes and contaminated sites

This sub-section covers the assessment of the current inventories of POPs stockpiles, wastes and contaminated sites. It is developed specifically to evaluate compliance actions required in relation to Article 6 of the Convention. This assessment was undertaken in association with the Annex specific chemicals assessments above that served to identify current POPs import and use. Here, the identified POPs stockpiles and waste as well as POPs contaminated sites is covered. In the case of POPs pesticides, this assessment was extended to an inventory of obsolete pesticides generally and this is reported below. Overall, no POPs stockpiles, wastes or contaminated sites were identified except as related to PCBs although the possibility that residual contamination associated with other POPs contained in discarded products or from unintentional releases could exist, albeit on a widely distributed and low volume concentration basis that is likely below the low POPs content as defined by the Convention.

a) Obsolete Pesticides Stockpiles

The NIP development work was used to undertake a comprehensive obsolete pesticide (OP) inventory for the country. This had the objective of both identifying any residual POPs pesticide stocks that might remain but also to get an overall quantitative data base of OP stocks generally. In that regard, the definition of OPs was that generally adopted by FAO and other international organizations, namely those pesticides that cannot be used for legal or technical reasons, which may be , banned for use, physically degraded, chemically degraded, ineffective as a pesticide, expired, not needed, unidentified (e.g. no label or labeled in a foreign language), non-compliant with local regulations (e.g. wrong package), and unsuitable formulation (e.g. cannot be used with available application equipment).

For collection of data on obsolete pesticide stockpiles and pesticide contaminated sites, the training guidance documentation issued by the United Nations Food and Agriculture Program (FAO)[22] was utilized and from this a survey form (Appendix 2) was developed for initial collection and then site visit follow up as required. This solicited type and quantities of OP's being declared as well as detailed information about storage conditions, spatial location, contact names and photographs. The work started with generation of a list of potential OP holders and information sources that was prepared jointly by PTCCB staff and the national consultants in consultation with stakeholders involved at the inception phase of the work. This list covers persons/organizations who are identified by PTCCB through registration or are in their database and who might potentially have or have had obsolete pesticides, or may have knowledge of such stockpiles. It includes importers, distributors, retailers (vendors), major rice farmers, major sugar cane farmers, and pest control operators. Additionally, within the country the process made contact with different sectors, the Ministries of Health and Agriculture, EPA, the University of Guyana, and others as identified as relevant. Direct contacts were made *via* telephone and site visits to determine whether these individuals/organizations had obsolete pesticides in their possession or associated knowledge. Based on this field visits were made to all significant sites in each region of the country.

In total, 6.821 t of OPs were identified and physically verified in this process at six locations. This inventory is summarized in Table 2.6 below by specific chemical where identified. The bulk of the inventory is currently centralized in that two storage facilities (bonds) are covered by national hazardous waste storage regulations and registered under the PTCCB regulations. One is operated by the PTCCB at the NARI research station site that houses PTCCB operations in Mon Repos the other larger store is operated by GUYSUCO at its Ogle technical support facilities. The PTCCB facility shown in Figure 2.4 has been in operation since 2008 when PTCCB and serves as a secure repository for materials either found abandoned or confiscated due to regulatory action by PTCCB staff. The GUYSUCO facility (Figure 2.5) established in the period 1988-89 as part of program to eliminate random substandard obsolete pesticides on the various estates owned by the company. It was used until 1994 at which time it was sealed due to security and theft concerns. GUYSUCO also maintains a secure storage area for expired materials in its main chemicals warehouse (Figure 2. 6). This stock is removed regularly and returned to the original manufacturers under their purchase arrangements with suppliers and is not included in the inventory. There is one relatively large store at a major importer/distributor (Associated Industries Ltd) in Ainlin, Georgetown is located in the firms registered pesticide storage bond in a defined but un-segregated area (Figure 2.7). The remaining stores are held by several small retailers and individual farmers/traders. The

[22] http://www.fao.org/ag/AGP/AGPP/Pesticid/Disposal/common/ecg/110449_en_No_10___Traning_Manuale.pdf

GUYSUCO storage bond is the only location where any POPs pesticide stockpiles were identified (Endrin).

Table 2.6: Obsolete Pesticide Stockpile Inventory

Pesticide	Quantity (kg)	Pesticide	Quantity (kg)	Pesticide	Quantity (kg)
PTCCB Storage Bond					
Unlabelled	111.3	Turque	3.6	Nomina	1.8
Cyanmid	0.6	Superkill	1.3	Cure	0.27
Diazion	1.9	Admister	9.6	Ronstar Flo	0.62
Fusirore	12	Karatox	0.3	Monodrin	1.3
Karteka	142.5	Commando	0.3	Herbizone	17
Malathion	14.0	Candela	0.3	Biopel 2X	6.5
Abamectin	16.6	Superkill	0.65	Best Act	1.3
Glyphosate	26	Admajor	87.9	Armado	0.3
Fusirore	3.2	Manzeb	14	Ants Powder	10
Hostathion	2.7	Carbendazim	5	Aluminum Phosphate	0.5
Abalotin	7.8	Prontax	7	Fentin Acetate	51
Glyfokill	1.3	Bellmark	0.3	Rebevo	0.25
Ronstar	0.6	Agrotac	88	Ethephon	234
Sandox Agri	1.3	Vydate-L	0.3	Farmixone	5.2
Fastax	1.6	Fuzi One	0.65	Bestac	78
Sub-Total					970.3
GUYSUCO Storage Bond, Ogle ECD					
Diazinon 5G	318	Crotothane	250		
Dichloran	300	Thalium Sulphate	1,500		
Endrin*	750	Dimethoate	822		
Furadan	340				
Sub-Total			4,280		
Ainlim Associated Ltd, Georgetown					
Fenoxaprop-p-Ethyl	1,245	Aamethiphos	201		
Sub-Total			1,446		
Boodhoo General store, Parika					
Cynamic acid	2.6	Padan 50 SP	1.1		
Metsulfuran-Methyl	0.1				
Sub-Total			3.8		
Individual Farmers					
Azoxystrobin	36	Propanil 48 EC	85		
Sub-Total			121		
Overall Total					**6,821**

*Annex A POPs Pesticide.

Figure 2.4 PTCCB Storage Bond – Mon Repos

Figure 2.5 Historical GUYSUCO Consolidated Obsolete Pesticide Storage Bond at Ogle

Figure 2.6 GUYSUCO Chemicals Storage Bond including Current Expired Stock at Ogle

Figure 2.7 Ainlim Associated Agri Storage Bond in Georgetown

In the course of undertaking the OP inventory work, a number of factual observations were recorded which should be useful in the development of better overall pesticide chemical management and being prepared to address present and future issues that may arise under Convention obligations. The following notes some of these observations:

a) *Pesticide Storage and Handling Practice:* As a general observation improvements in the storage and handling of pesticide stocks at the distribution and retail level can be improved, particularly with respect to personal safety and exposure related practices. While larger distributors and wholesalers generally had well organized storage bonds, appropriate safety precautions were often not fully implemented even in these. This included insufficient signage, requirements for better ventilation of the storage bonds and availability/use of basic personal protection equipment. In most instances this was due to ignorance of safety and exposure issues. The owners, operating managers and staff need to be better aware of the health implications that long term continuous exposure to even relatively low levels of pesticide can lead to.

b) *Illegal Imports and Vendors:* Anecdotal reports were common regarding illegal trade in pesticides across Guyana's large stretches of unprotected borders. These particularly focused on the border with

Suriname in the Berbice region and from Venezuela along the Essequibo Coast, although some instances from Brazil and even the port of Georgetown have been recorded. One of the major issues here is that the labels are typically in a foreign language which most of the end users cannot read so they depend on the vendor to give them verbal instructions regarding use. This resulting inadequate level of information has significant implications for safety. In addition to the illegal imports there are a few illegal (unlicensed) vendors who sell the illegally imported pesticides and do not usually observe the required regulation regarding storage, labeling and safety generally.

c) *Return of Obsolete/Expired Pesticides:* There is no formal policy on how obsolete or expired pesticides are dealt with at the retailer level. Some retailers have indicated that the current practice is usually to either give away pesticides which have reached their expiry date or sell them at reduced prices. Two of the large distributors indicated that they do allow the retailers to return the product. However, not all retailers would take this option, especially if the quantity is small. This can become a serious problem if a pesticide is being recalled due to safety concerns. During the course of the work, an overall estimate of between 200 and 300 kg/year of such material would normally be expected to be generated. One related implication of accumulation of obsolete pesticides at a local retail level and in the hands of end users is the prevalence of certain products being used as a self inflicted poison in suicide cases.

In summary, Guyana, despite relatively high pesticide usage only has a small stockpiled inventory of obsolete pesticides. The largest portion is old historical stock from sugar production that is now securely stored, and materials that has been abandoned or confiscated which are now under government control. Relatively little expired material was identified and this was largely concentrated at a single importer/distributor who was unable to sell or return several specialty products. The remainder was small quantities of largely consumer packaged product at the retail or farm level. This result is not unexpected in Guyana where the practices have involved use of all products sold, even if in some cases it is expired, for economic reasons. Larger operations also have commercial arrangements allowing expired material to be returned to the original manufacturers, thus avoiding larger volumes to accumulate.

However, the work does suggest that a number of measures would be appropriate to consider in order to enhance the management of future generation of OPs that can be anticipated in modest amounts, as well as reduce environmental risks associated with what accumulations that do occur. These measures might include:

- Undertake consolidation of any small quantity accumulations at the small enterprise level likely as a service provided by PTCCB who currently have secure storage facilities, inclusive of any upgrading and practice enhancement that may be appropriate.
- Arrange for one time removal and environmentally sound destruction of the present inventory inclusive of the small quantity of POPs pesticides, potentially through an international assistance program such as a follow on GEF project addressing POPs legacies.
- Implement mandatory take back purchase arrangement for all bulk imports of pesticides by distributors where materials are expired, potentially through a product stewardship arrangement supported by international manufacturers.
- Expanded inspections, training, public information and technical assistance provided through PTCCB to small holders and users of pesticides to ensure pesticide storage and handling meets basic safety and environmental practice standards.

b) PCB Stockpiles and Wastes

As indicated in Sub-section 2.3.2 above, while there is no evidence of any current direct use of PCBs and very limited evidence of any historical use, there is PCB contamination of mineral oil in older transformers in larger units at generation sites and potentially in the older distribution transformers. The assumption is that this contamination applied to equipment manufactured during a period where common mineral and PCB dielectric oil filing equipment was used or transformers originally filled with PCBs were refilled with mineral oil prior to import. Its presence in the system could have further spread to other units during local maintenance over the years, although it is also likely that a substantial amount of dilution has also occurred over the long service period. As a result it is also reasonable to conclude that legacies in the form of PCB stockpiles, wastes and contaminated sites may be associated with this PCB contamination noting that there are significant inventories of old electrical equipment held by utilities and a history of past disposal of potentially contaminated equipment and oil.

The inventory work on potential PCB stockpiles and waste was undertaken in parallel with the inventory work reported in Sub-Section 2.3.2. The methodology applied was similar to that described above. At each major power generation site where transformers were serviced or discarded equipment was stored, this equipment was inspected and where accessible oil samples were taken. A Dexsil Chor-N-Sol screening test to determine PCB content above or below 50 ppm was performed on a selection of accessible stockpiled discarded equipment In total 6 tests were performed on larger stockpiled transformer oils and 24 tests were conducted on stored and discarded distribution transformers. In cases were equipment was drained local soil samples using the Chlor-N-Soil test kits were conducted (see below) as a indicator of possible contamination associated with specific units or stockpiles. The following summarizes observations at each of the sites examined.

- *Sophia Power Generating Station and Maintenance Facility:* The GPL Sophia Complex includes the utility's main maintenance facility that undertakes transformer servicing and testing as well as acting as GPL's main storage facility for discarded equipment. GPL's transformers except for larger units are transported to this site with the oil in place where a diagnosis is made and unserviceable transformers are drained and stored for disposal. They also perform such services for the private sector and other utilities, almost exclusively for small distribution transformers.

  Currently, there are over 900 distribution transformers classed as "discarded" that are stockpiled on the site awaiting further directions for disposal. Approximately 20% of these are un-drained. There is also one large 69 kv transformer that is deemed "discarded" which has been drained. Overall, there is no complete consolidated inventory of discarded transformers on site. These are accumulated both from the maintenance operation and from waste stockpiles consolidated from other GPL sites. The current practice applied to GPL originating equipment is that equipment declared surplus is drained and stockpiled pending disposal as recyclable metal. Transformers from others that are to be discarded are not drained and stored as is with associated risk of leakage over time. The last time GPL shipped discarded transformers was in 2006 when a quantity was taken by a local scrap metal dealer and exported. It is understood that no shipments have been made since that time even though there has been an ongoing program of replacing old distribution equipment as the system is fully unified. This explains the relatively large accumulation of discard units. However, there are currently discussions on disposing these for scrap but no decisions have been made. Figure 2.8 shows the general area where discarded distribution transformers are stored.

Figure 2.8 General Discarded Transformer Storage Areas - Sophia

The one larger transformer available for inspection on site was a damaged and disconnected 69 KVA station transformer manufacturer by Westinghouse Canada in 1974 (Figure 2.14 below). It was checked for oil but was found to be fully drained rendering an oil test impossible. However the ground around the transformer exhibited spilled oil, likely from when it was drained. This tested positively for PCBs, over 50 ppm. This and the fact that it was similar in age and manufacturer to other PCB contaminated units still in service (Sub-section 2.3.2 above), this transformer should be considered potentially PCB contaminated.

The current practice respecting disposal of mineral oil is to ship it to BOSAI Minerals bauxite processing kiln (high temperature rotary drying kiln) where it is blended with heavy fuel oil or a waste oil stream used as fuel. Historically oil was blended with heavy fuel oil and used in the Kingston Power plant. No testing of this oil for contamination, specifically PCBs has ever been undertaken

Sampling of residual oil was undertaken at the maintenance site and on residuals in distribution transformers held as waste on the site. All tests displayed a low concentration of PCBs of less than 50 ppm. An oil sample was taken from the drain pit where discarded transformer oil is processed for shipping to BOSAI was also taken and this also showed a low level of PCBs. The oil filter was also sampled and the test indicated a negative result for PCBs.

Overall it was concluded that the discarded equipment held on site current appears not to be PCB contaminated waste under the convention. However, this examination was not exhaustive and as indicated by soil sampling reported below there is evidence of PCB contaminated oil having been handled historically. As a result, it is recommended that all oil be screened upon draining for PCB content over 50 ppm and a systematic survey of discarded transformers using a swab screening test be undertaken before any further shipment of drained transformers be undertaken. Developing a contained and orderly stockpile storage capability should also be organized.

- *Kingston Power Station (Georgetown)*: This site contains two areas (Figure 2.9) where discarded transformers are stored. One is a generally hard surface but uncontained area adjacent to the now dismantled old power generation unit which contains approximately 30 small and medium sized transformers, apparently still filled with oil and where evidence of leakage was noted. The other is a larger area of open ground where several hundred discarded distribution transformers are randomly piled. These were generally opened and appeared to have been drained. It is understood that these are units that were moved from Sophia at some point. In both cases the units were generally of US or UK manufacture. Oil drawn from these transformers or taken from residuals was tested with the result that all was less than 50 ppm PCB. A similar low PCB result was found for associated soils. The overall conclusion made is that this waste stockpile appears not to have sufficient PCB contamination to require action under the Convention. However, the same recommendation above respecting undertaking a complete inventory, doing swab screening tests and testing any oil that is drained apply. In addition, developing a contained and orderly stockpile storage capability should also be organized.

Figure 2.9 General Discarded Transformer Storage Areas – Kingston

- *Garden of Eden Power Station:* This site has a stockpile of approximately filled sixteen (16) distribution transformers collected locally and are awaiting transport to Sophia for processing and likely classification as discarded (Figure 2.10). Oil from two was tested and one was positive for PCBs. This particular distribution transformer was unlike all others examined in that it was manufactured by General Electric in the US and according to the name plate was filled with Pyranol,

a trade name of PCB oil commonly used by this manufacturer prior to 1980 (Figure 2.10). It was apparently removed from an old grid in Timehri and was one of four with the other three remaining at Timehri awaiting transportation to the workshop at Sophia. Follow up was unable to locate these units but this should be pursued during future inventory initiatives. These units appear to be the only PCB based equipment identified and should not be handled with mineral oil transformers given the high environmental risk they represent and potential for creating cross contamination from the concentrated PCBs involved.

Figure 2.10 – Filled Distribution Transformers including one containing Pyranol

- *Canefield Power Station (Berbice):* This site has a stockpile of approximately 8 filled distribution transformers collected locally and are awaiting transport to Sophia for processing and likely classification as discarded. Oil from one of these was tested and it was less than 50 ppm.

- *Onverwagt Power Station:* There were no stockpiles of out of service equipment at this site. The business office had eight transformers awaiting transportation to Sophia. The site was tested and found negative for PCBs.

- *Versailles Power Station:* There were no stockpiles of out of service equipment at this site.

- *Linden Power Company:* The LPC site which is common with that used by LEC has a number of discarded larger station units (3 units identified) owned by LEC (Figure 2.11). All these units were drained but oil spilled around and leaking from was tested and found to be greater than 50 ppm contamination suggesting that these units generally should be considered PCB stockpiled waste pending further testing.

Figure 2.11 Discarded Large Transformers at the LPC Site in Linden

- *Linden Electric Company:* LEC services its distribution transformers at the site it shares with LPC and has a store of 26 discarded un-drained distribution transformers located with the larger discarded LPC units noted above in its compound (Figure 2.11)[23]. Discarded transformers with oil were tested for PCBs and the tests revealed a concentration of PCBs of less than 50 ppm. The transformer service site has evidence of oil in the soil and was tested for PCBs. The test revealed a PCB concentration greater than 50 ppm. The soils at the base of the storage site was tested and revealed a presence of PCBs greater than 50 ppm.

- *Linden Utility Services Cooperative Society Limited:* Approximately 8 drained distribution transformers are stored on this site. No residual oil was available for testing.

In summary there is a national PCB waste stockpile of four (4) larger discarded or waste transformers that have been drained that are or likely PCB contaminated, and one and potentially three additional so-called distribution transformers that are filled with a PCB based dielectric oil (Pyranol). A list of these is provided in Table 2.7 below. Additionally, there are approximately 1,200 discarded distribution transformers, mostly drained but including a significant quantity with retained mineral oil. These units are anticipated to be generally uncontaminated or contaminated below the low POPs content of 50 ppm. However, it is likely that some will exceed this level as well.

Table 2.7: List of Stockpiled Large Transformers Potentially requiring Disposal as PCB Waste

Location	Equipment Type	Equipment Identification#/ Manufacturer	Oil Volume (Liters)	Remarks
Sophia	69KV Substation	B-3S 7307, 1974,	Drained	Damaged, discarded and

[23] The units at this site were damaged by fire in July 2012.

Location	Equipment Type	Equipment Identification#/ Manufacturer	Oil Volume (Liters)	Remarks
	Transformer	Westinghouse, Canada Coolant – Oil		drained of oil, awaiting disposal
Linden Power Company	Three Phase Grounding Transformer	ST030058879, Sunbelt, USA, Coolant – Non PCB Mineral Oil	2574	Current Transformer on contaminated site
	Three Phase Grounding Transformer	31588/6, 1959, London Transformer Product, UK	1684	Discarded Grounding Transformer on Contaminated site.
	Three Phase Grounding Transformer	1959, London Transformer Product, UK	1684	Discarded Grounding Transformer on Contaminated site.
Garden of Eden	Distribution Transformer	6716820, General Electric, USA, Coolant – Pyranol	44 per unit (based on name plate capacity)	Removed from grid awaiting transportation to Sophia Three similar units reported at Timehri

The principle recommendations respecting identified PCB stockpiles and wastes for inclusion in the NIP Action Plan are:

- Complete a comprehensive inventory of discarded transformers including the informal stockpiles of distribution transformers.
- Associated with the above undertake a systematic survey using screening test kits of both filled and drained distribution transformers using oil or surface swab tests as applicable.
- Measures should be taken to consolidate these stockpiles of equipment in a secure location having appropriate containment and stock control. As a minimum this should apply to the larger units noted in Table 2.7 above and particularly the pyranol based equipment.
- In any event, it should be mandatory through specific regulatory order to not allow the transfer of any of this equipment externally until the above screening and classification as waste is done, specifically noting that transfer of either contaminated transformer shells or oil to dealers for export would potentially constitute a violation of compliance under the Basel and Stockholm Conventions unless appropriately classified and declared as hazardous waste.

c) <u>POPs Contaminated Sites</u>

The inventory work on potential pesticide and PCB contaminated sites was undertaken in parallel with the inventory work reported in Sub-Sections 2.3.1 and 2.3.2 above is described below. It is reported in both the national consultant reports noted above on PCBs and independently in a separate report covering contaminated sites and capacity assessment work.

The work described above assessing POPs pesticide use, OP stockpiles, and assessment of Annex B POPs use (specifically DDT) also looked at the possibility of POPS pesticide and more generally OP contaminated sites. Given the absence of any recent POPs pesticide use, potential locations where contamination might be associated with POPs pesticides could not be identified. In general, there was the potential for general pesticide contamination at any of the registered agricultural chemicals storage bond operated by distributors and retailers but based on visual inspections during OP inventory work, there was no direct evidence of anything that would qualify as a significant contaminated site. Similarly, contamination could be generically associated with the two

larger OP storage bonds at GUYSUCO's Ogle site and the PTCCB site. However there is no evidence of this, although given their status as points of OP consolidation periodic monitoring with soil samples may be appropriate.

The one location that might constitute a pesticide contaminated site is associated with wastes generated by GUYSUCO's aerial spraying base at Ogle airport. The company uses predominantly herbicides in its operation including Round Up and Fuselage along with some pre-emerging herbicides. Most of the application is done by the company's aircraft and the company has an effluent treatment facility which collects water from the washing of the aircraft and the triple rinsing of pesticide containers at this location. It is estimated that about 360 kg of sludge is generated annually from this facility. This sludge, which may have some amount of pesticide contamination, is disposed of in a pond at the Enmore Sugar Estate. The Company also shreds the empty pesticides containers at its Ogle location after rinsing. The empty containers from all the sugar estates are collected and taken to this shredding facility. After shredding the material is taken to Enmore Estate to be disposed of in the same pond as the washing sludge. The Company has indicated that over time one such pond was filled and a second is currently in use. There is a strong smell of pesticide emanating from the area, indicating possible contamination. These ponds are shown in Figures 2.12. It should be noted that all the GUYSUCO sugar estates have washing facilities where empty pesticide containers and the clothes of personnel involved in the application of pesticides are washed. The effluent from the washing is drained into a local holding pond to allow for degradation. A portion of the pond at the Enmore Estate is shown in Figure 2.13.

Figure 2.12 GUYSUCO Washing Sludge and Container Shredder Residue Disposal Pond - Enmore

Figure 2.13 GUYSUCO Rinse water disposal pond - Enmore

Overall, no site contamination associated with Annex A or B POPs pesticide or industrial chemicals other than PCBs (see below) has been identified. There is potential for site contamination associated with current practices used for disposal of residuals from washing of equipment and containers as well as shredded container material. It is recommended that an analytical investigation of residual pesticide contamination at these sites be undertaken and of sludge and container material prior to disposal. The former, if retaining significant harmful pesticide content exceeding national limits applied to define hazardous waste should be dewatered and kept in secure bulk containers that would be included in the overall national OP stockpiles pending environmentally sound disposal. The shredded containers if sufficiently washed should qualify for disposal as solid waste or potentially a recycling option back into industrial chemical containers if such a market is identified or which may develop through a stewardship take back program.

The identification of PCB contaminated sites was integrated with the inventory work on PCBs in use (Section 2.3.2) and the above assessment of PCB stockpiles and waste. This work focused on the same sites assessed in these areas and the results by site are summarized below.

- *Sophia Power Generating Station and Maintenance Facility:* As noted above, this site contains several storage areas for discarded distribution transformers (Figure 2.8 above). Most units have been drained but it also includes some un-drained units owned by other parties including ones with evidence of leakage. The drained units are often open and collecting rain water which has become contaminated with residual oil and the overflow have created oil contamination in the underlying and surrounding land. This presumably also contaminates site run off surface water. The site also houses GPLs transformer maintenance facility with

its external drainage system (Figure 2.14)

Figure 2.14 GPL Transformer Maintenance Operations and Drain -Sofia

Soil samples were taken at different locations at Sophia and the results indicated that some soils are contaminated with PCBs. Overall the tests identified four contaminated areas at the Sophia Complex as follows:

i) The oil spill onto the soil around the main stockpile of unserviceable transformers was contaminated with PCBs over 50 ppm (Figure 2.15). Given that oil tested from the current stockpile of discarded transformers themselves did not reveal any PCBs above this level, the site appears to have been contaminated by historical accumulations likely already disposed or perhaps moved to Kingstown (see below).
ii) The soil in the drain (at the front of the transformer service station) was found to be contaminated with PCBs. This drain is constructed of concrete this offering some protection for the underlying soil.
iii) The soils with oil spilled from a damaged and disconnected 69 KVA transformer discussed above (Figure 2.16) was found to be contaminated with PCBs.
iv) Three soil samples were taken from the drain behind the transformer service station and all were found to be contaminated by PCBs (Figure 2.14 above). The first sample was taken from the direct point of entry into the drain where the oil meets the soil, the second sample taken from the drain ten paces to the left of the first sample point and the third sample taken five paces right of the first sample point

Figure 2.15 Soil contamination associated with discarded distribution transformers - Sophia

Figure 2.16 Damaged 69KV transformer with contaminated soil – Sophia

- *Kingston Power Station (Georgetown)*: As noted above this site contains two areas where discarded transformers are stored, both showing evidence of oil contamination. Soil contamination was also noted under in-service station transformers. There is also an oil handling area where mineral oil was historically mixed with heavy oil used as fuel. The soil at all these points was tested with the following results:

  i) The oil under the active transformer was found to be contaminated with PCBs greater than 50 ppm (Figure 2.17).
  ii) Tests applied to the oil pit where transformer oil was mixed with fuel for burning were inconclusive due to current oil in and around the pit being too heavy to provide a proper result using the test kit
  iii) Tests on soils in the hard surface discarded transformer storage areas did not indicate PCB contamination, over 50 ppm.
  iv) Tests on soils in the larger area of randomly stored drained and partially dismantled distribution discarded transformer storage did indicate PCB contamination over 50 ppm (Figure 2.17)

Figure 2.17 Soil Contamination over 50 ppm associated with stored distribution transformers and an active station transformer - Kingston

In summary, there is a significant area of this site that requires further investigation for PCB contamination as well as a small area of PCB site contamination under an active transformer and which potentially would require attention under the Convention as a POPs contaminated site under Article 6. However, the observation should be made that this site also represents a significant contaminated site legacy in terms of spilled hydrocarbons and will at some point require clean up. The existence of PCB contamination should be considered in undertaking this work.

- *Garden of Eden Power Station:* No evidence of oil contamination associated with in-service or stored equipment was noted at this site. As a result no soil screening tests were undertaken. However, given the discovery of a pyranol filled distribution transformer at this site (Figure 2.10 above), some follow up needs to be undertaken to ensure any locations where oil from it is handled has not resulted in contamination. In particular, special precautions are required for shipping and draining of such equipment sent to Sophia. Likewise the locations where the other three units of this type are reported to be stored in Timehri should be assessed and these units secured to prevent creation of a serious PCB contaminated site.
- *Canefield Power Station (Berbice):* No evidence of oil contamination associated with stored equipment was noted at this site. As a result no soil screening tests were undertaken. However, the in-service 69 KV Station Transformer had oil in soil around it which tested positive for PCBs over 50 ppm, and would represent a small surficial clean up requirement (Figure 2.18).
- *Onverwagt Power Station:* There were no stockpiles of out of service equipment at this site. However, at the base of the 69KV station transformer there was a visible oil spill on the soil which tested as having in excess of 50 ppm PCB (Figure 2.19).
- *Versailles Power Station:* The soil at the bases of two of the station grounding transformers connected to the caterpillar mobile power generators were tested for PCBs. Both tests revealed a concentration of PCBs in the soil, over 50 ppm (Figure 2.20).
- *Linden Power Company*: Oil spilled around the drained discarded transformers noted above was tested and found to be greater than 50 ppm contamination (Figure 2.11 above).
- *Linden Electric Company:* The transformer service site has evidence of oil in the soil and was tested for PCBs. The test revealed a PCB concentration greater than 50 ppm. The soils at the base of the storage site was tested and revealed a presence of PCBs greater than 50 ppm)
- *Linden Utility Services Cooperative Society Limited:* LUSCSL's transformer service facility at Wismar, Linden is covered in oil from fuel and transformer oil spills (Figure 2.21) soil prevented a proper analysis. However, it is very likely that this site is PCB contaminated because of the long history of servicing of distribution transformers with oil spills onto the soil.

Figure 2.18 Contamination over 50 ppm Around an Active Station Transformer - Canefield

Figure 2.19 Contamination over 50 ppm Around an Active Station Transformer - Onverwagt

Figure 2.20 Contamination over 50 ppm Around a Grounding Transformer - Versailles

Figure 2.21 Contamination over 50 ppm Around a Service Area at the LUSCSL site - Linden

In summary, there is an issue associated with PCB contaminated sites at GPL and other utility sites, noting that this is common but in this case relatively small in comparison to experience elsewhere. It is estimated that approximately 6 t of potentially heavily contaminated soil would require treatment and/or disposal from these sites with a larger quantity soil that would be contaminated at levels below 50 ppm likely also being potentially addressed. In that regard, a number of these sites involve substantial amounts of historical heavy hydrocarbon spillage and contamination which who also potentially have some level of PCB and perhaps heavy metals contamination. This likely represents a significant and relatively complex environmental legacy that will have to be addressed at some point in time.

Other sites that might potentially had PCB contamination were considered as noted below:

- Given that metal scrap dealers have traditionally handled discarded transformers for their ferrous and non-ferrous metal scrap, the major dealers were contacted. In general none had knowledge of handling these

items although one dealer indicated that a pending arrangement with GPL to take their inventories when they are made available. This apparently included handling residual oil as a separate export commodity. While no specific sites or actual contamination issues were identified the need for both information on risks and appropriate practice in handling this type of scrap, and regulatory controls on this trade was noted for action under the NIP. In particular it will be important that all electrical equipment be classified as being subject to Basel Convention export and prior informed consent requirement applicable to hazardous waste unless it can be certified as being below the Convention low POPs limit. It is also noted that there is very limited understanding among the main stakeholders in this sector of this issue and associated national obligation. The potential for a significant non-compliance situation in relation to both Stockholm and Basel Conventions exists.

- Several locations where mineral oil was blended and used as fuel were visited including a waste oil management service provider and BOSAI Minerals who currently takes this material (the other historic location- the Kingston Power Station is addressed above). While these sites do not show any unique contamination associated with handling transformer oil, the current practice involving disposing of mineral oil from transformers as fuel needs to be subject to a number of controls. It should be tested by individual source as being above or below 50 ppm with only that below 50 ppm being allowed for blending as fuels. As in the case of scrap metal dealers, information and regulatory actions would be appropriate. It should be noted that their drying kiln is potentially suitable for the destruction of liquids with low POPs and perhaps moderate content and this may be an option subject to further investigation and technical qualification.

While not directly related to the NIP and Stockholm Convention, the work undertaken in this area also looked at mercury contamination in the country, recognizing that it is generally accepted that the main issue related to contaminated sites of global significance in Guyana relates to mercury. For this reason a brief overview of the issue is provided in this sub-section recognizing that any coordinated initiatives addressing contaminated sites generally should include it. It is also noted that an International Negotiating Committee process is in its final stages and an international convention on mercury (Minimata Convention) which is anticipate to be open for signing in in 2013[24].

Guyana has extensive alluvial gold deposits and artisanal gold mining contributes significantly to the economy of the county. The gold mining sector has increased tremendously over the last few years due to the high gold prices. As part of the gold extraction process, mercury is used to form an amalgam with the gold to release it from its ore body. Amalgamation is normally considered to be part of the secondary processing in small and medium scale gold mining, after the gold bearing ore is separated out using a sluice box. The amalgam is subsequently burnt to remove mercury leaving behind the precious metal. In order to separate the mercury from the gold, miners apply fire resulting in toxic fumes escaping into the atmosphere. The remainder of the material which is mixed with the mercury to form the amalgam is usually dumped at uncontrolled tailings sites. Some miners also practice the pouring of mercury directly into sluice boxes which results in direct contamination. Caribbean Environmental Health Institute (CEHI) estimated that 185,800 ounces or 5,800 kilograms or mercury is used on a yearly basis in Guyana[25].

[24]http://www.unep.org/hazardoussubstances/Mercury/Negotiations/INC5/tabid/3471/Default.aspx
[25] Source: Guyana National Hazardous Waste Inventory Report 2008

As a result of these practices contaminated land areas and waterways exist in mining districts, including waterways. Several studies were conducted within the last decade by institutions and bilateral projects such as Caribbean Environmental Health Initiative (CEHI), the Geology and Mines Commission (GGMC), the Guyana Environmental Capacity Development Programme (GENCAPD), the Institute of Applied Sciences and Technology (IAST) and the World Wildlife Fund (WWF) and these have confirmed that mercury contamination is occurring[26,27,28,29]. Tissue of fishes, hair samples from residents downstream of mining areas, and sediments at the bottom of streams were tested and some amount of mercury contamination was detected in all these medium. Significant contamination that potentially warrants clean up is anticipated in the rivers within the mining areas that have been contaminated and at local areas of land contamination occurring as a result of dumping of mercury contaminated materials.

The GoG, through the GGMC, is trying to address the issues and to reduce it effects, especially since some of the rivers and streams affected are integral source of food among residents of interior communities. The GoG has indicated that the use of mercury will be eventually phased out and replaced by other gold recovery methods. The controlled use of cyanide is one of the options being examined. New regulations such as the Mining Environmental Regulations made under the Mining Act were passed to ensure mercury is used in a managed manner. A Code of Practice has been developed and miners are required to use retorts to burn the amalgamation. The pouring of mercury into the sluice boxes is banned and mercury contaminated soils are to be stored in containers.

2.3.6 Assessment of future POPs use and releases and requirements for exemptions

As described above current legal use of POPs listed in the Convention Annexes is limited to electrical equipment that may retain PCB contamination in excess of 50 ppm, noting that the levels of contamination are modest in comparison to situations where PCB based equipment rather than that which was cross contaminated were historically used. Historically, release of PCBs to the general environment as a consequence of handling, maintenance and disposal practices associated with electrical equipment has inevitably occurred, largely in the form of land contamination and associated transfer to water and potentially air. This would continue in the absence of action and elimination of both current use through implementation of a PCB Phase Out Program in advance of the Convention obligation of doing so in 2025, and cleaning up PCB contaminated sites. This is identified as a priority aspect of the NIP Action Plan.

The only other POPs chemical for which potential future use has been identified is DDT (Annex B), noting it is not currently used nor has been for a number of years suggesting continuing releases are minimal. As noted above, the Ministry of Health wishes to retain the option of emergency use of DDT in recognition of the endemic nature of malaria in the interior regions of the country. The country currently has an exemption for such use which it will maintain as permitted by the Convention.

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[26] CEHI (2008). *National Strategy and Management Plan for the Sound Management of Hazardous Waste for Improved Public and Environmental Health in Guyana*, Castries, St Lucia.

[27] GGMC/GENCAPD (2001). *Potaro River Orientation Survey – A Preliminary Study of Suspended Solids and Mercury in the Mahdia Mining Drainage Basin,* Georgetown, Guyana

[28] IAST (2001). *Mercury Technical Report*, Georgetown, Guyana

[29] Hays, P and Veira, R. *Mercury Contamination – A Legacy to a Handicap Generation,* WWF Guianas Regional Programme Office Technical Paper Series #2

Noting that Endosulfan became an Annex A chemical subject to specific exemptions in October 2012 under Decision SC-5/3[30], this POPs pesticide, while not having any current legal import and use, is imported illegally for unregulated use. As such it could be subject to future use pending action respecting either delisting of its current registration and application of a formal ban, or under a specific exemption requested under Article 4 of the Convention for use in the crop-pesticide complexes listed in the above referenced decision on the Convention's amendment. The NIP Action Plan (Section 3) will address this POPs through its final notification action by banning Endosulfan, a process that is currently being undertaken.

2.3.7 Programmes for monitoring releases and environmental and human health impacts

At present, Guyana does not have a coordinated national environmental monitoring system or the supporting infrastructure in place to undertake such systematic environmental monitoring generally or to do so specific to POPs chemicals. Similarly, no regular programs have been established or historical studies undertaken in relation to human health impacts associated with chemical exposure. As noted in Section 2.3.10 below, Guyana has some analytical capability that has supported ad hoc studies related to specific chemicals in environmental media, food and tissues. However as further discussed below, this is fragmented and largely oriented to specific issues and/or products, rather than supporting more broadly based environmental or health impact monitoring, although with appropriate upgrading and institutional direction it would form a reasonable basis to develop such monitoring capacity. For both environmental releases and health impacts the only relatively systematic study work of note relates to mercury as mentioned in Section 2.3.5 above.

The county is nominally a participant in the Global POPs Monitoring Programme[31] administered by UNEP through the Regional Organization Group of the Group of Latin American and Caribbean Countries (ROC-GRULAC) within the Caribbean sub-group. However to date it has not yet been an active contributor. Overall, it is noted that the first regional report for the region[32] indicated that limited monitoring data respecting ambient levels of POPs, presence of POPs in humans (mainly breast milk) and long range transport was available. Nevertheless, it can be assumed that the presence of POPs in air, water and sediment as well as human receptors at detectable levels would exist and should be monitored. The NIP Action Plan should flag more active participation in the ROC-GRULAC.

In summary, it is concluded that significant capacity and information gaps exist in relation to environmental and health impact monitoring associated with chemical releases generally and POPs in particular. These need to be addressed in the NIP Action Plan including enhancement and optimization of national analytical capacity required to support programs in this area and generally meeting national obligations in relation to Convention obligations in respect to Articles 9 and 11.

2.3.8 Status of POPs awareness and information exchange

No targeted awareness programs related to POPs had been undertaken in the country, prior to initiation of the NIP preparation work. During NIP preparation, a number of events and initiatives were undertaken to

[30] http://chm.pops.int/Convention/ConferenceoftthePartiesCOP/COPDecisions/tabid/208/Default.aspx
[31] http://chm.pops.int/Implementation/GlobalMonitoringPlan/Overview/tabid/83/Default.aspx
[32] http://chm.pops.int/Implementation/GlobalMonitoringPlan/MonitoringReports/tabid/525/Default.aspx

introduce the issue, including the inception phase consultations and use of the established communication tools employed by PTCCB for its general information activities. This included regular media information updates on chemicals issues and circulation of various information documents prepared by international organization including the Stockholm Convention Secretariat, UNEP, FAO and International POPs Elimination Network (IPEN). Once the NIP was formulated and circulated for broad stakeholder review, written summaries of the results were prepared and widely disseminated. In addition consultations with specific stakeholders with key roles in NIP implementation were held, notable with holders of PCBs and the agro-chemical sector. Notwithstanding the above activities, it is recognized that developing and maintaining public awareness generally requires continuing efforts. To this end, it is planned to maintain an ongoing public awareness program on POPs as part of the NIP Action Plan including progress reporting on implementation of the NIP Action Plan.

In terms of international information exchange, Guyana has responded to information requests respecting POPs and pesticide issues from various international organizations. In particular inventory data related to obsolete pesticides has been provided as available to FAO for purposes of developing a regional inventory of obsolete pesticides. The country has not undertaken any reporting to date under Article 15 of the Convention and this is identified as a priority activity upon endorsement and submission of the NIP along with and ensuring that regular reporting is maintained thereafter.

2.3.9 Activities of non-governmental stakeholders

The scope of activities related to the POPs issue by non-government stakeholders in Guyana has been limited largely to the role played by major enterprises and business sectors as historical and in some cases current users of POPs and holders of stockpiles and wastes. This is described in the above sections. To date there has been limited attention paid to the issue by other non-government stakeholders, particularly civil society organizations, although a number have been identified and were involved in preparation of the National Chemicals Profile referenced above. The current initiatives developed as part of the NIP are targeting extension of this involvement specifically to the POPs issue. However, during development of the NIP non-governmental stakeholders were involved such as the Input Suppliers, Cane and Rice Farmers Group, Cash Crop Groups, Scrap Metal Dealers, Pesticide Vendors and Distributors, Industrial Manufacturers such as paint companies etc. Stakeholder involvement is a major aim in keeping with Guyana's goal of achieving chemicals management in a lifecycle approach and reaching the objectives of the Stockholm Convention.

2.3.10 Available technical capacity for POPs assessment, analysis, monitoring, management and research and development

a) POPs Assessment, Analysis and Monitoring Capacity

In general, technical capability for POPs assessment, analysis, and monitoring capacity is historically limited. Institutionally, the current NIP preparation work is the first actual POPs related assessment work undertaken in the country. This work demonstrates that the basic capacity in PTCCB to undertake such work is good, as is the availability of technical expertise in the national environmental consulting community. However, capacity limitations can be identified areas such as site and risk assessment associated with POPs, something that should be addressed in the NIP Action Plan and future capacity strengthening initiatives.

As discussed in Section 2.3.7 above, no systematic environmental and health monitoring programs generally or any specific to POPs exist but there is a selection of basic analytical capacity in a number of national laboratories that have potential to support such programs with appropriate upgrading, sustaining financing and institutional coordination. A profile of this capability is provided in Annex 3. This indicates a number of significant capacity gaps exist in terms of POPs analytical capability. The most immediate relates to the ability to do multi-media PCB analysis, something that could be addressed by relatively straight forward modification and upgrading of existing equipment and staff training, along with required methods development support. This will be important in the near term to establish a monitoring baseline as well as support the PCB Phase Out Plan and addressing PCB contaminated sites, both of which should be priority elements of the NIP Action Plan. Similarly, other POPs chemical specific analytical capability covering those historically used in the country, particularly DDT and potentially Lindane and Enfrosulfan. Ideally PCDD/F analytical capacity would be useful but this is unlikely to be justified for Guyana alone, and Guyana would appropriately participate in development of regional capability in this area. More broadly, there is a need to better coordinate laboratory capacity across regulatory and institutional responsibilities as well establish a sustainable mechanism to support their operation. Likewise, at least one internationally certified laboratory should exist in the country to support POPs and chemicals related analysis and monitoring.

b) Waste Management Capacity

In terms of physical POPs management capacity, specifically waste management and dangerous good handling facilities and services, the Guyana has only been addressing waste management issues relatively recently. Historically, solid waste management (SWM) has been generally unorganized generally outside of Georgetown with wide use of burn barrels and general open burning as well as random dumping of all types of waste. Local authorities in the form of municipalities and Neighbourhood Democratic Councils (NDCs) typically do not have the resources to employ sound management practices, although some local districts have more recently established designated dump sites. In Georgetown which accounts for at least half of the national waste generation, both incineration facilities and a municipal dump site have operated historically, but in recent years both types of facilities have been closed, with a new engineered landfill opened in 2011 at Haags Bosch to service the general area and currently with 10 years developed capacity. It is privately operated under the supervision of the municipal implementation agency for Georgetown Solid Waste Management Programme which is supported by Inter-American Development Bank (IDB) funding that is also supporting other infrastructure upgrading, site rehabilitation, institutional development and public awareness in the country.

As part of the Haags Bosch landfill, a designated cell is being added specifically for what is designed as hazardous waste. This cell once completed is being designed to with the following features:

- *Cell capacity:* The landfill volumetric capacity required for management of hazardous waste from the service area for 25 years has been set at approximately 27,000 t or approx. 55,000 m3 – 77,000 m3. The estimated variability in waste density used is (350-500 kg/m3).
- *Waste acceptance:* Organic or inorganic solids and sludge will be accepted with sludge requiring placement in the landfill. Liquids are not acceptable in the landfill.
- *Bottom Liner Design:* Designed from the down with the following components: i) Primary leachate collection layer at least 300 mm thick, of a free draining medium with coefficient of permeability of at least 10^{-3} cm/sec; ii) Primary composite liner comprising a HDPE membrane at least 2.0 mm thick laid over a compacted clay layer at least 750 mm thick having a coefficient of permeability no greater than 10^{-7} cm/sec iii) Secondary leachate collection layer (a leak detection layer) at least 300 mm thick, of a free draining medium with coefficient of permeability of at least 10^{-3} cm/sec; iv) secondary composite liner comprising a HDPE membrane at least 2.0 mm thick laid over compacted native clayey soil.

This facility may offer some POPs management capability, specifically for lower concentration PCB contaminated soil and debris generated during the cleanup of PCB related contaminated sites discussed in Section 2.3.5 above. However this needs to subject to the establishment of appropriate detailed standards on specifically what regulated hazardous waste is allowed in this facility, appropriate requirements for pre-treatment, and having national capability to undertake waste analysis and monitor the facility, particularly in terms of leachate generation. Evaluation of this option is identified as a NIP Action Plan activity.

The other current development related to waste management capacity that potentially relates to POPs realises is recent installation of modern medical waste treatment/disposal capability. Traditionally, medical waste was subject to land disposal and destruction in a number of sub-standard and relatively crude incineration facilities. These practices are being discontinued at least for the majority of this type of waste with the construction and commissioning in early 2012 of a modern facility employing hydroclave [33] technology located at the Georgetown Public Hospital Corporation (GPHC). The process involves the shredding and steam sterilization of waste to destroy microorganisms. It can handle all direct healthcare waste including plastics, sharps, dressings, blood and blood products, laboratory cultures, live vaccines, human or animal cells cultures used in research, small pathological materials, and specimen containers. It has a nominal capacity of 2.4 t/day. It currently serves the most populous regions of the country but could ultimately handle all national requirements subject to commercial and institutional arrangements. To this end, the GPHC has acquired the appropriate truck to collect and transport the medical waste. While not contributing to POPs management capability directly, the availability of this facility removes a significant potential source of POPs (PCDD/F) and mercury release.

With respect to generally hazardous waste management capability to collect, package, handle, transport, and store POPs wastes, there is currently no dedicated commercial service provider capability in the country. Major fuel and chemical distributors, as well major industrial enterprises such as BODAI and GPL would posses some of the basic required capability to varying degrees. There are several contractors capable of handling some types of hazardous wastes. This includes asbestos removal from buildings and waste oil collection. One company, Franklin-Singh Disposal Service, was in the business of cleaning up and treating hydrocarbon

[33] http://www.hydroclave.com/

contaminated areas by bioremediation and land farming. Some manufacturers/distributors and more recently waste dealers have initiated programs to accept used/depleted components such as batteries, empty and obsolete containers. However, generally this capacity is ad hoc in nature and not permitted in any systematic way except as provided for through PTCCB's regulatory oversight of chemicals handling. The development of this capability along with supporting regulatory standards and emergency response capability is identified as a capacity gap relative addressing the management of POPs stockpiles and waste. As such it is identified in the NIP Action Plan.

c) Human Resource/Research and Development Capacity

The overall assessment of the technical and institutional capacity in the country is that there is a reasonable core pool of professionals available to support the implementation of the Convention. These are primarily located in PTCCB (8 staff), the recently formed Hazardous Waste Unit within EPA (3 staff), laboratories (see Annex 3) and various enterprises and environmental consultants. However, the relevant disciplines are generally exposed to high turnover, particularly in the public sector, due to emigration. The primary source of such professionals is the undergraduate programs at the University of Guyana mainly in chemistry, engineering and other physical sciences. No graduate programs are available in these areas.

Presently there are no specific research and development activities related to POPs being undertaken in the country. The University of Guyana has some potential capability to do research and development but this has traditionally been constrained by funding. However, it is currently involved in a restructuring program supported by the World Bank which aims at furthering the country's Low Carbon Development Strategy (LCDS) and includes a component to re-orient its research and development activities to be more relevant and beneficial to Guyana. This includes rehabilitation of the science laboratories, the provision of equipment for scientific research, and development of research protocols. Similarly, IAST could offer some research and development capacity and partnering with North American Universities to enhance this capacity, specifically in areas such as bio prospecting, renewable energy and utilizing of indigenous materials for construction.

2.3.11 Identification of social and environmental impacts

Social and environmental impacts associated with the POPs issue and the various actions appropriate to addressing it are generally considered to be typical of this found in most small developing countries that do not produce POPs but which currently or have historically relied on POPs chemicals.

In the case of Guyana, the historical social and environmental impacts of POPs use and release would be associated with some accumulation of POPs in the environment and likely in the food chain as well as human tissues and breast milk, although no concrete data is available to validate this. Such impacts might potentially have been most serious in socially disadvantaged segments of the population such as those at lower income levels, in rural areas, and specifically women and children. Balancing this historically, would have been the positive impact of using DDT on public health through malaria prevention, noting that other means of doing this have been generally effective over at least the last decade and the impact of eliminating this POPs chemical has already been substantively mitigated. While the current POPs releases are relatively small, the same kinds of

impacts would continue, the most significant being continued PCB releases and the unintentional release of PCDD/F primarily from open burning (waste and biomass) and power generation.

There will be some social impacts associated with addressing the POPs issue, the major one being the additional public costs associated with addressing current POPs stockpiles and wastes as well as U-POPs release. In a country where public resources are scarce, use of funds in any specific area potentially reduces financial capacity in another, often one of social importance. Having said this, the country has in fact prioritized addressing issues such as waste management in recognition that there is generally a positive cost benefit in terms of things like health costs from doing so, something that the reductions of associated POPs releases serves to reinforce.

A recommendation for inclusion in the NIP Action Plan is undertaking in-depth socio-economic assessments associated with various NIP action activities, consistent with international guidance.

2.3.12 Assessment and listing of new chemicals

The measures in place under the Pesticide and Toxic Chemicals Control Act and its regulations relative to assessment and listing of new chemical are described above in Section 2.3.1 and 2.2.4. All new chemicals not previously registered are assessed and classified upon a mandatory application prior to import permission being granted. While no actual production of chemicals occurs in the country, should that be undertaken, including formulations of pesticides with imported components, the same procedure would apply to the components upon application for import and the final formulation prior to permission to put on the market.

2.3.13 Assessment and regulation of chemicals already in the market

As above, the measures in place under the Pesticide and Toxic Chemicals Control Act and its regulations relative to assessment and regulation of chemicals already in the market are described above in Section 2.3.1 and 2.2.4. This includes licensing of importers, distributors as well as applicators of pesticides. It also allows for the monitoring and requirement of secure storage of obsolete pesticides.

2.4 Gap Analysis Summary for Convention Implementation

The following summarizes the results of the above assessment of the POPs issue linked to the requirements of the Convention Articles in terms of current compliance gaps and the significance that this may have in terms of implementation activities required. This will form the basis for the NIP Action Plan developed in Section 3 below.

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
Article 1 Objective	• While national environmental	• Need to strength demonstration of

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
	policies and strategies are consistent with the Convention's objective to protect human health and the environment, an explicit policy statement to this effect as well as acknowledgement of the "precautionary principle" is lacking.	national commitment to the Convention through an explicit policy statement on it and sound chemical management generally
Article 3.1	• Statutory provisions for elimination from production, and use subject to permitted use specific exemptions applicable to most POPs chemicals added to Annex A under the 2009 and 2011 Convention Amendments are not in place. • Statutory provisions for elimination of import and export applicable to most POPs chemicals added to Annex A under the 2009 and 2011 Convention Amendments are not in place. • Statutory provisions for the elimination from production, import, export and use or restriction to permitted and registered use of Annex B chemicals are not in place.	• Basic requirements to maintain Convention compliance require explicit coverage of all POPs chemicals, particularly in respect to recently added POPs chemicals. • Need to clarify the status of endosulfan either as permitted for import and use under a specific exemption or banned for import and use. • Strengthen the scope, legal basis, and capacity for actions related to control of illegal imports of banned or restricted chemicals including POPs chemicals.
Article 3.2	• Statutory allowance of export of Annex A and B POPs chemicals for purposes of environmentally sound disposal (as provided for under Article 6) is not provided for. • No explicit provisions apply in regulations respecting the banning of import and export products containing Annex A and B POPs chemicals.	• Required to facilitate environmental sound disposal of POPs stockpiles and waste in the absence of suitable facilities in Guyana. • Reinforces need for facilitating regulations for Basel Convention compliance. • Required to practically address potential imports of recently added POPs particularly flame retardants and small PCB containing electrical components. • Need to remove risk of illegal export of PCB contaminated equipment for scrap and likely violation of Basel and Stockholm Convention obligations.
Annex A Part II (PCBs)	• Absence of specific policies and regulations directed to the mandatory identification (registration), labeling, and status reporting of PCB containing	• Need for a nationally adopted PCB Phase Out Plan and its implementation. • Need for specified allowable limits of PCB content/contamination that

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
	electrical equipment in use in accordance with Annex A Part II. • Absence of defining the PCB phase out requirement consistent with the guidance and elimination dates applied Annex A Part II	define PCB containing equipment in use. • Implementation of procedures for comprehensive screening transformers in the utility system.
Annex B Part II (DDT)	• Elimination from production and use or restriction to permitted and registered use of DDT not provided for. • If potential allowance of import and use is to be maintained, the following actions are outstanding: o Inclusion of an action plan covering use and eventual elimination as part of the NIP. o Tri-annual reporting on DDT use	• Need to establish and document policy on continued allowance of DDT use to ensure national compliance with the Convention and protection of public health. • Priority issue to be addressed in the NIP
Article 4- Register of Specific Exemptions	• Potential requirement to register import and use of Endosulfan will apply if continued use required	• Issue being addressed by electing to ban endosulfan (in process)
Article 5 – Measures to reduce or eliminate releases from unintentional production	• A specific Action Plan for addressing U-POPs has not been prepared. • No U-POPs release limit values or source performance standards have been established. • Absence of BAT/BEP requirement in relation to source permitting	• Inclusion of U-POPs release reduction within the NIP action plan and follow up implementation activities. • Need for coverage of U-POPs and inclusion of specified release limits in Environmental Protection Regulations (hazardous waste, air, water). • Strengthened permitting and monitoring requirements applied to major sources including BAT/BEP provisions. • Importance in the context of promotion of improved solid waste management and biomas burning practices. • Importance of improved maintenance practices associated with in-service electrical equipment to prevent PCB releases
Article 6 – Measures to reduce or eliminate releases from stockpiles and wastes	• Comprehensive identification of POPs stockpiles (chemicals and products containing POPs). • Environmentally sound management of stockpiles and wastes particularly in respect to ensuring release	• Need for expanded assessment of discarded electrical equipment stockpiles for PCB contamination. • Consolidation and secure storage of present stockpiles of PCB containing/contaminated

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
	prevention during handling and storage. • Provision for environmentally sound disposal of POPs stockpiles and wastes • Elimination of uncontrolled recovery and export of scrap metal from waste potentially contaminated with POPs. • Unidentified and unsecured POPs contaminated sites.	equipment. • Consolidation into secure storage of obsolete pesticide (including POPs pesticides). • Development of ongoing mechanisms, capability and/or infrastructure to identify, capture, handle, store and ultimately dispose of POPs stockpiles and waste. • Review of hazardous waste regulations to ensure coverage of POPs waste inclusive of specified limits on POPs levels. • Need for action/cleanup standards and action plans applicable to identification, containment and ultimately remediation of POPs contaminated sites, particularly PCB sites. • Immediate action to prevent the sale and potential export of PCB contaminated waste electrical equipment.
Article 7 – Implementation plans	• Submission of the NIP exceeds the two years required from date of Convention • Need to make provision for monitoring and evaluation of the NIP implementation and for updating it consistent with Decision SC2/7	• Expeditious submission of the NIP. • Inclusion of all current amendments to ensure compliance with updating and review requirements. • Need to establish provisions monitor and evaluate NIP implementation progress and regularly update it.
Article 9 – Information exchange	• Ensure information exchange related to reduction and elimination, alternatives including risks and costs. • Designate a focal point for information exchange.	• Expanded information activities as part of NIP implementation. • Review public disclosure practices with respect to chemicals confidentiality during registration to ensure disclosure of health and safety information.
Article 10 – Public information, awareness and education	• Current limited public information, awareness and education efforts related to POPs. • Absence of POPs related training and educational programs.	• Investigate the development a national PRTR system • Expand current PTCCB and EPA public information programs related to chemicals and waste management to encompass POPs. • Inclusion of POPs related materials in higher education programs • Targeted training programs on the

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
		identification and management of POPs chemicals, stockpiles and wastes.
Article 11 – Research, development and monitoring	• Absence of active R&D related to POPs and its impacts. • Absence of POPs related monitoring of environmental or health impacts. • Capacity deficits related to analysis and monitoring of POPs • Passive participation in the Global POPs Monitoring Programme	• Consideration of target R&D capability in national institutions • Initiate development of national environmental and health impact monitoring programs, inclusive of POPs chemicals. • Optimization and upgrading of national laboratory capacity for POPs analysis, particularly PCBs and POPs pesticides. • Participation regional initiatives to develop specialized POPs analysis capability, particularly PCDD/F • Proactive participation in the Global POPs Monitoring Programme.
Article 12 – Technical assistance	• To date technical assistance limited to NIP preparation support and development of waste management regulations and capacity	• Need to pursue additional international technical assistance targeted on POPs and Convention implementation.
Article 13 – Financial resources and mechanisms	• Currently, limited state and private sector resources directed to the POPs issue. • No operational economic instruments or extended producer responsibility mechanisms in place to support targeted POPs related initiatives. • No current initiatives to attract international assistance.	• Opportunity to investigate implementation of an extended producer responsibility mechanism to support the long term management of obsolete pesticides. • Need to initiate development of a proposal for GEF funding of NIP implementation. • Potential opportunities to pursue bilateral support for elements of NIP implementation.
Article 15 – Reporting	• No official reporting as required under the Convention undertaken and country is nominally in non-compliance with second reporting date set at COP-5 as 31 July 2011. • Third reporting deadline is 31 August 2014	• Immediate need to complete baseline reporting of POPs chemicals use, stockpiles, waste and releases based on NIP inventories. • Establish the administrative capacity and procedures for future regular reporting consistent with Decisions SC-1/22. SC-4/30 and SC-5/18 on a regular basis.
Article 16 Effectiveness Evaluation	• No formal monitoring and evaluation related to Convention implementation yet in place/ • Limited consultation regionally on	• Development of a formal M&E process needs to be included in the NIP implementation strategy and action plan.

Convention Reference	Identified Compliance and Convention Implementation Gap	Specific National Significance
	Convention implementation as advocated in Article 6	• Fostering of regional effectiveness evaluation important in addressing illegal trade issues with neighboring countries.

3. Strategy and action plan elements of the national implementation plan

3.1 Policy statement

The GoG's policy with respect to the implementation of the Stockholm Convention and more generally to sound chemicals management is addressed in the Executive Summary and formal endorsement letter applicable to this NIP as issued by ***the Minister of Agriculture acting on behalf of the Government of Guyana***. This policy statement highlights the following aspects that reflect both the counties commitment to addressing the POPs issue and, more generally to sound chemicals management on an ongoing basis:

- Reaffirmation of the county's commitment to meeting the objectives of the Stockholm Convention; namely "to protect human health and the environment from persistent organic pollutants" as is implicit in its status as a Party to the Convention.
- Linkage of the NIP to the current National Development Strategy (NDS)
- Adoption of a "precautionary approach" with respect to efforts made toward meeting this objective.
- Integration of the country's efforts to address POPs within its broader efforts ensuring sound chemical management under the framework of the International Conference on Chemicals Management and implementation of the Strategic Approach to Integrated Chemicals Management.
- Recognition of the interconnections and need for coordination between the Stockholm Convention and its implementation with obligations and implementation activities associated with the Rotterdam and Basel Conventions as well as the anticipated convention of mercury.
- Pursuit of an NIP implementation strategy based on ensuring cooperative inter-agency efforts under the coordination of PTCCB, a high level of stakeholder involvement, and open and transparent public consultation and disclosure,
- Prioritization of critical areas identified in the NIP including: i) ensuring legislation and regulation covers all POPs and products containing them; ii) addressing registration and reporting of exemptions as required; iii) addressing continued presence of PCBs in the national electrical system; iv) environmentally sound disposal of current POPs/obsolete pesticide stockpiles and wastes, and ensuring capacity to do so in the future; v) identification, containment and elimination of POPs contaminated sites; vi) addressing priority sources of unintentional POPs releases, specifically those associated with combustion of waste and biomass, and vii) development of human resource capacity and technical capabilities in the country through educational programs, training and targeted research and development.

3.2 Implementation strategy

The overall implementation strategy to be adopted for the NIP will be based on a model of inter-agency cooperation with particular emphasis on PTCCB and EPA as the key implementation agencies, with PTCCB acting in an overall coordinating role. Overall supervision will be provided by an Inter-Agency Committee

involving the key institutional stakeholders, namely Ministry of Agriculture (MoA), Ministry of National Resources and Environment (MNRE), Ministry of Health (MoH), Ministry of the Local Government and Regional Development (MLGRD), Guyana Energy Authority (GEA), Customs Authority, as well as key external stakeholders, representatives of the chemicals import/distribution sector, power utilities (GPL), and University of Guyana (UG).

The NIP itself would be formalized as a national plan within the framework of the current National Development Strategy (NDS) for Guyana, with a requirement for updating every 5 years or sooner as might be required when Convention amendments come into effect as required under Article 7 of the Convention. On that basis the NIP Action Plan detailed below is divided into two time blocks (2013-2017) and 2018-2028 with the latter assuming that updating would occur at least twice during that period. The approach that is adopted focuses the 2013-2017 period with specification of detailed activities, tasks, outcomes, outputs with a formal monitoring and evaluation process undertaken at the mid-point and end of the period. Latter periods are simply described at a more general level recognized that the elaborated detail would be developed at the update stage in 2017.

At a practical technical and institutional level the NIP implementation strategy would be focused on addressing the priorities and gaps identified and documented in Section 2 above and summarized in Section 2.4 In broad terms these cover those identified in Section 3.1 above, namely: i) ensuring legislation and regulation covers all POPs and products containing them; ii) addressing potential registration and reporting of exemptions; iii) addressing continued presence of PCBs in the national electrical system; iv) environmentally sound disposal of current POPs/obsolete pesticide stockpiles and wastes and ensuring capacity to do so in the future; v) identification, containment and elimination of POPs contaminated sites; vi) addressing priority sources of unintentional POPs releases, specifically those associated with combustion of waste and biomass.; and vii) development of human resource capacity and technical capabilities in the country through educational programs, training and targeted research and development.

In pursuing this approach it, full recognition will be given to the fact that Guyana is a relatively small developing country with limited resources available generally to address both national and global environmental issues. In respect to the latter, the protection of biodiversity while allowing sustainable resource development, and managing the country's high vulnerability to climate change and consequential sea level rise will remain overall national priorities. However, it is also recognized that management of the POPs issue and more broadly ensuring sound management of chemicals are linked to both these issues and will require attention. Similarly it is also recognized that within the overall scope of chemicals related issues of global significance, the management of mercury and legacies associated with it likely represent the highest priority. This underlines the importance of maximizing synergies and coordinating action plans related to chemicals issues and chemicals related international obligations. In light of this the GoG will devote what resources it is able to the implementation of the Stockholm Convention NIP per say, particularly noting it has the both basic capacity and commitment to undertake the activities and tasks required. However, a key part of the implementation strategy will involve solicitation of international assistance from both bi-lateral and multi-lateral sources. This is further elaborated in Section 3.4 below.

3.3 NIP Action Plan

This section presents the Action Plan for compliance and implementation of the Stockholm Convention by Guyana, The Action Plan for the 2013-2017 period is as laid out in Table 3.1 below. It is structured into fourteen (14) principal activities as summarized in the following sub-sections, each with one or more tasks defined along with anticipated outcomes and outputs. These generally follow the Convention text and correlate with specific Articles. In each case rough timing is assigned to each task along with national lead and participatory responsibilities, and indicative baseline and incremental cost estimates and anticipated sources of funding. In general the Action Plan has been structured based on the guidance provided in various Convention sanctioned documents[34], including the guideline for NIP preparation (UNEP/POPS/COP.2/INF/7) and the guidance provided for estimating NIP Action plan indicative costs (UNEP/POPS/COP.4/INF/11). However, modifications to the structure have been made to best suit the national context and the scale of the POPs issue as documented in Section 2 above.

3.3.1 Activity 1: General institutional regulatory and technical capacity strengthening measures:

This activity has the overall objective of addressing overarching institutional, regulatory and technical capacity gaps and issues that need to be addressed for the efficient and effective implementation of the NIP and the Convention generally. This includes the establishment of a formal Chemicals Convention Inter-Agency Coordinating Committee (ICC) covering all major institutional stakeholders. Its first priority would be Stockholm Convention Implementation but would serve a similar role in relation to the other two current Conventions that Guyana is party to as well as its participation in the International Conference on Chemicals Management and the pending Convention on Mercury. It also addresses the need for strengthened Convention focal point capacity given the current and on-going need for Convention related administrative and compliance. General legislative and regulatory measures are addressed including expanded coverage of the Pesticide and Toxic Chemicals Control Regulation, and the urgent priority to put pending regulations related to hazardous waste import and export to make compliance with the Basel Convention fully operational. It also covers enforcement training, particularly in relation to illegal import of chemicals, and technical capacity strengthening related to national analytical capability to effectively manage POPs and other chemicals.

3.3.2 Activity 2: Reduction/Elimination of releases from intentional production and use (Article 3) - Annex A POPs chemicals and products containing them, except PCBs

This activity has the objective of aligning current Convention requirements for Annex A chemicals (except PCBs) with the requirements of the Convention with respect to import and use. In practice, the current Pesticide and Toxic Chemicals Control Act and regulations effectively ban import and use of all but some the most recently added POPs chemicals and the activity essentially involves the addition of these to the lists of banned or restricted chemicals under the regulations. It would extend bans on import and use to products containing all

[34] http://chm.pops.int/Implementation/NIPs/Guidance/tabid/587/Default.aspx

Annex A POPs chemicals (except PCBs). One newly added Convention POPs pesticide, endosulfan, would require formal de-registration. Responsibility for this activity would lie with PTCCB and largely involves the process of developing and administering approvals of the required regulatory amendment. No negative social or economic impacts would be foreseen given the current absence of any demand for import and use of these chemicals or products containing them.

3.3.3 Activity 3: Reduction and elimination of releases from intentional production and use (Article 3) - PCBs and equipment containing PCBs (Annex A, part II)

PCBs contained in operational electrical equipment primarily transformers is the only identified intentional POPs use in the country and as such is the target of this high priority activity. The tasks identified under it are directed at ensuring that PCB containing equipment in service is identified, registered, labelled and monitored until it reaches the end of its service life and then can be captured for environmental sound disposal. This involves tasks establishing a regulatory basis for this, ensuring that a current comprehensive inventory of such equipment exists and all of this is formulated into an agreed PCB Phase-Out Plan. Such a plan would dictate the rate at which equipment containing PCBs was replaced or potentially decontaminated to ensure that the convention requirement to completely eliminate use by 2015 was achieved. In reality the relative modest scale of the issue in the country and the fact that most identified equipment is approaching 40 years old make this task relatively straight forward and the country could have a realistic opportunity to achieve accelerated PCB use phase out well before 2025. Responsibility for this activity would lie primarily with PTCCB on the regulatory side and with GPL as the major holder of such equipment.

3.3.4 Activity 4: Reduction and elimination of from intentional production and use (Article 3) – Annex B Chemicals and products containing them (Annex B, part II DDT, Part III – PFOS)

Guyana does not import or have current legal uses for either of the Convention listed Annex B POPs chemicals but neither is currently banned or restricted under existing regulations. Additionally, it is possible that products containing PFOS could be imported. In the case of DDT the country wishes to reserve the right to use it in emergency situations for vector control under the supervision of the Ministry of Health and has an exemption in place for this. PFOS Could still be allowed under restriction to "acceptable uses" listed in Annex B or alternatively could be banned. This activity is designed to make the necessary regulatory adjustments to existing Pesticide and Toxic Chemical Control Regulations formalize the restricted and acceptable use as permitted under the Convention. This will also entail coordination with the reporting of this chemical use as provided in Activity 5 in compliance with the Convention. Primary responsibility for this activity would lie with PTCCB in consultation with Ministry of Health and Custom's authorities as applicable.

3.3.5 Activity 5: Registration of specific exemptions and the continuing need for exemptions (Article 4)

This activity is linked to Activity 4 above and relates to the undertaking the procedural tasks associated with the reporting of DDT use if any under a specific exemption for restricted use and registration of PFOS for a specific

exemptions and acceptable uses, subject to a decision to do so. Again the responsibility for this lies with PTCCB in consultation with Ministry of Health.

3.3.6 Activity 6: Reduction of releases from unintentional production (Article 5)

Recognizing the significant potential for unintentional release of POPs chemicals, specifically PCDD/F, and the limitations of the current regulatory framework to address such releases, this activity represents another high priority within the NIP Action Plan. It covers setting internationally benchmarked emission and release limits for PCBs and PCCD/F under existing air, waste and hazardous waste environmental protection regulations, updating and maintaining the PCCD/F release inventory and implementation of regulatory and mitigation practices for major source categories now identified. With respect to the latter, open waste burning represents the major source category and the activity should have a strong linkage to the country's current and future efforts to modernize solid waste management collection and disposal. EPA with PTCCB support would lead this activity noting that significant roles will be played by those responsible for solid waste management and to some degree agricultural practices involving burning of agricultural residues.

3.3.7 Activity 7: Reduction of releases from stockpiles and wastes through identification, capture and environmentally sound management (storage, handling, transportation, treatment and disposal) (Article 6)

In parallel with Activities 1, 3, 6, and 8, this activity represents the highest level of priority in the NIP Action Plan. It is directed at addressing the principle POPs and related chemical waste legacies in the country and ensuring that the programs and infrastructure are in place to manage future chemical waste generation, including POPs wastes. In the case of obsolete pesticides the tasks set out basically optimize capability and resources to address what is an already generally well managed issue. This involves a program to collect and provide secure consolidated storage for OP that would not otherwise be afforded an adequate level of care and custody. Another task provides for their environmentally sound disposal of current stockpiles, likely through export to qualified facilities available in North America or Europe. It also supports the introduction of a self financing "Extended Producer Responsibility (EPR)" system for environmentally sensitive chemicals generally and pesticides in particular. In parallel with the above, other tasks under this activity address consolidation of PCB contaminated equipment and oil, prevention of any uncontrolled export of such materials as scrap, and developing options for their environmental sound treatment and destruction. The latter may range from use of a planned hazardous waste landfill, local decontamination, qualification of existing national combustion facilities and/or export as planned for OP stockpiles, all depending on levels of contamination involved. The primary responsibility for this activity would be shared between PTCCB and EPA with major participation from end users and commercial importers/distributors of chemicals, and in the case of PCBs, GPL and other power utilities.

3.3.8 Activity 8: Reduction if releases from contaminated sites (Annex A, B and C Chemicals) through identification, assessment, containment and remediation in an environmentally sound manner (Article 6)

This activity addresses the other major area of POPs legacies identified, namely POPs contaminated sites. One category of such sites addressed under the first task addresses due diligence assessments and monitoring of several sites potentially contaminated as a result of obsolete pesticide storage and operational application and waste management activities. The following two tasks address the potentially more significant problem associated with PCB contamination at power utility operations and support facilities including assessment and physical removal and containment of contaminated soils and associated materials. The final two tasks relate to developing national capacity related to managing contaminated sites including POPs contaminated sites. One examines development of national treatment capability, potentially bioremediation that may have broader application, particularly for hydrocarbon contaminated soils. The other focuses on training programs and higher education in areas such as site and risk assessment, analysis, site monitoring and clean up design and technology selection. Responsibility for this activity is generally shared between PTCCB and EPA with the current holders of contaminated sites having substantial roles is operationally addressing them.

3.3.9 Activity 9: Implementation Plans

This activity addresses the administrative obligations associated with Convention compliance related to updating of NIPs and undertaking Monitoring and Evaluation (M&E). Primary responsibility lies with PCTTB as the Convention focal point.

3.3.10 Activity 10: Information exchange (Article 9)

This activity addresses information and public disclosure practices mandated under the Convention. It involves ensuring disclosure of health and safety information associated with regulated chemicals and proactive national participation in international information exchange initiatives such as the Global POPs Monitoring Network. PTCCB would be the primary responsibility for this activity.

3.2.11 Activity 11: Public awareness, information and education (Article 10)

In recognition of the priority generally attached to public awareness on the POPs issue, this activity seeks to develop a comprehensive program to enhance awareness, public and stakeholder involvement in addressing it and ensuring that chemicals management including that undertaken for POPs is incorporated into education programs. The various task defined under the activity target increasing overall institutional awareness and commitment to addressing POPs and chemicals management issues, development of an ongoing broadly based external stakeholder consultation mechanism for NIP implementation, a general public information and consultation program, and targeted educational initiatives. The primarily responsibility for this activity would be assigned to the PTCCB and EPA with overall direction provided by the ICC.

3.3.12 Activity 12: Research, development and monitoring (Article 11)

The primary focus of this activity would be to support the development of national programs for ambient environmental and health impact monitoring with respect to chemicals including POPs. This recognizes the very limited current national activity in these areas and longer term importance. The activity also includes a task related to undertaking R&D supporting contaminated site remediation, again something that represents a longer term investment in addressing environmental legacies including POPs legacies. The primary responsibility for the three tasks in this activity would be distributed between EPA, Ministry of Health, Ministry of Agriculture and UG. It would be anticipated that this activity would be attractive to bilateral donors and partnerships as a source of financing.

3.3.13 Activity 13: Technical and financial assistance (Articles 12 and 13)

This activity is intended to cover tasks related to soliciting multi-lateral and bi-lateral international technical assistance for the NIP implementation activities recognizing the limitations of national resources. While elaborated further in Section 3.6 below, one task would focus on multi-lateral sources, the primary one being the GEF, but also potentially including United Nation agency programs directly (FAO, UNEP, UNDP) and linkages to loan programs from international financial institutions (IFIs) such as the Inter-American Development Bank (IDB) and the World Bank. The second task focuses on bi-lateral assistance and partnerships including traditional North American donors but also countries like China and Brazil. The lead responsibility for this activity would be PTCCB along with the Ministry of Finance (MoF) but strong participation on an opportunity specific basis from the principle institutional and non-government stakeholder beneficiaries.

3.3.14 Activity 14: Reporting (Article 15)

The final activity in the action plan covers addressing the administrative obligation of the country under the Convention for reporting and would be the responsibility of PTCCB.

The above applies to the period 2013-2018. Beyond 2018, in the ten year period 2019-2028 the NIP Action Plan would be anticipated to focus on the following general priorities and associated activities.

- Maintaining compliance with current and evolving Convention amendments and COP decisions, particularly related to new POPs that may be added.
- Completing elimination of PCBs in use and providing for their environmentally sound destruction.
- Operating a robust environmental and health impact monitoring system in relation to POPs chemicals and chemicals generally, with provision for information dissemination and exchange nationally and internationally.
- Building on the capacities and lessons learned in the 2013-2018 period to more broadly apply to sound chemicals management, particularly the anticipated high priority in Guyana associated with mercury releases.

Table 3.1: NIP Action Plan 2013-2018

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
Activity 1: General institutional regulatory and technical capacity strengthening measures								
Task 1.1: Establish Inter-agency Coordinating Committee (ICC) to supervise NIP implementation and oversee convention compliance	• Effective supervision and monitoring NIP implementation and convention compliance in place. • Policy level and major stakeholder awareness and support established. • Initiatives seeking international technical assistance and financial support for NIP implementation coordinated.	• Meeting minutes and reports. • Timely consideration of Convention/NIP related decisions. • Efficient government endorsement of Convention/NIP related decisions and actions as required.	MoA/ PTCCB	MNRE/ EPA MoH Customs MLGRD MoF GPL GEA GUYSCO UG	2013-2014	20	20	GoG
Task 1.2: Strengthen focal point support and institutional capacity for purposes of administering Convention activities and NIP implementation	• Capacity in place for: - regular Convention reporting and information exchange. - NIP implementation - performance monitoring of Convention compliance and NIP implementation established - public awareness information programs. - training program delivery	• Current and regular reports to the Convention Secretariat • Regular performance monitoring and evaluation reports • Public awareness and information program delivery • Training programs for technical capacity strengthening, regulatory enforcement and import control	PTCCB	EPA Customs Stakeholders	2013-2015	20	20	GoG GEF
Task 1.3: Expansion of Pesticide and Toxic Chemicals Control Regulations coverage for new POPs chemicals and products containing POPs chemicals	• Full coverage of all POPs chemicals and products containing them in terms of bans, import approvals and registration in place	• Revised Pesticide and Toxic Chemicals Control Regulations to cover new POPs • Explicit application of the regulations respecting bans and imports to products containing specified POPs chemicals	PTCCB	EPA Customs Stakeholders	2014-2015	40	20	GoG
Task 1.4: Finalization and adoption of hazardous waste import/export regulation	• Regulatory authority, procedures and capacity covering import, transit and export of HW in accordance with Basel Convention defined and enforced	• Environmental Protection (Export and In-Transit Import) Regulations. • Explicit coverage of PCBs and equipment/products contaminated with PCBs over 50 ppm. • Associated administrative	EPA	Customs PTCCB Waste generators Service providers	2014	20	10	GoG

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
		procedures and capacity						
Task 1.5: Updating hazardous waste regulations to include all POPs chemicals and products containing POPs and their environmentally sound management.	• Explicit coverage of stockpiles and wastes containing POPs chemicals adopted, particularly PCB containing equipment and materials. • Limits on POPs content defining hazardous waste in effect. • Standard, permitting requirements and procedures for HW storage, treatment and disposal established.	• Revised HW regulations to cover all POPs stockpiles and waste containing POPs chemicals over defined levels. • HW regulation elaboration to cover standards, permitting and procedural requirements for HW storage, treatment and disposal. • Restriction of trade in PCB contaminated equipment and materials (oil)	EPA	PTCCB Waste generators Service providers	2013-2015	20	10	GoG
Task 1.6: Initiate policy and regulatory action on contaminated sites, including POPs contaminated sites	• Regulation defining and applying conditions applicable to sites with chemical contamination in place. • National contaminated sites inventory system initiated.	• Site specific registration, assessment, monitoring requirements applicable to chemical land contamination • Action and cleanup content standards applicable to relevant chemical contamination including POPs chemicals. • Baseline national contaminated sites inventory.	EPA	PTCCB MoH MLGRD GPL GUYSCO	2014-2015	20	100	GoG GEF Bi-lateral donors
Task 1.7: Expanded training programs for PTCCB, EPA and customs enforcement staff on import/export and use controls	• Effective enforcement capacity for POPs chemicals, products containing POPs chemicals and POPs wastes respecting import and export in place	• Training programs for border controls on chemicals including POPs, particularly pesticides	PTCCB	EPA Customs	2014-2016	100	100	GoG GEF Bi-lateral donors
Task 1.8: Upgrading and optimization of laboratory and environmental monitoring capacity for POPs chemicals	• Capacities and responsibility assignments of government laboratories supporting chemicals management activities and environmental/health monitoring clarified. • Three government laboratories certified including one to international standards. • National capacity for operational analysis for PCBs and POPs pesticides of interest established. • Laboratory staff training in support of the above delivered.	• Policy on distribution of responsibility assignments between national laboratories. • Three nationally certified environmental laboratories. • One internationally certified laboratory. • PCB and relevant POPs pesticide analytical capability. • Delivery of supporting laboratory staff training programs.	ICC	PTCCB EPA/IAST MoH	2014-2016	500	250	GoG GEF Bi-lateral donors IFI loan programs

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
Activity 2: Reduction/Elimination of releases from intentional production and use (Article 3) - Annex A POPs chemicals and products containing them, except PCBs								
Task 2.1: Application of bans on import and use of all Annex A POPs chemicals and products containing them except PCBs (undertaken in associated with Activity 1 Task 3)	• Excepting PCBs, Guyana has fully banned all Annex A chemicals and products containing them from production and use	• Addition of Chlordecone, Hexabromobiphenyl, Hexabromodiphenyl/ Heptabromodiphenyl ether, Pentachlorobenzene (PeCB), Tetrabromodiphenyl/ Pentabromodiphenyl to list of banned chemicals. • De-registration of endosulfan and addition to listing of banned (or restricted) chemicals.	PTCCB	MoH Customs EPA	2013-2014	10	10	GoG
Activity 3: Reduction and elimination of releases from intentional production and use (Article 3) - PCBs and equipment containing PCBs (Annex A, part II)								
Task 3.1: Regulatory requirements for identification, registration, labeling of PCB containing electrical equipment	• Regulatory direction for mandatory identification (screening), analytical verification, labeling and status reporting of PCB containing electrical equipment enacted and implemented. • Training and awareness programs on these regulations developed and delivered.	• Regulation covering PCB containing equipment. • Training program on identification, screening and verification of electrical equipment potentially containing PCBs.	PTCCB	GEA GPL EPA	2014	-	40	GoG GPL Other utilities GEF
Task 3.2: Comprehensive inventory of PCB contamination in national utility system	• Comprehensive base line inventory of PCB contaminated electrical equipment in service prepared and disclosed. • Monitoring and status reporting on all such equipment undertaken. • Reporting/tracking linkage to inventories of PCB stockpiles/wastes and contaminated sites in place	• Confirmatory screening tests on all in-service or standby large transformers manufacturer prior to 1985 in the GPL and smaller utilities systems. • Practice of applying screening tests to distribution transformers during periodic maintenance. • Archived oil samples for individual transformers for laboratory verification analysis on all units were screened > 50 ppm • Documented baseline inventory of in-serve PCB contaminated equipment. • Annual in-service PCB inventory • Tracking reports of PCBs/PCB contaminated	PTCCB/ GPL	GEA EPA	2014	-	100	GoG GPL Bi-lateral utilities GEF

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
		equipment and site locations when removed from service.						
Task 3.3: Development of PCB Phase Out Plan	• Targeted Convention phase out compliance date established/agreed. • Comprehensive phase out plan for PCB containing electrical equipment in service developed and agreed. • Supporting regulatory measures adopted. • PCB phase Out Plan integrated with programs for electrical generation, transmission and distribution upgrading.	• Documented PCB phase out plan. • Agreements with major stakeholders documented. • Regulatory measures supporting plan implementation. • PCB phase out activities incorporation into programs for electrical generation, transmission and distribution upgrading.	PTCCB/ EPA	GPL GEA	2014-2015	-	100	GoG GPL Other utilities GEF
Task 3.4: Implementation of PCB Phase Out Plan	• PCB phase out in the electrical system completed in accordance with convention obligations.	• Annual reports on PCB Phase out Plan implementation. • Regular M&E reports	GEA/ GPL	PTCCB EPA	2015-2020	-	2,500	GoG GPL Other utilities GEF IFI loan programs
Activity 4: Reduction and elimination of from intentional production and use (Article 3) – Annex B Chemicals and products containing them (Annex B, part II DDT, Part III – PFOS)								
Task 4.1: Establish measures to restrict import and use of DTT and PFOS	• Limitation of DDT to import and use to emergency vector control upon notification formalized and documented. • Limitation of PFOS import and use, including products containing PFOS allowed by the Convention as acceptable uses and under specific exemptions in effect.	• Regulations under the pesticide and Toxic Chemicals Control Act: - Limiting import and use of DDT as permitted under the convention - Limiting import and use of PFOS as permitted under the Convention	PTCCB/ MoH	Customs Local authorities	2013-2014	10	10	GoG
Activity 5: Registration of specific exemptions and the continuing need for exemptions (Article 4)								
Task 5.1 Ensure compliance with exemption compliance requirements	• Country compliance with registration and reporting requirements applicable to DDT and PFOS in place. • Capacity to ensure continuing compliance with reporting procedures and requirements maintained.	• Registration of DTT under Convention specific exemption provisions. • Registration of PFOS under Convention specific exemption provisions and registration of declared acceptable uses. • Compliance reports to the Convention on measures taken in relation to DDT use directed to restrict use,	PTCCB	MoH Customs	2013-2014	10	10	GoG

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
		alternatives, and health impact prevention as required under Annex B Part II • Compliance reports to the Convention on progress in eliminating PFO as required under Annex B Part III						
Activity 6: Reduction of releases from unintentional production (Article 5)								
Activity 6.1: Setting internationally benchmarked limits for emission/release of principal POPs chemicals to air, water and land.	• Maximum allowable release limits for PCBs, and PCDD/F to air, water and land consistent with international practice established in enforceable regulations	• Enacted regulation defining maximum allowable release of PCDD/F to air, water and land from major source categories and targeted priority point sources. • Enacted regulation defining maximum allowable release of PCBs to air, water and land.	EPA	PTCCB UG IAST	2014-2015	20	40	GoG GEF
Activity 6.2: Updating and elaboration of NIP PCDD/F release inventory	• Current PCDD/F release inventory in accordance with current guidance adopted by the Convention completed every two years. • Detailed evaluation of priority source categories (open waste and biomass combustion) undertaken. • Support for development of regional PCDD/F analytical and monitoring capability • Arrangement to source and implement PCDD/F monitoring capability	• Updated PCCD/F release inventories published • Detailed priority source evaluations for open waste and biomass combustion. • Availability of PCDD/F monitoring capability in the region.	PTCCB/ EPA	MLGRD GPL GEA GUYSCO UG IAST	2014-2015	-	40	GoG GEF
Activity 6.3: PCDD/F release reduction	Comprehensive and environmentally appropriate solid waste management infrastructure developed. Regulatory controls applied to control the extent of open biomass burning in agriculture established. Upgraded emission controls applied to biomass to energy combustion processes.	Local waste burning practices replaced with organized collection and sanitary landfills. Regulations on open burning of agricultural residues. Investment in emission controls at combustion based power generation facilities	EPA MLGRD MoA GEA	PTCCB	2014-2018	200	1,000	GoG Local gov't. Ag, sector GEF Bi-lateral donors IFI loan programs
Activity 7: Reduction of releases from stockpiles and wastes through identification, capture and environmentally sound management (storage, handling, transportation, treatment and disposal) (Article 6)								

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
Task 7.1: Development of consolidated obsolete pesticide (OP) collection and storage program	• Program for collection of confiscated/ abandoned OP and that volunteered by small holders expanded. • Secure centralized OP storage facility based on current PTCCB facility to handle the above developed. • Commercial chemicals storage bond including Ops assessed and upgraded as required. • Training program to support the above collection and storage operations developed and delivered.	• Upgraded and expanded PTCCB storage bond available for confiscated/ abandoned OPs and that volunteered by small holders. • Commercial chemicals storage facilities upgraded and permitted. • Regular training of staff involved in handling OPs	MoA/ PTCCB	EPA GUYSUCO Rice growers Chem. Sector	2013-2015	50	150	GoG GUYSUCO Ag, sector Chem. Sector GEF FAO
Task 7.2: Development of Extended Product Stewardship (EPR) Program for pesticides and regulated chemicals	• Consultation with chemical importers, distributors and users on development of an EPR program to "take back" or fund obsolete chemicals and address chemicals related environmental legacies undertaken. • A pilot EPR program for pesticides developed and implemented.	• Consensus on and public policy direction on the principles for EPR for chemicals. • Pilot EPR program initiated for pesticides.	PTCCB	EPA Ag. Sector Chem. Sector	2014-2016	-	100	GoG GUYSUCO Ag, sector Chem. Sector GEF FAO
Task 7.3 Elimination of current OP stockpiles	• Packaging and export for environmentally sound disposal of current OP stockpiles arranged.	• At least 6 tons of OP stockpiles eliminated.	PTCCB	EPA GUYSUCO Chem. Sector	2014-2015	-	30	GUYSUCO Ag, sector Chem. Sector GEF
Task 7.4: Segregation and consolidated secure storage of PCB contaminated electrical equipment.	• Regulatory moratorium on sale/export of discarded transformers for scrap and drained transformer oil pending assessment imposed • Screening program applied to inventories discarded transformers and oil. • Secure storage facility for PCB contaminated equipment and oil established.	• Regulations restricting sale/trade/export of discarded transformers and oil pending screening for PCB contamination above or below 50 ppm. • Current inventories of discarded transformers and any associated oil screened and classified as above or below 50 ppm PCB. • Current inventories of equipment and oil over 50 ppm packaged and stored in an environmentally sound manner.	GPL Other Utilities	PTCCB EPA	2014-2015	-	250	GPL Other Utilities GEF

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
Task 7.5: Environmental Sound Management of PCB Contaminated equipment/oil	• Options for treatment (decontamination) of discarded PCB equipment determined. • Evaluation of BOSAI kiln as destruction option for PCB contaminated mineral oil assessed. • High concentration and highly contaminated equipment and oil securely packaged and exported for environmentally sound destruction.	• Local capability to decontaminate discarded distribution transformers. • Local capability to destroy moderately contaminated mineral oil and decontamination residuals. • High PCB concentration equipment and oils disposed of in qualified facilities elsewhere.	GPL Other Utilities	PTCCB/ EPA	2015-2016	-	500	GPL Other Utilities GEF
Activity 8: Reduction if releases from contaminated sites (Annex A, B and C Chemicals) through identification, assessment, containment and remediation in an environmentally sound manner (Article 6)								
Task 8.1 Site assessment and containment of potentially pesticide contaminated sites	• Evaluation of potential pesticide contamination at GUYSUCO pond and old storage bond undertaken • Monitoring programs as required for GUYUCO sites and PTCCB storage bond established. • Old GUYSUCO bond facility and site cleaned up as required upon closure.	• Technical reports on baseline soil, surface water and ground water conditions at GUYSUCO sites. • Monitoring of ground, soil and surface water at active GUSUCO and PTCCB sites	GUYSUCO/PTCCB	EPA PTCCB	2013	-	100	GUYSUCO GEF Bi-lateral donors FAO
Task 8.2: Site assessment and containment of identified PCB contaminated sites	• Further screening of potentially PCB contaminated sites undertaken, • Detailed delineation of PCB contamination on localized areas identified in NIP screening undertaken. • Options for cleanup identified and assessed	• Comprehensive identification of PCB contaminated sites. • Technical reports, risk assessments and action plans for all identified PCB contaminated sites.	GPL Other utilities	EPA PTCCB	2014-2015	-	250	GPL Other utilities GEF Bi-lateral donors
Task 8,3: Cleanup of priority POPs (PCB) contaminated sites	• Removal and secure containment of PCB contaminated soil from PCB contaminated soil provided for. • Consolidated secure/contained storage site for PCB contaminated materials established.	• Consolidated secure/monitored containment of principle volumes of PCB contaminated soil from active sites (approx. 20 tons).	GPL Other utilities	EPA PTCCB	2015-2016	-	500	GPL Other utilities GEF Bi-lateral donors IFI loan programs
Task 8.4: Development of national contaminated soil treatment/disposal capability.	• Options for treatment/disposal of PCB contaminated soil and other solid materials, including use of the Haags Bosch	• Selected option for national management of PCB contaminated soils and site other contaminated site	GPL Other utilities	EPA PTCCB	2014-2017	-	500	GPL Other utilities GEF Bi-lateral

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
	landfill, establishment of a bioremediation facility investigated. • Preferred option recommended and developed.	materials. • Pilot program for PCB contaminated soil treatment and disposal.						donors IFI loan programs
Task 8.5: National technical capacity developed for contaminated site management.	• Training programs covering site and risk assessment, supporting analysis/monitoring, clean up design/technology selection developed and delivered. • Course materials and programs for higher education related to the above developed and offered.	• Site and risk assessment, supporting analysis/monitoring, clean up design/technology selection training programs. • Introduction of these areas in high education curriculum	PTTCB/ EPA	GPL Other utilities UG Local service providers	2014-2016	-	150	GPL Other utilities GEF Bi-lateral donors
Activity 9: Implementation Plans								
Task 9.1 NIP M&E and updating	• Provision for monitoring and evaluation of the NIP implementation and for updating it, consistent with Decision SC2/7 in place.	• Regular M&E reporting on NIP implementation. • Response capacity for updates every 5 years or when as required when amendments are adopted.	**PTCCB**	EPA Other stakeholders	2013-2018	-	50	GoG
Activity 10: Information exchange (Article 9)								
Task 10.1: Implementation of active information exchange.	• Public disclosure practices with respect to chemicals confidentiality during registration to ensure disclosure of health and safety information reviewed. • Contributions to the Global POPs monitoring network initiated. • Other international information exchange initiatives supported	• Policy clarified on public disclosure of health and safety information related to chemicals. • Active participation in regional and global information exchange initiatives including the Global POPs Monitoring Network.	PTCCB/ ICC	EPA Other stakeholders	2013-2018	10	20	GoG UNEP
Activity 11: Public awareness, information and education (Article 10)								
Task 11.1: Institutional awareness and information dissemination	• Regular and proactive communication of NIP implementation status and policy issues disseminated at all levels in the national government. • Rapid and informed response by policy makers on POPs/chemicals related issues.	• Regular ICC and NIP status reports • Policy issue papers as required.	ICC/ PTCCB	Institutional stakeholders	2013-2018	10	10	GoG
Task 11.2 Non-Government stakeholder awareness,	• Advisory group of external stakeholders for purposes of	• Advisory stakeholder group formed with broad and	PTCCB/ EPA	GPL Guysuco	2013-2018	10	20	GoG GEF

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
information and consultation	regular consultation on NIP implementation established • General and technical documentation related to NIP implementation prepared and disseminated. • External stakeholder workshop program delivered • Targeted consultation and joint program development with key external stakeholders undertaken	representative external membership. • Technical and general information documents on NIP implementation. • External stakeholder workshops. • Joint program task forces addressing priority issues (PCBs, OP, contaminated sites)		Private sector stakeholders ENGOs UG				Bi-lateral donors
Task 11.3: General public awareness, information and consultation.	• General public information program on POPs and NIP implementation developed and implemented. • Range of written, electronic and media based information products prepared and released. • Public open houses arranged. • Upgrading of PTCCB and EPA web-sites to cover POPs and chemicals related issues.	• Formal public information program. • Public information on POPs and NIP implementation available in widely distributed brochures, posters and summary reports. • Regular media interface through interviews, press releases and TV/radio information programs. • Regular public open houses and information sessions.	PTCCB/ EPA	Municipal Gov't NDCs Local/Civil Society groups Media	2013-2018	10	40	GoG GEF Bi-lateral donors
Task 11.4: POPs and Chemicals education	• School curriculum material developed and distributed. • Sound chemicals management including POPs specific issues introduced into higher education curriculums	• School curriculum materials • Higher education curriculum materials	PTCCB/ EPA	MoEd School boards UG	2014-2018	-	20	GoG GEF Bi-lateral donors
Activity 12: Research, development and monitoring (Article 11)								
Task 12.1: Development of national monitoring capability for chemicals in the environment.	• Planning for national environmental monitoring system including POPs chemicals undertaken	• National environmental monitoring plan	EPA	PTCCB MoH UG	2013-2018	-	200	GoG GEF Bi-lateral donors
Task 12.2: Development of national monitoring capability for chemicals related human health impacts.	• Planning for national health impact monitoring system including POPs chemicals undertaken	• National chemicals related health impact monitoring plan	MoH	EPA PTCCB UG	2013-2018	-	200	GoG GEF Bi-lateral donors
Task 12.3: Establish basic R&D capability for chemicals contaminated site remediation technology	• Research program proposal on site remediation technology developed.	• Proposals for R&D program on assessment of contaminated site remediation technology	UG	PTTCB EPA GPL	2014-2018	-	250	GoG Bi-lateral donors
Activity 13: Technical and financial assistance (Articles 12 and 13)								

Description	Outcomes	Outputs	Responsibility		Timing (2013-2018)	Indicative Cost (US$ x1000)		Financing Source
			Lead	Participate		Base	Incr.	
Task 13.1 Development of proposals for multi-lateral technical and financial assistance.	• GEF PIF/PPG Proposal for NIP implementation support prepared and submitted. • Potential IFI financing for NIP implementation activities investigated.	• Project for NIP implementation approved in GEF pipeline. • IFI loan programs targeted	PTCCB/ MoF	EPA MoH GPL	2013-2014	-	20	GoG GEF IA IFIs
Task 13.2 Development of proposal for bilateral technical and financial assistance	• Bi-lateral agencies aware of potential funding opportunities. • Specific proposal prepared	• Bi-lateral technical assistance projects	PTCCB/ EPA	MoF MoH MoA	2014-2018	-	20	GoG GEF IA IFIs
Activity 14: Reporting (Article 15)								
Task 14.1 Reporting in accordance with Convention Decisions	• Second report (baseline report) due July/2011 prepared and submitted • Third report due August 2014 prepared and submitted. • Provisions for required futures reporting in place.	• Second (baseline) Convention report. • Third Convention report.	PTCCB	EPA	2013-2018	10	20-	GoG

3.4 Development and capacity-building proposals and priorities

The Action Plan described above designates a number of development and capacity building activities tasks. These generally fall into several categories namely: i) institutional and regulatory initiatives that update the existing regulatory framework covering chemicals management, hazardous waste management and pollutant releases, as well as capacity in administration/compliance with Convention obligations; ii) technical training and capacity strengthening activities in key areas such as regulatory enforcement, border import control, site/risk assessment, POPs and contaminated sites management practice and technology, and upgraded analytical and monitoring capability; iii) infrastructure, works and facilities modernization developments to reduce POPs releases and manage POPs legacies; and iv) consultation, information and outreach related activities intended to develop and maintain awareness and consensus on the POPs issue.

As previously stated, the priorities for NIP implementation are i) ensuring legislation and regulation covers all POPs and products containing them; ii) addressing registration of exemptions and restricted uses as required; iii) addressing continued presence of PCBs in the national electrical system; iv) environmentally sound disposal of current POPs/obsolete pesticide stockpiles and wastes, and ensuring capacity to do so in the future; v) identification, containment and elimination of POPs contaminated sites; vi) addressing priority sources of unintentional POPs releases, specifically those associated with combustion of waste and biomass, and vii) development of human resource capacity and technical capabilities in the country through educational programs, training and targeted research and development. In the near term, the focus would be on i) ensuring compliance with the Convention, addressing currently identified POPs legacies and impacts, and on institutional and human resource development to sustain compliance and effective management of POPs into the future consistent with the Convention's overall objective.

The above will form the basis for a strategy that will seek international assistance in these priority areas, principle among these will be a proposal requesting GEF funding under its chemicals focal area. The GoG through the PTCCB have initiated discussions with the GEF Secretariat on this and based on their positive response and encouragement, have initiated preparation of a Project Information Form (PIF) to be undertaken on a country implemented basis.. Similarly, the various opportunities presented by the Action Plan are being discussed with a number of other donors.

3.5 Timetable for plan implementation and measures of success

Table 3.2 provides an implementation schedule for the NIP based on the assumption of its submission in June 2013 and the availability of GEF funding in early 2014.

The detailed measures for success are identified in the specific outcomes and outputs in the Action plan in Table 3.1 which will form the basis for specific performance indicators that will be incorporated in the NIP's monitoring and evaluation activity. At a higher level the overarching measures of success will be as follows:

- Full and sustained Convention compliance in 2014 inclusive of relevant decisions and amendments made at the COP -6
- All gaps in the current regulatory framework addressed and appropriate legal and regulatory measures implemented and enforced by the end of 2015.
- Elimination of current POPs stockpiles and waste legacies by 2016.
- A national PCB phase out Plan under implementation in 2015 and elimination of all PCB containing equipment by 2020
- A national stewardship program for agricultural chemicals, involving the return and management of obsolete pesticides and containers by 2016.
- POPs contaminated sites addressed and cleaned up by 2020.
- National capacity in place providing analytical capability for POPs, principally PCBs, with cooperative arrangements with regional capacity building in this area for other POPs chemicals.
- Active participation with regional initiatives providing for cooperative solutions for the environmentally sound management of POPs stockpiles, wastes and contaminated sites.
- Active and contributory participation in the Regional POPs monitoring network starting in 2014
- A sustaining public information and awareness program covering POPs and more generally environmentally sound chemical management operational from 2014.

3.6 Resource requirements

The Action Plan presented in Table 3.1 provides indicative cost estimates for implementation of the NIP from 2013 through 2018, along with prospective funding sources. A total incremental expenditure associated with NIP implementation based on achieving and maintaining Convention compliance of US$7.65million is estimated.

It is anticipated that a substantial portion of this will involve national financing, both from the government and from the principal industrial and utility stakeholders. However, it will also require international assistance. As indicated above this is anticipated to involve country specific grant funding from the GEF which is already under discussion. However this will also likely involve funding directly from other multi-lateral organizations and international financial institutions, as well as bi-lateral donors. Discussions with prospective donors based on the NIP are planned in 2013.

Table 3.2: NIP Implementation Schedule

Action Plan Activity and Task	2013				2014				2015				2016				2017				2018			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Activity 1: General institutional regulatory and technical capacity strengthening measures																								
Task 1.1: Establish Inter-agency Coordinating Committee (ICC)																								
Task 1.2: Strengthen focal point support and institutional capacity - Convention activities and NIP implementation																								
Task 1.3: Expansion of Pesticide and Toxic Chemicals Control Regulations- new POPs chemicals and products containing POPs																								
Task 1.4: Finalization and adoption of hazardous waste import/export regulation																								
Task 1.5: Updating hazardous waste regulations- POPs chemicals and products containing POPs																								
Task 1.6: Initiate policy and regulatory action on contaminated sites, including POPs contaminated sites																								
Task 1.7: Expanded training programs for PTCCB, EPA and customs enforcement staff on import/export and use controls																								
Task 1.8: Upgrading and optimization of laboratory and environmental monitoring capacity for POPs chemicals																								
Activity 2: Reduction/Elimination of releases from intentional production and use (Article 3) - Annex A POPs chemicals and products containing them, except PCBs																								
Task 2.1: Application of bans on import and use of all Annex A POPs chemicals and products containing them except PCBs																								
Activity 3: Reduction and elimination of releases from intentional production and use (Article 3) - PCBs and equipment containing PCBs (Annex A, part II)																								
Task 3.1: Regulatory requirements for identification, registration, labeling of PCB containing electrical equipment																								
Task 3.2: Comprehensive inventory of PCB contamination in national utility system																								
Task 3.3: Development of PCB Phase Out Plan																								
Task 3.4: Implementation of PCB Phase Out Plan																								
Activity 4: Reduction and elimination of from intentional production and use (Article 3) – Annex B Chemicals and products containing them (Annex B, part II DDT, Part III – PFOS)																								
Task 4.1: Establish measures to restrict import and use of DTT and PFOS																								
Activity 5: Registration of specific exemptions and the continuing need for exemptions (Article 4)																								
Task 5.1 Ensure compliance with exemption compliance requirements																								
Activity 6: Reduction of releases from unintentional production (Article 5)																								
Activity 6.1: Setting internationally benchmarked limits for emission/release of principal POPs chemicals to air, water and land.																								

Action Plan Activity and Task	2013				2014				2015				2016				2017				2018			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Activity 6.2: Updating and elaboration of NIP PCDD/F release inventory																								
Activity 6.3: PCDD/F release reduction																								
Activity 7: Reduction of releases from stockpiles and wastes through identification, capture and environmentally sound management (storage, handling, transportation, treatment and disposal) (Article 6)																								
Task 7.1: Development of consolidated obsolete pesticide (OP) collection and storage program																								
Task 7.2: Development of Extended Product Stewardship (EPR) Program for pesticides and regulated chemicals																								
Task 7.3 Elimination of current OP stockpiles																								
Task 7.4: Segregation and consolidated secure storage of PCB contaminated electrical equipment.																								
Task 7.5: Environmental Sound Management of PCB Contaminated equipment/oil																								
Activity 8: Reduction if releases from contaminated sites (Annex A, B and C Chemicals) through identification, assessment, containment and remediation in an environmentally sound manner (Article 6)																								
Task 8.1 Site assessment and containment of potentially pesticide contaminated sites																								
Task 8.2: Site assessment and containment of identified PCB contaminated sites																								
Task 8.3: Cleanup of priority POPs (PCB) contaminated sites																								
Task 8.4: Development of national contaminated soil treatment/disposal capability.																								
Task 8.5: National technical capacity developed for contaminated site management.																								
Activity 9: Implementation Plans																								
Task 9.1 NIP M&E and updating																								
Activity 10: Information exchange (Article 9)																								
Task 10.1: Implementation of active information exchange.																								
Activity 11: Public awareness, information and education (Article 10)																								
Task 11.1: Institutional awareness and information dissemination																								
Task 11.2 Non-Government stakeholder awareness, information and consultation																								
Task 11.3: General public awareness, information and consultation.																								
Task 11.4: POPs and Chemicals education																								

Action Plan Activity and Task	2013				2014				2015				2016				2017				2018			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Activity 12: Research, development and monitoring (Article 11)																								
Task 12.1: Development of national monitoring capability for chemicals in the environment.							→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Task 12.2: Development of national monitoring capability for chemicals related human health impacts.							→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Task 12.3: Establish basic R&D capability for chemicals contaminated site remediation technology											→	→	→	→	→	→	→	→	→	→	→	→	→	→
Activity 13: Technical and financial assistance (Articles 12 and 13)																								
Task 13.1 Development of proposals for multi-lateral technical and financial assistance.		→	→																					
Task 13.2 Development of proposal for bilateral technical and financial assistance				–	–	–	–	–	–	–	–	–	–	–	→									
Activity 14: Reporting (Article 15)																								
Task 14.1 Reporting in accordance with Convention Decisions			→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

Annexes

Annex 1: Details of PCDD/PCDF Estimates

Source Category/ Sub-Category	Source	Production	Emission Factors (µg TEQ/t)					Annual Emission Estimate (g TEQ/year)				
			Air	Water	Land	Residue	Product	Air	Water	Land	Residue	Product
Category 1. Waste Incineration (t/year)												
Incineration of Medical Waste	De Mon fort Incinerators (8)	26	3,000			20		0.079			0.001	
	Pennram Diversified Incinerator	10	1			150		-			0.001	
Total		36	Total					0.079			0.002	
Category 2. Ferrous & Non-Ferrous Metal Production (t/year)												
Thermal recovery of cables	(4) Scrap Metal holding yards	7	5000			0		0.035			0	
Aluminum production	(4) Secondary production of Aluminum utensils	35	150			200		0.005			0.007	
Aluminum production	Re-smelting of Aluminum scraps	60	35			400		0.002			0.024	
Zinc production	Re-smelting of Zinc scrap	120	100			0		0.012			0	
Total		222	Total					0.054			0.031	
Category 3. Power and Heat Generation (TJ/year)												
Fossil fuel power stations (HFO)	GPL Power Plants	3,428	2.5			-		0.009			-	
Fossil fuel power stations (LFO)	GPL Power Plants	1,036	0.5			-		0.001			-	
Biomass energy IND (Clean wood)	GUYSUCO	3,951	50			15		0.198			0.059	
Biomass energy IND (Mixed biomass)	GUYSUCO	478	500			-		0.239			0.1	
Combustion of Biogas	DDL, Agriculture farm		8									
Household cooking with (biomass)	Household Population Census	11,103	1500			µg TEQ/t Ash 1000		1.110			0	
Household cooking with virgin wood (Coal)	Household Population Census	18,085	100			µg TEQ/t Ash 10		1.809			0	
Total		38,080	Total					3.366			0.159	
Category 4. Production of mineral products (t/year)												

Source Category/ Sub-Category	Source	Production	Emission Factors (µg TEQ/t)					Annual Emission Estimate (g TEQ/year)				
			Air	Water	Land	Residue	Product	Air	Water	Land	Residue	Product
Production of bricks	Rupuniuni brick makers	160	0.2									
Production of Asphalt	Asphalt plant	38,400	0.01		0	0.06					0.2	
Total		38,560	Total								0.2	
Category 5. Transportation (t/year)												
4 stroke engines	Gasoline engines	18,977	0.1	-				0.002				
Diesel engines	16% Total imports	34,468	0.1	-				0.003				
Total		53,445	Total					0.005				
Category 6 – Open Air Combustion Processes (t/year except as noted)												
Burning of biomass	Post harvested paddy husk	131,109	30		10	-		3.933		1.311		
	Pre harvested sugar cane	517,988	0.5		10	-		0.258		5.180		
Burning of waste and accidental fires	Uncontrolled domestic waste burning	116,800	300		600	600		35.040		70.080		
	# of Vehicle fires (17)	(17)	94		18	18		0.002		-		
	# of Building Fires (198)	(198)	400		400	400		0.079		0.079		
Total		766,112	Total					39.312		76.650		
Category 7. Production and Uses of Chemical Substances and Consumer Goods (t/year)												
Production of pulp & paper	Recycling of cardboard from cont. waste	2,513					10					0.025
Total		2,513	Total									0.025
Category 8. Miscellaneous (t/year except as noted)												
Drying of green forage	Paddy	561,955	0.01		-		0.2	0.056				0.056
Crematorium	16 sites	890	90		-			0.080				
Tobacco	Cigarettes	65.6 million units	0.1			20		0				-
Smoke houses	3 entities	7.36	6		-			0				0
Total (t)		562,852	Total					0.136				0.056
Category 9. Final disposal solid wastes/sanitation landfill (t/year)												
Sewage untreated	Mixed domestic and industrial inputs	288	-	0.005		1,000						
Composting	Agriculture Farm	0		-	-		5	0	0	0	9	9
Total		288	Total									
Category 10: Hotspots												
PCB contaminated equipment l	PCB containing electrical components and soil	No data										
Dumps of Waste/Residue from Categories 1-9	Covered above	n/a										
Dredging of Sediments	Drain dredging	No data										
Overall Emission Estimates – 119.817 g TEQ/year								49.951	0.000	76.650	0.135	0.081

Annex 2 Obsolete Pesticide Inventory Form

GUYANA STOCKHOLM CONVENTION NATIONAL IMPLEMENTATION PLAN

OBSOLETE PESTICIDES INVENTORY FORM

SITE AND WAREHOUSE INFORMATION

1. Site name_____ 2. Stability of site _____

3. Type of business _____ 4. Warehouse name _____

5. Site address _____ 6. GPS _____

7. Contact person at site _____ 8. Owner of site_____

9. Person responsible for storage and custody/contact number _____

OBSERVATIONS AND QUANTITY

10. Storage bond description (if applicable)_____

11. Physical form of product ☐ Granules ☐ Liquid ☐ Powder ☐ Sludge

12. Container type ☐ Drum ☐ Bag ☐ Bottle ☐ Jerry can ☐ Woven sack ☐ Other _____

13. Container material ☐ Aluminum ☐ Plastic ☐ Glass ☐ Steel ☐ Jute ☐ Other _____

14. Condition of container ☐ Destroyed & contents dispersed ☐ Leakage ☐ Some damaged but no leakage ☐ Intact

15. Container size _____ ☐ kg ☐ L ☐ Other_____ 16. Amount contained _____

PESTICIDE INFORMATION

17. Active Ingredient (if known) _____ 18. Brand name_____

19. Class of pesticide_____ 20. Age of material_____

PICTURES

21. Picture of storage bond: Filename _____ Description _____

22. Picture of container: Filename _____ Description _____

23. Historical accumulation at site _____

24. Any past storage? ☐ DDT ☐ Lindane ☐ Other POP's

25. Any other comments _____

Annex 3 Profiles of National Laboratory and Analytical Capability

Guyana has four (4) laboratories that have varying degrees of analytical capability relevant to the identification, assessment and monitoring of POPs and POPs releases into the environment and/or their impact on humans. In general they have capability to conduct to conduct basic physical, chemical and biological analysis with special capability in specific areas of responsibility. However none offer comprehensive capabilities to fully support that required to fully address the issue. Having said that, they provide the basis for a targeted upgrading program at one or more facilities to address POPs related analytical requirements and associated monitoring programs.

A3.1 PTCCB Laboratory

The PTCCB Laboratory was created in 2008 to analyze formulated pesticides and pesticide residues, generally for regulatory purposes associated with the PTCCB's responsibilities in approving and registering pesticides, and in controlling their application. Currently, work in being done in the area of formulated pesticides. Plans are on stream to commence analyzing of pesticide residues in food in the near future.

The lab is equipped with two (2) major pieces of equipment that can be adapted to detect and quantify many of the compounds listed as POPS. These are the:

- Gas Chromatograph with Mass Spectrometer and Flame Ionization Detector and Electron Capture Detector (Thermo Trace GC Ultra with DSQII MS – single quadruple)

- High Pressure (Performance) Liquid Chromatograph with Photodiode Array Detector and Mass Spectrometer (Thermo Surveyor HPLC with MSQ Plus MS – single quadruple).

The instruments available are generally capable of analyzing the following classes of compounds: Organochlorine, Organophosphates, Carbamates, and other similar classes of organic compound (pesticides, herbicides, etc), subject to availability of columns required for specific types of analysis. Dioxins and furans cannot be analyzed at this lab. The tables below list the pesticides for which there are methods that appear to be able to positively identify the compounds of interest, noting validation of methods through a formal certification process is generally required. This list is continually being expanded as additional methods are added.

Current GC Methods

Active Ingredients	Detector
Alpha-cypermethrin	FID
Chlorpyrifos	ECD
Cypermethrin	ECD
Fipronil	ECD
Lambda-cyhalothrin	FID

Current LC Methods

Active Ingredients	Detector	Active Ingredients	Detector
2-4 D	UV-MSD	Chlorpyrifos	MSD
Acetamiprid	MSD	Cypermethrin	UV
Alpha-cypermethrin	UV	Deltamethrin	MSD
Asulam	UV-MSD	Fipronil	UV-MSD
Brodifacoum	UV-MSD	Hexazinone	UV-MSD
Carbaryl	UV	Imidacloprid	UV-MSD
Carbendazim	UV-MSD	Lambda-cyhalothrin	UV

The PTCCB lab has three (3) chemists. To date, this lab has not been accredited either internationally or locally. The process has begun for certification through Guyana

National Bureau of Standards (GNBS). Technical support for instruments is the major limitation to this lab. Other limitations include: delays in obtaining chemical and supplies, inexperience of staff members as relates to technical capacity and the need for more training for staff.

A3.2 Institute of Applied Sciences and Technology

The laboratory at the Institute of Applied Science and Technology (IAST) was originally set up in 1977 as the main environmental analytical facility in Guyana. When the EPA was established in 1996 the IAST lab was renovated to support the EPA and environmental related analysis. Capabilities were also improved under the GENCAPD Project as it relates to mercury analysis. However, it remains limited in its capacities, although currently, work is being done to improve the services provided by the lab and several new pieces of equipment have been acquired.
IAST currently provides services to the environmental sector, especially during the conduct of Environmental Impact Assessments, aquaculture applications, the mining sector, breweries and distilleries, seafood processors and exporters and potable water.

Currently, the type of samples the lab can currently conduct analysis on includes water (surface, fresh, potable, waste and effluent discharges), fish and seafood products, bleach (halogen disinfectants), and occasionally clinical samples (blood, hair); and bio-diesel (internal quality control). Analyses which can be conducted include:

- Physical aggregate parameters such as turbidity, hardness (in water), conductivity, salinity, solids (total, suspended, dissolved).
- Metals (total and dissolved) such as copper, iron, zinc, lead, cadmium, magnesium, manganese, sodium, calcium (Flame Atomic Absorption Spectrophotometry), and mercury (Cold Vapor-Atomic Absorption Spectrophotometry).
- Inorganic non-metallic constituents such as chlorides, pH, nitrogen (total, nitrates, nitrogen as ammonia), dissolved oxygen, phosphates and sulphates.
- Aggregate organic constituents such as biochemical oxygen demand, chemical oxygen demand and oil and grease.

IAST has a GC-MS (Agilent Technology 7890A GC, Agilent technology 5975C VL MSD), a HPLC (Agilent 1200 series with Agilent Technology 1260 Infinity ELSD detector) and a GC (HP 5890 Series 11 with FID). These instruments would nominally have the capacity to analyze for Organochlorine, Organophosphates, Carbamates, PCB's and similar classes of organic compounds (pesticides, herbicides, etc) with some column additions and modifications. It also has the capacity to conduct tests for the presence of mercury in hair and tissues samples. Dioxins and furans cannot be analyzed.

The IAST analytical laboratory has three (3) chemists and one (1) technician. In general, it is felt that are not enough qualified chemist available for specific areas of analysis. Other limitations include: difficulty in obtaining correct purity of gases, delays in procurement process and technical support. To date, it has not been accredited but is working with the Guyana National Bureau of Standards (GNBS) for certification.

A3.3 Government Analyst/ Food and Drugs Department

The Government Analyst/ Food and Drugs Department under the Ministry of Health operates a laboratory, established in 1971, located in the same building with the IAST facility. It provides analytical services for the Ministry and well as other government entities and the private sector.

It has two (2) main pieces of equipment namely a HPLC (Agilent Technology 1100 series) equipped with Diode Array, Fluorescence and Refractive Index detectors and a HPLC (Waters 2695 Separator module with waters 2487 Dual Absorbance Detector (DAD)). These instruments are capable of analyzing the following classes of compounds: Organochlorine, Organophosphates, Carbamates, and other similar

classes of organic compound (pesticides, herbicides, etc), subject to certain modifications and column additions. Dioxins and furans cannot be analyzed.

The laboratory has four (4) chemists and two technicians. It has not been accredited either internationally or locally. Insufficient office and equipment space coupled with instability with respect to electrical power and water supply were the major constrains at this laboratory. Other limitations include: no local service provider for instruments, long delay in procurement system at the Ministry of Health, inadequate storage space for reagents and need for more training of staff.

A3.4 GUYSUCO

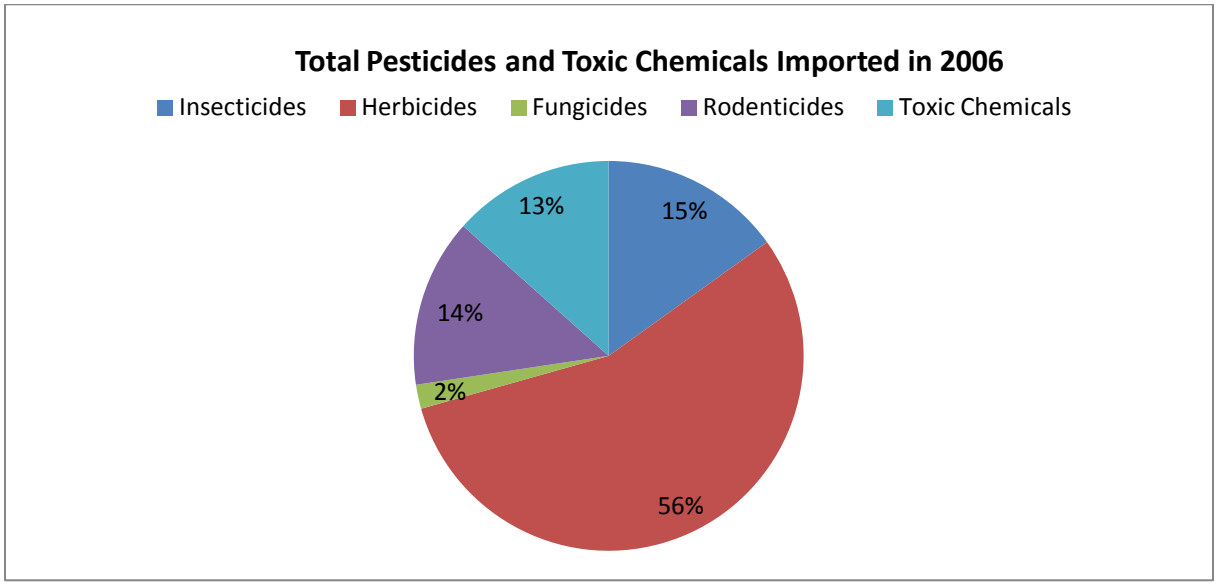
GUYSUCO operates a central laboratory located at the LBI Estate, East Coast Demerara. In addition to its own analytical requirements related to pesticides use, the Company would also conduct analysis for the public.

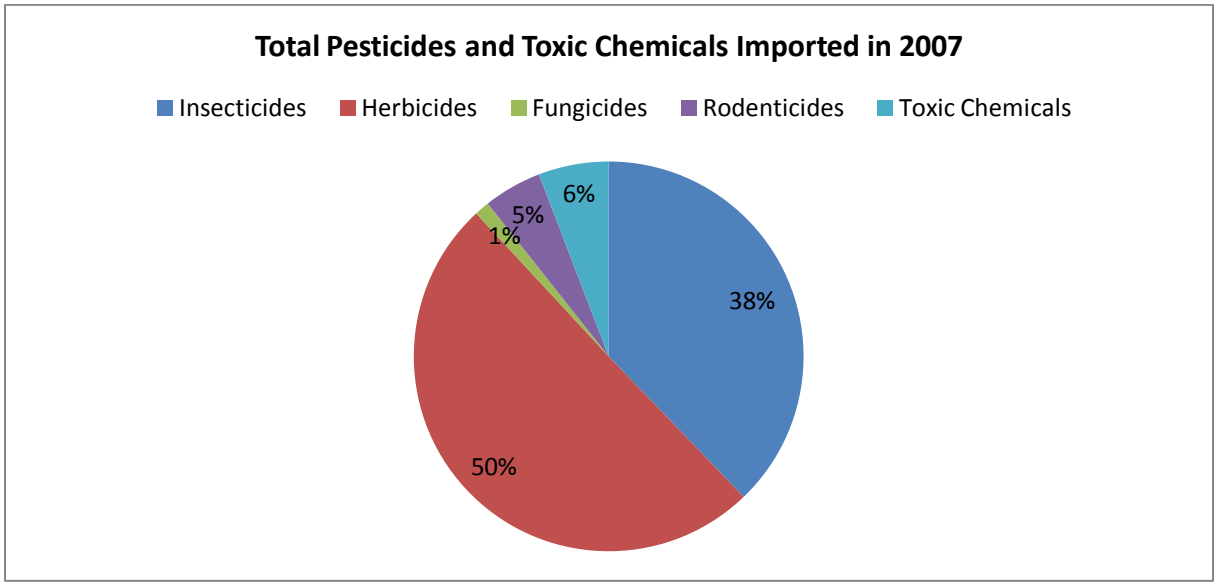
The laboratory has one main instrument of interest, a HPLC (Varian 9012 Prostar with Refractive Index (RI) detector). It is nominally capable of analyzing the following classes of compounds: Organochlorine, Organophosphates, Carbamates, other similar classes of organic compounds (pesticides, herbicides, etc) subject modifications and column additions. It can also conduct a wide range of environmental analysis including dissolved oxygen, COD, nitrate, sulphate, potassium, phosphorous, total suspended solids, metals, ph, electrical conductivity, salinity, etc. Dioxins and furans cannot be analyzed.

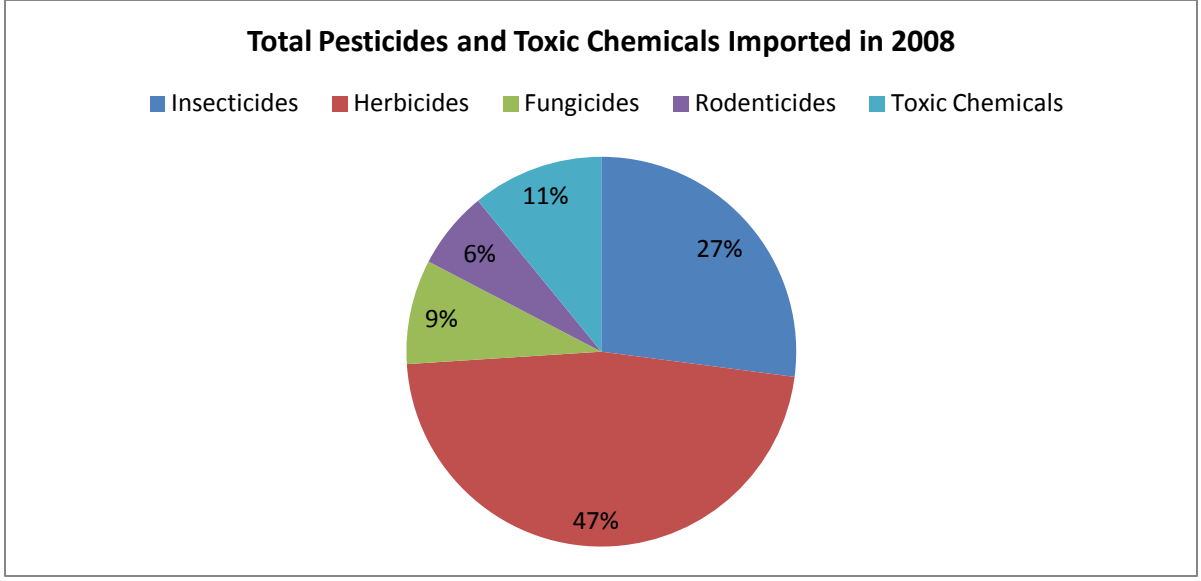
The Guysuco Central Laboratory has four (4) chemists and four (4) technicians. One chemist holds a PhD, while the other three have Masters Degree. The technicians have A-levels and CXC certificates. The staff is very experienced with other analytical instruments and method/sample preparations.

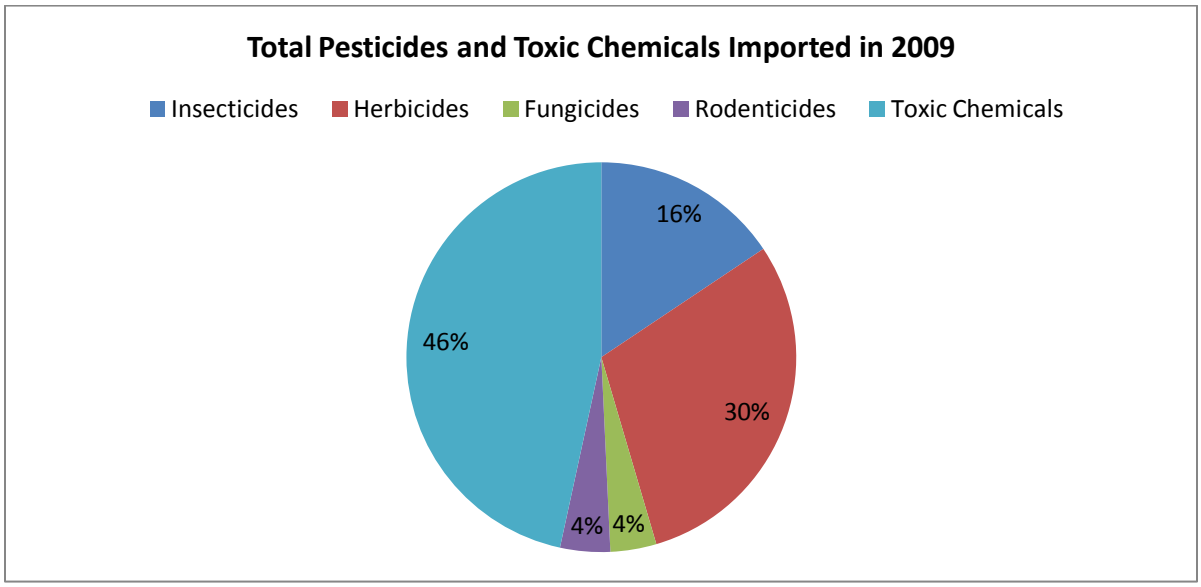
Annex 4: Pesticides and Toxic Chemicals Imports Data Summary

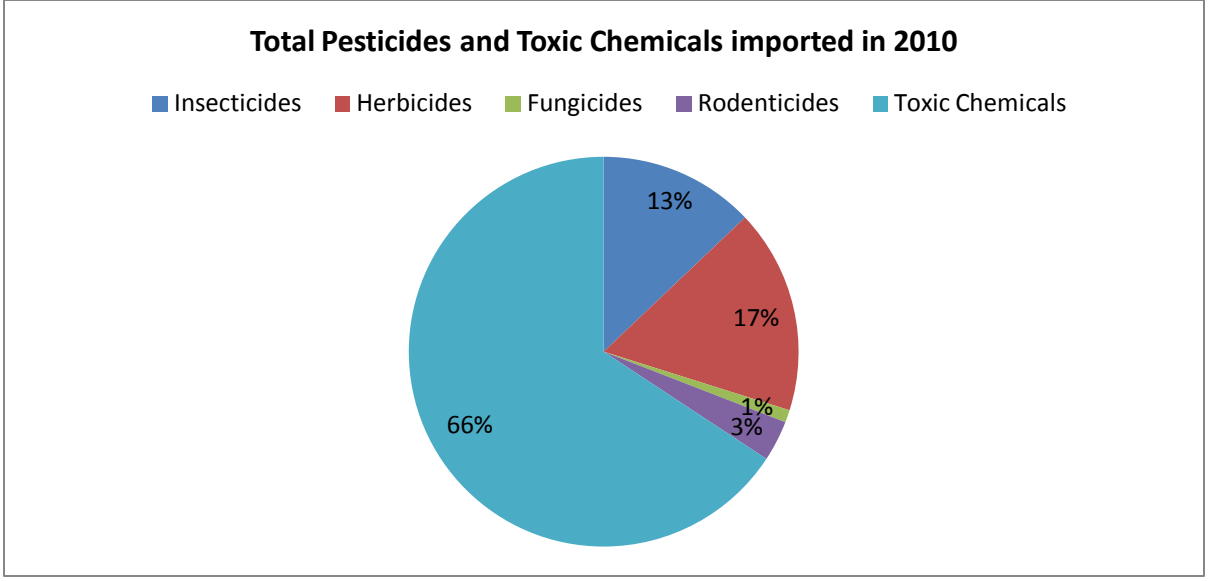
Total pesticides and toxic chemicals imported in Guyana during the period 2006-2010. All data obtained from Pesticide and Toxic Chemical Board (Guyana).

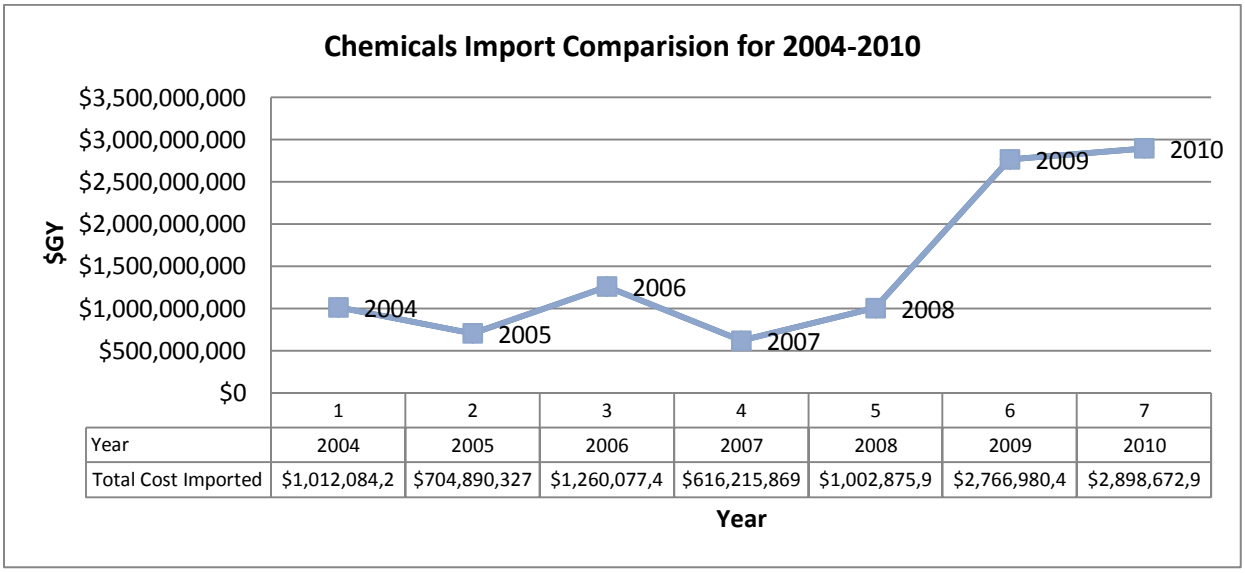





Total Pesticides and Toxic Chemicals Imported in 2008
Insecticides
Herbicides
Fungicides
Rodenticides
Toxic Chemicals
27%
47%
9%
6%
11%


Total Pesticides and Toxic Chemicals Imported in 2009
Insecticides
Herbicides
Fungicides
Rodenticides
Toxic Chemicals
16%
30%
4%
4%
46%





	1	2	3	4	5	6	7
Year	2004	2005	2006	2007	2008	2009	2010
Total Cost Imported	$1,012,084,2	$704,890,327	$1,260,077,4	$616,215,869	$1,002,875,9	$2,766,980,4	$2,898,672,9

Annex 5: Record of Stakeholder and Public Consultation

Under the Project and as part of its implementation requirements and Project Steering Committee was established. The Steering Committee comprised of members from the following Agencies, Ministries, Industries and NGO's:

PROJECT STEERING COMMITTEE

1. Government

Government Sector	Agency
Agriculture	Ministry of Agriculture
Environment	Environmental Protection Agency
Health	Ministry of Health
Energy	Guyana Energy Agency
Industry	Ministry of Tourism, Industry and Commerce
Finance	Ministry of Finance
Transport	Ministry of Public Works and Communication
Labour	Ministry of Labour, Human Services and Social security
Customs	Department of Customs and Trade Administration
Statistic	Covered by Ministry of Finance
Local Authority	Ministry of Local Government
Home Affairs	Guyana Police Force,
Housing & Water	Ministry of Housing and Water
Agriculture	Guyana Forestry Commission
Agriculture	Guyana Rice Development Board
Other	Guyana Geology and Mines Commission
Education	Ministry of Education

2. Business and Industry

Business and Industry Sector	Organization
Chambers of Commerce	Georgetown Chamber of Commerce
Pesticides Industry Associations	Associated Industries Limited Caribbean Chemicals Limited
Industrial Chemicals Industry Associations	Guyana Manufactures Association
Other	Urban Pest Controls Association

3. Public Interest and Labour Organizations

Sector	Organization
Consumers Groups	Guyana Consumers Association
Labour Unions	Guyana Agricultural Workers Union Rice Producers Association Guyana Agricultural Producers Association
Research Institutes	National Agricultural Research Institute
Academia	University of Guyana

In carrying out the inventory and national capacity and gap analysis, the PTCCB along with the National Consultants conducted numerous training and awareness sessions to ensure that the general public and all concern stakeholders understood the process of the inventorying. These sessions highlighted the

Stockholm Convention, the need for the Development of the National Implementation Plan and all areas that are pertinent for information gathering with each stakeholder group. The PTCCB also utilized the Ministry of Agriculture's television program to educate the general public about the NIP development and the need for information sharing so as to facilitate the inventory and information gathering process. The PTCCB established a hotline number to allow information collection as to all areas covered by the NIP with regards to inventory. There were many inter-agency and inter-ministerial meetings that were held to garner information on chemicals such as mercury and environmental impacts. The table below highlights some of the public stakeholder groups who were consulted during the execution of this project.

Public/Stakeholder Group	Level of Awareness
1. Toxic Chemical Importer/Manufacturers/Industries	Countrywide
2. Pesticides Importers/Distributors/Vendors	Countrywide
3. Pesticides End-Users/Farmers/Farm-workers	Agriculture Producing Communities
4. Large Cane Farmers Association	Cane Farming Communities
5. Rice Producers Association	Regions 3 & 5
6. Customs and Trade Administration	Various Ports of Entry
7. Cash Crops and Non Traditional Farmers	Countrywide
8. Manufacturing Industries	Countrywide
9. Paint Producers	Countrywide
10. Guyana Power and Lights Stations	Countrywide
11. Pest Control Operator	Countrywide
12. Guyana Sugar Corporation and all factories	Countrywide
13. Rice Mills	Countrywide
14. Scrap Metal Dealers	Countrywide
15. Solid Waste Disposal Companies and Sites	Countrywide

Annex 6: Representative Public Information Materials

During the development of the National Implementation Plan numerous public awareness activities and consultation workshops were held to allow information collection and sharing to relevant stakeholder and the General Public.

The following article was featured in the Guyana Stabroek Newspaper on the launch of the Project. Also featured are picture references of other public awareness activities that were carried out.

Stakeholders to develop national plan on organic pollutants

August 17, 2010 · By Staff Writer ·

Minister of Agriculture Robert Persaud said a National Implementation Plan will be developed incorporating international guidelines to stop the importation and use of illegal chemicals in the sector. According to a Government Information Agency (GINA) press release the minister met with stakeholders on forming an Inter-Agency Committee to control the use of harmful chemicals in the agriculture sector as the country takes steps to export more produce.

Discussions centred on eradicating Persistent Organic Pollutants in Guyana through the development of a National Implementation Plan under a Stockholm Convention, the release said. According to Persaud, Guyana is positioning itself as a major exporter of food and as such measures are being implemented to ensure that the country conforms to international standards. In keeping with this, the administration has taken bold steps through the newly established Pesticide, Chemical and Toxic Board to not only positions the sector to be a major exporter but also to ensure that what consumers produce and consume meet health standards. "The Board in recent times has been building up its capacity…today our labs can be considered one of the most modern…in recent weeks we have seen some dramatic development in this regard," Persaud said.

Human aspect

The Board is expected to provide support by listing the chemicals and pesticides allowed into the country. The minister said over a period of time stakeholders have raised concerns about illegal chemicals being smuggled into the country. Some of these chemicals have since been banned as they are considered unsafe for the environment. Persaud also said the Board has since increased its enforcement capacity and has instituted more procedures in tandem with customs; "since it is quite evident also that those who man the entry points need to be guided as to what can or cannot be allowed."

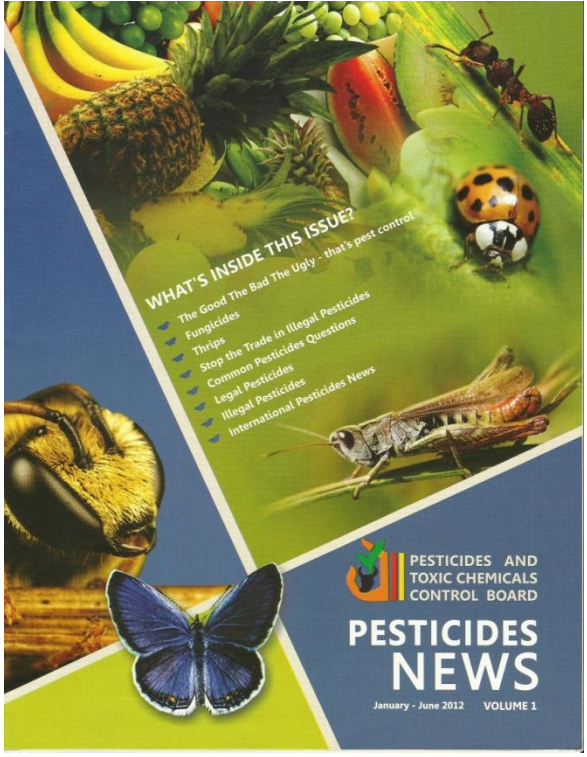
"We are concerned too about seeing the influx because notwithstanding the best efforts in terms of education and a great degree of moral persuasion we find that some of our farmers are willing to use these illegal chemicals and pesticides. I want to again make an appeal for their own health and the health of consumers too that they stick with the approved list," he added.

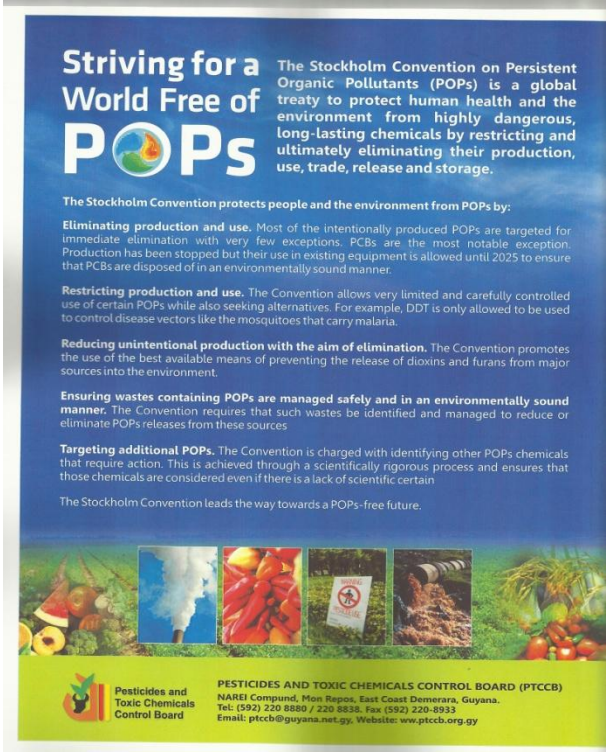
As regard modernising the laboratories, Persaud emphasised the need for more tests to be done as it relates to testing for residue and chemical applications and their effects. This will enhance the Board's capacity in keeping with the ministry's Agriculture Diversification Project and its Agricultural Support Services project. "I want to encourage all stakeholders to support the Pesticide Board and their activities. This is necessary if we are going to be certified as being a country and a sector that is fit for export and producing food for the export market. I encourage persons to not see it as a nuisance; but rather as a necessary regime of control and regulations that we have if we are going to advance and move forward in this regard," he said.

The minister also said government will continue to ensure that international conventions and protocols are adhered to in order to advance the sector. He also used the opportunity to encourage stakeholders to

be willing and able to support the initiative. Under the project $82M will be made available over two years in order to undertake the plan.

This 2012 Calendar was produced by the Board and was used to highlight the Stockholm Convention





This 2012 Newsletter of the Board also was used to raise awareness on the Convention.

Meeting with the National Coordinating Committee

Workshop on Project and Convention with Power Generating Companies

Workshop with Pesticides Stakeholders on Project and Convention

Workshop with Industrial Manufacturers and Solid Waste Disposal Companies

Consultant visits to a Power Generation Company and Transformer Storage Facility


15/09/2011 14:21


15/09/2011 14:21


15/09/2011 14:22

Consultants visit to a Power Generation Company

Consultants visit to a Chemical Storage Facility

Training Programs were carried out countrywide by Technical Officers of the Board so as to allow information sharing and inventorying in some areas

PESTICIDES & TOXIC CHEMICALS CONTROL BOARD

NAREI Compound, Mon Repos, East Coast Demerara, Guyana, S.A.

Tel: 592-220-8880/8838 | Website: www.ptccb.org.gy