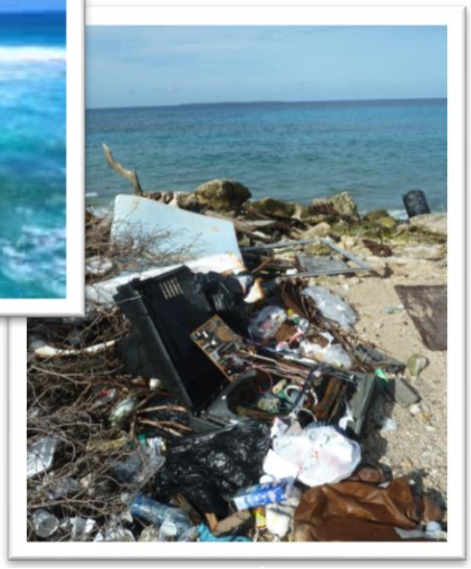
Review and Update of the National Implementation Plan (NIP) for the Stockholm Convention on Persistent Organic Pollutants (POPs) in Samoa



Samoa, 2019

REPORT

Review and Update of the National Implementation Plan (NIP) for the Stockholm Convention for Persistent Organic Pollutants (POPs) in Samoa

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EXECUTIVE SUMMARY

The Stockholm Convention of Persistent Organic Pollutants (POPs) is a global environmental treaty to protect human health and the environment from Persistent Organic Pollutants (POPs). Samoa signed the above Convention in 2001 and ratified it in 2002. Samoa is therefore a Party to the Convention that seeks to protect human health and the environment with the aim to reduce or eliminate the production, use, trade, release and storage of POPs.

This updated National Implementation Plan (NIP) provides an assessment of the current inventory and legal, institutional aspects of POPs management in Samoa. The preparation of this document was based on United Nations Environment Program (UNEP) methodology for reviewing and updating NIP. Samoa does not have POPs producing industries or factories for manufacturing other synthetic chemicals, however the current assessment of POPs inventory was mainly based on new POPs since the inventory for initial POPs and related compounds in Samoa listed in Stockholm Convention in 2001 was reported during the first NIP in 2004. The new POPs covered by this NIP are PFOS its salts, PFOSF, PBDE and HBCD and are suspected of being used as by products such as fire-fighting foam, electrical and electronic equipment, printing inks and toners. However, there are no physical quantities of new POPs in Samoa and there is no available information on POPs, contaminated sites and hot spots.

In terms of policy and legislations, a number of regulations and legal acts have been approved for managing POPs and its related compounds in Samoa. However, Samoa as a Party to the treaty will need to reassess and update obligations that relevant government ministries, corporations and the private sectors currently have in relation to POPs management, in accordance with their functions and responsibilities. A series of action plans is proposed including the following:

- Strengthen national legislative framework for the obligations related to the ban of new POPs in Samoa through existing legislations and policy;
- Explore waste management practices carried out by companies for management and disposal of products/articles containing new POPs;
- Ensure that residues/wastes containing PFOS, its salts and PFOSF, PBDEs and HBCD are managed and disposed in an environmentally sound manner;
- Improve government ministries, corporations, private sectors knowledge on new POPs impact on the environment, human health and releases;
- Seek development partners and secure sufficient funds to ship products containing new POPs in accordance with the Basel and Waigani Conventions.

Financial means needed for the NIP implementation for the next five years (2020-2025) are foreseen to be US$25 million. These costs can be incorporated into national planning towards the achievement of the goals of the Strategy for the Development of Samoa (SDS) and Sustainable Development Goals in particular to waste management, environment and human health.

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ABBREVIATIONS AND ACRONYMS

ASC	Agriculture Store Corporation
BAT	Best Available Technique
BEP	Best Environmental Practices
CEO	Chief Executive Officer
COP	Conference of Parties
CWMU	Chemical Waste Management Unit
DDE	Dichlorodiphenyl dichloroethene
DDT	Dichlorodiphenyl trichloroethane
DEC	Division of Environment and Conservation
c-decaBDE	Decabromodiphenyl ether
EPC	Electric Power Corporation
EEE	Electronic Electrical Equipment
ELV	End of Life Vehicles
EPS	Expanded Polystyrene
FESA	Fire and Emergencies Services Authority
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
GoS	Government of Samoa
GWS	Government of Western Samoa
HBCD	Hexabromocyclodecane
HCB	Hexachlorobenzene
IPC	Integrated Pest Control
IPM	Integrated Pest Management
IVM	Industrial Vegetation Management
LSE	Land Survey and Environment
MAF	Ministry of Agriculture and Fisheries
MESC	Ministry of Education Sports and Culture
MNRE	Ministry of Natural Resources and Environment
MoF	Ministry of Finance
MoH	Ministry of Health
MCR	Ministry of Customs and Revenue
MCR-CD	Ministry of Customs and Revenue – Customs Division
MWCSD	Ministry of Women, Community and Social Development
MWH	Montgomery Watson Harza
NCMS	National Chemical & Hazardous Waste Management Strategy
NIP	National Implementation Plan
NUS	National University of Samoa
PBDEs	Polybrominated diphenyl ethers
PeCB	Pentachlorobenzene
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
PFOSF	Perfluorooctane sulfonyl fluoride
PCDD	Polychlorodibenzo-*p*-dioxin
PCDF	Polychlorodibenzo-*p*-furan
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol

PCN	Polychlorinated napthalenes
POPs	Persistent Organic Pollutants
uPOPs	Unintentionally produced Persistent Organic Pollutants
PTS	Persistent Toxic Substances
PUMA	Planning Urban Management Agency
SAICM	National Strategic Approach to International Chemical Management
SBS	Samoa Bureau of Statistics
SC	Stockholm Convention
SCCPs	Short-chain chlorinated paraffins
SDG	Sustainable Development Goals
SDS	Strategy for the Development of Samoa
SFC	Samoa Forest Corporation
SIDs	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Environment Programme
SROS	Scientific Research Organisation of Samoa
SRWMA	Samoa Recycling and Waste Management Association
SWA	Samoa Water Authority
TEQ	Toxic Equivalents
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USP	University of the South Pacific
WEEE	Waste Electronic Electrical Equipment
WHO	World Health Organisation
WMA	Waste Management Act
XPS	Extruded Polystyrene

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INTRODUCTION

Samoa ratified the Stockholm Convention on Persistent Organic Pollutants (POPs) in 2002 and the Convention entered into force in 2004. The overall objective of the Convention is to protect human health and the environment from POPs. Under this Treaty with over 160 signatories, parties commit to reduce and/or eliminate release of the initial POPs into the environment.

POPs are synthetic organic based chemicals used in pesticides or industrial products or resulting unintentional as by-products from different industrial processes. POPs can accumulate through the food chain, reaching peak concentrations at the top of the food chain, posing a risk of harm to human health and the environment. They resist photo degradation and undergo biomagnification and bioconcentration. POPs and its related compounds can be carried through long range atmospheric transport where they are dispersed into the environment. These compounds were commonly produced for a range of purposes including industrial processes, disease vector control and agriculture. The twelve initial POPs including PCBs and its related compounds have been banned or have been subject to intense restrictions in many countries due to their toxicity and harmful effects on human health and the environment. However, due to their persistence and poor disposal management, these compounds are still being detected in various environmental compartments in low concentrations and thus remain serious threats.

As of 2019, there are eighteen newly listed POPs in the Stockholm Convention such as chlordecone, hexabromobiphenyl, alpha & beta hexachlorocyclohexane, lindane, tetrabromodiphenyl ether and pentabromodiphenyl ether, hexabromodiphenyl ether and heptabromodiphenyl ether, perfluorooctane sulfonic acid (PFOS) and its salts perfluorooctane sulfonyl fluoride (PFOS-F), pentachlorobenzene (PeCB), polychlorinated naphthalenes, hexabromocyclododecane, hexchlorobutadiene, pentachlorophenol and its salts and esters, technical endosulfan and its related isomers, short-chain chlorinated paraffins (SCCPs), decabromodiphenyl ether (commercial mixture, c-decaBDE), dicofol and perfluooctanoic acid (PFOA), its salts and PFOA-related compounds.

The increased concerns regarding the health risks of new POPs and its related compounds, has resulted in legal restrictions of their use. Mounting evidence from experimental and epidemiological research revealed that POPs can cause serious health problems such as metabolic dysfunction, birth defects, cancer and dysfunctional reproductive and immune systems. It was suggested that POPs and its related compounds function as endocrine disruptors.

The NIP was an activity that assessed the effectiveness of previous NIP application undertaken to address POPs and related compounds and identified the activities/measures to be taken to address the reduction and/or elimination of new listed POPs. The specific objectives of NIP were as follows:

- To provide Samoa with an overview of the effectiveness of the initial NIP measures and to measure of the problem of new listed POPs at the national level as well as the capacity for compliance with the Convention;
- To improve the understanding of relevant Stockholm Convention provisions among government institutions responsible for priority sectors;
- To ensure that decision-makers in the public and private sector involved in activities with intentional uses or unintentional releases of POPs understand relevant obligations under the Stockholm Convention;
- To sensitize decision makers, vulnerable populations and other relevant groups towards the health and environmental risks posed by POPs;
- To complement the efforts of Samoa to significantly reduce the exposure of POPs use;
- To facilitate the design of targeted interventions, which in turn provide local and global benefits through reduced emissions to the environment;
- To identify the lessons learnt and experience gained from national and regional capacity-building and national inventory development to be used as a model approach to be replicated in other countries and regions to effectively address similar issues.

1. COUNTRY PROFILE OF SAMOA

1.1 General Information

Samoa is a small, volcanic island nation that lies between latitudes 13⁰25'S and 14⁰05'S and longitudes 171⁰23'W and 172⁰48'W within the South Pacific region (Figure 1).

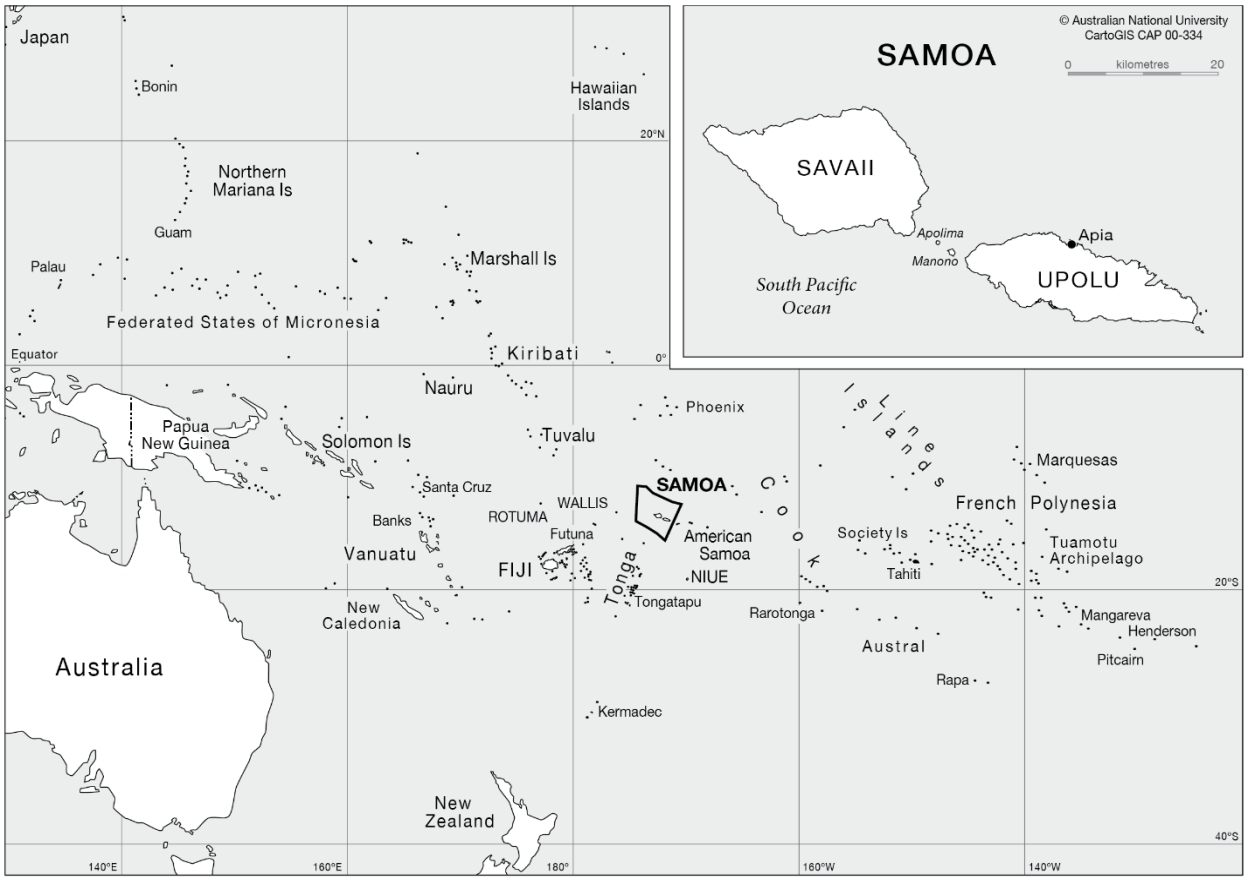

Figure 1. Geographical location of Samoa relative to other Pacific Islands (Source: https://asiapacific.anu.edu.au/mapsonline/base-maps/samoa-pacific)

Samoa is the first country in the Pacific to gain independence in 1962 and until 1997 was known as Western Samoa. The capital of Apia is located on Upolu Island. The country is governed by a unicameral, democratic parliamentary system where the Parliament is elected every five years through universal suffrage. The Legislative Assembly is made up of 54 members who hold a chiefly title. The Prime Minister and a Cabinet of 12 ministers selected from the elected parliamentarians manage the daily affairs of the country. At the national level, the country is governed by the Human Rights Protection Party (HRPP) that has been in power for over 37 years. Village Councils establish and administer by-laws to guide leadership, order, health and social issues at the village level.

1.2 Geography and Climate

1.2.1 Geography

The Samoa archipelago comprises four inhabited islands (Figure 1 inset) namely Upolu, Savaii, Manono and Apolima and six uninhabited islands (Namu'a, Nu'utele, Nu'ulua, Nu'usafee, Nu'ulopa and Fanuatapu) giving a total land area of about 2,830 km^2. The bulk of the nation comprises the two largest islands of Upolu and Savaii. Most of the mass of these two mountainous islands is of volcanic origin and consisting of basalt derived from subcrustal magmatic matter common to the Pacific basin (Wright, 1963; Burgess, 1987). Volcanic action has not occurred since 1911. Coral reefs surround much of the coastline and there is abundant fresh water in the lakes and rivers.

1.2.2 Climate

Samoa has a "tropical rainy" climate (Koppen & Geiger, 1954). There is a distinct cool and dry season which occurs from May to October and a hot and wet season which is predominant from November to April. These climatic seasons are determined by a subtropical high pressure zone and trade winds, the South Pacific Convergence Zone (SPCZ) and the impacts of the Southern Oscillation (SO) on the SPCZ (Burgess, 1987).

The two main islands of Upolu and Savaii have a southeast-northwest alignment (Figure 1), lying almost parallel to the prevailing southeast trade winds which are predominant during the drier parts the year (Burgess, 1987; Ward & Ashcroft, 1998). These prevailing winds blow in a southeasterly direction at the boundary layer and at a northwesterly direction above it (Pszenny *et al*., 1982). The boundary layer is an atmospheric layer which can reach heights of up to 1.5 km from the surface of the equator (Berner & Berner, 1996). Internal variations in rainfall patterns occur due to the islands' topography. The southeast-northwest alignment and the topography of the islands normally result in higher rainfalls in the southeast parts while the northwest is generally drier. Because the interior areas of the islands are mountainous with a maximum height of about 1,100 m, an increase in altitude is normally associated with a marked decrease in temperature and an increased humidity, cloudiness and rainfall (Ward & Ashcroft, 1998). Thus, while rainfall is of convective origin, orographic enhancement can occur.

1.3 Population

The latest Samoa census in 2016 recorded a population size of 195,979 with a male to female ratio of about 1:1 and an annual growth rate of 0.9% per year, a slow growth rate due to emigration. The population density was 69 persons/km^2. The majority of the population (~78%) reside on Upolu Island and 19% of the population live in the Apia urban area. Five percent of the population are over 65 years old, 32% are between 30 & 64, 25% are between 15 & 29 while the majority at 38% are under 15 years with a median age for the total population of 21.4 (SBS, 2017). The national census takes place every five years.

1.4 Economy

Samoa has a small and developing economy that has generally performed well in recent years. The economy of Samoa has traditionally been dependent on development aid, family remittances from overseas, tourism, agriculture, and fishing. The country's Gross Domestic Product (GDP) was worth 0.86 billion US dollars in 2018. The GDP value of Samoa represents less than 0.01 percent of the world economy. GDP in Samoa averaged 0.39 USD Billion from 1982 until 2018, reaching an all-time high of 0.86 USD Billion in 2018 (Figure 2) and a record low of 0.10 USD Billion in 1985. Agriculture, including fishing, employs roughly two-thirds of the labor force and furnishes 90% of exports, featuring fish, coconut oil, nonu products, and taro. The manufacturing sector mainly processes agricultural products. Industry accounts for nearly 24% of GDP while employing less than 6% of the work force. The service sector accounts for nearly three-quarters of GDP and employs approximately 50% of the labor force. Tourism is an expanding sector accounting for 25% of GDP (SBS, 2017; https://www.indexmundi.com/samoa/economy_profile.html).

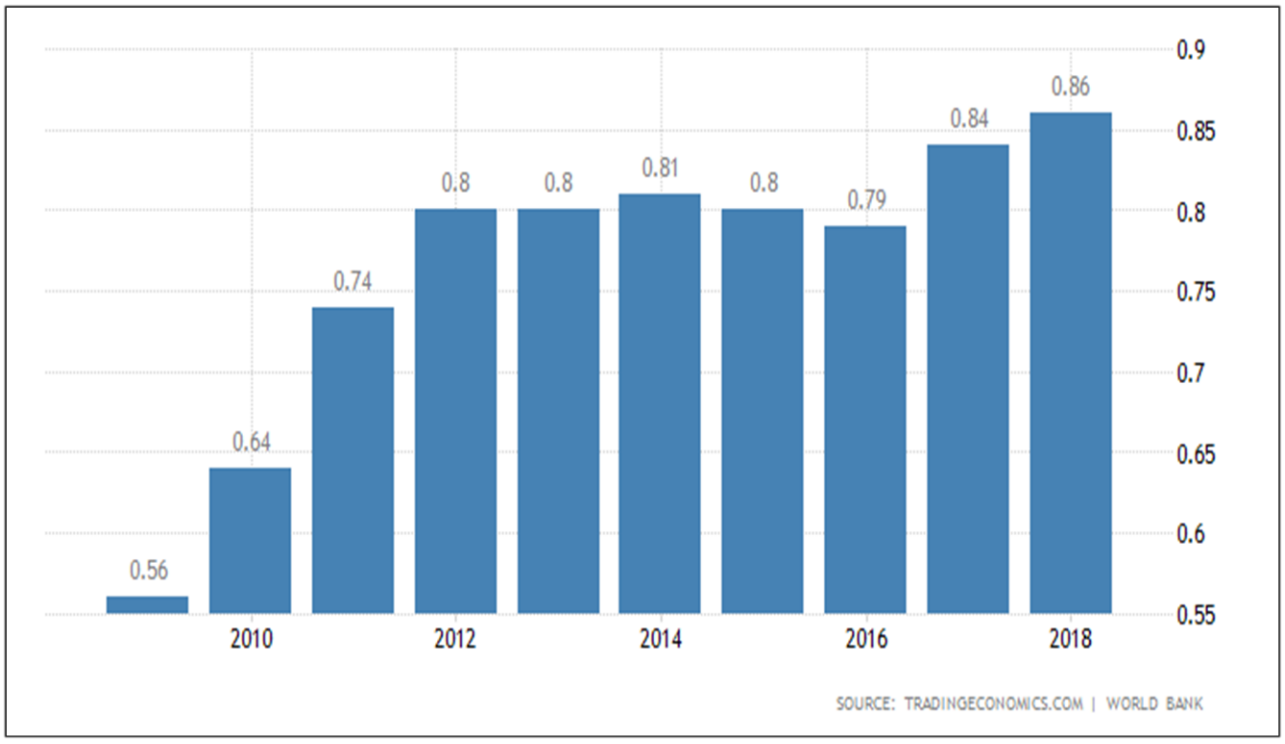

Figure 2. Samoa's GDP
(Source: https://tradingeconomics.com/samoa/gdp)

The labour force participation rate which defines the proportion of the economy's working age group 10 years and over that is economically active in the production of goods and services was highest in the Apia Urban area in 2016 while the unemployment rate dropped from 6% in 2011 to 4% in 2016 (SBS, 2017).

1.5 Agriculture and Livestock

Agriculture, forestry and fisheries sustain many households in Samoa and supply the majority of livelihoods, as well as food security. Over two-thirds of Samoans are employed directly or indirectly in the agricultural sector, with the manufacturing sector also mainly processing agricultural products. Much of Samoa's economy is, however, based on primary production. Crops, livestock, fisheries and forestry account for around 40 per cent GDP, much of it at subsistence level. Coconut, cocoa and banana are all important cash crops and fishing provides the major source of protein as well as important cash income. Livestock production is mostly small-scale, mainly pigs, poultry and cattle. In the early 1990s, a succession of highly destructive cyclones caused widespread damage to the country's economy and infrastructure. In early 2004 and 2012, respectively cyclones Heta and Evan seriously damaged crops and resulted in extensive flooding. Such natural disasters have an enormous impact on an island nation dependent on fishing and agriculture. Under the auspices of the coordinating government ministry, efforts are planned and implemented to Improve Food Security, Improve Commercial Development and Sustain Agricultural Production in Samoa.

1.6 Industrial Production

The main industries in Samoa are commerce, construction, agriculture and fishing, manufacturing, public administration, transport and communication, and finance and business service (MCIL, 2017). Retailers contribute an average 31% to national GDP while the Manufacturing Sector accounts for an average 10% through mainly food and beverage production.

Exports tend to consist of fish, coconut produce, taro, automotive parts, garments and beer, with more than half of all exports going to American Samoa. In 2011, exports contributed US$11.4 million to the Samoan economy. Imports – mostly machinery and equipment, industrial supplies, and foodstuffs – arrive primarily from Fiji, New Zealand and Singapore. Imports totalled an estimated $318.7 million in 2011, an increase on the 2010 value of $280 million.

Industrial production index measures changes in industrial production and is widely used for the observation and analysis of the current economic activity. Based on the World Bank collection of development indicators, Import and export price indexes in Samoa in 2016 was reported at 0 (SBS, 2017; https://tradingeconomics.com/samoa/import-and-export-price-indexes-wb-data.html).

1.7 Water Resources

Freshwater from both surface and groundwater sources exist across most of Samoa, although their distribution is not uniform. The older volcanic terrain of the Fagaloa and Salani volcanics are most weathered and eroded, and the formed clay cover results in effectively impermeable strata, and therefore surface runoff. These older volcanics and associated surface water courses are mostly located on the eastern and southern halves of both the Upolu and Savaii islands (MNRE, 2013).

The younger volcanics of the Mulifanua, Lefaga, Puapua and Aopo lava flows, have little or no soil cover and allow the infiltration of nearly all rainfall. These lavas are also highly permeable, with former lava tubes enabling rapid groundwater flow to the sea. The location of the younger volcanics along the north-west Upolu and Savaii regions coincide with the dominant distribution of coastal springs and good groundwater sources, and the absence of perennial river systems (MNRE, 2013).

There are more than forty river systems in Samoa originating in the uplands and draining into the sea. Upolu Island has about 15 more or less perennial rivers, while Savai'i Island has about 4 perennial rivers (MNRE, 2013). River flow is good during the wet season whereas in the dry season, ephemeral rivers and streams begin to dry up and perennial river systems experience low flows (MNRE, 2013). However, these trends do not always occur as expected with some dry months experiencing high river flows and conversely for the wet months.

Water Resources are managed by MNRE which has prioritized efforts to enhance the sustainability of Samoa's water resources through ongoing rehabilitation of degraded watershed areas in partnership with watershed communities; protection of critical riparian zones from unsustainable socio-economic developments; and regulation of water abstraction activities (MNRE, 2013).

1.8 Environmental Overview

Samoa faces similar challenges identified in other countries in Small Islands Developing States (SIDS) and in particular the Pacific. The biggest threats to Samoa's biophysical environment are extreme events associated with climate change and climate variability including extreme temperatures, cyclones, floods and droughts. These and other climatic and weather pattern changes that were previously predicted are now a reality. The devastation caused by Cyclone Evan in 2012 was clear evidence of the destructive nature of climate change leading to infrastructure breakdown, loss of livelihood and human lives and severe degradation of native habitats and species populations (MNRE, 2013). Unsustainable use of natural resources, poor sanitation and waste disposal practices are additional pressures that threaten Samoa's environment as well as economic development activities (such as development in infrastructure, agriculture, tourism, fisheries), population growth, changing consumption patterns and lifestyles, traditional institutional arrangements governing access to and use of resources (MNRE, 2013).

2. LEGAL, INSTITUTIONAL AND REGULATORY FRAMEWORK

2.1 Legal Instruments for Managing POPs

The existing regulatory framework for managing POPs to cover production, import, export, use, licensing, storage, handling and disposal of POPs may be described as more robust than the regulatory framework that existed when Samoa submitted its initial NIP in 2004. The difference may be attributed to the following developments.

2.1.1 Pesticides Regulation 2011

The 2011 regulation repealed the 1990 regulation as part of a legislative overhaul that Samoa took in order for the country to become a Party to the World Trade Organization (WTO). The 2011 regulation was also modified to ensure it covered the use and management of Pesticides across its life cycle. Despite the changes, the Pesticides Regulation focuses only on pesticides.

2.1.2 Waste Management Act 2010

The WMA 2010 was an important addition to the legal framework that existed at the time Samoa submitted its initial NIP. As discussed above, it is described as the regulatory framework for Samoa to meet its obligations under the Stockholm Convention. Until this Act, the principle legal instruments to regulate POPs were the Pesticides Regulation 1990 and regulations that could be but were never made under the LSE 1989.

2.1.3 Forestry Management Act 2012

The Forestry Management Act 2012 is an act to make provision for the effective and sustainable management of Samoa's forestry resources, and for related purposes. The Act repeals the Forests Act 1967. The general functions of the Ministry are the management of the forestry resources (section 14) and to take measures to protect against erosion and fires (Part 9 section 63-71) that may cause releases of dioxins and furans into the environment.

2.1.4 Health Ordinance 1959

Under the Health Ordinance a Health the Chief Executive Officer (CEO) is given certain powers to apply to the Court to close (section 14) or demolish building that present a risk to public health (section 19) . The Department can bring an action for nuisance section 22 (b) where any accumulation or deposit is in such a state or is so situated as to be dangerous to health or offensive; (k) forbid the discharge of sewage, drainage, or insanitary matter of any description into any watercourse, stream, lake, or source of water supply. Actions can also be brought (g) where a factory, workroom, shop, office, warehouse, or other place of trade or business; (ii) is not provided with appliances so as to carry off in a harmless and inoffensive manner any fumes, gases, vapours, dust or impurities generated therein; (j) where any offensive trade is so carried on as to be dangerous to health or unnecessarily offensive; (k) where a chimney (including the funnel of a ship, but not including the chimney of a private dwelling) sends forth smoke in such quantity or of such nature, or in such manner as to be dangerous to health or offensive, or in a manner contrary to any regulations; (l) where a street, road, right of way, passage, yard, premises, or a land is in such a state as to be dangerous to health or offensive; (m) where a well or other source of water supply or any cistern or other receptacle for water which is used or is likely to be used for domestic purposes or in the preparation of food, is so placed or constructed or is in such a condition as to render the water therein offensive, or liable to contamination, or likely to cause danger to health; or (n) where any offal or material liable to be dangerous to health or offensive is deposited on the foreshore or in the harbour of Apia.

2.1.5 Ministry of Health Act 2006

The Ministry of Health provide and assist the government and the Minister with advice as to strategies, policies and planning concerning the development, resourcing, provision and management of health services. The Ministry is responsible for the handling, transport and disposal of healthcare waste including POPs and related compounds from hospitals and health clinics.

2.1.6 Other Legal Instruments

Legislation post-dating Samoa's first NIP that touch on aspects of chemicals management as discussed above include the Water Resources Management Act 2008 to protect water resources from all type of pollutants. The Village Fono Act 2016 empowers the village matai or chiefs to make by laws in relation to hygiene and sanitation and (protecting natural resources and the environment. In the Samoan context this authority is important as over 80% of Samoan land is customary land under the control of village matai.

2.2 Policy Instruments for Managing POPs

An assessment of the policy framework and systems for the management of POPs in Samoa shows that since the first NIP, there have been many important policy developments. The current policy framework for managing POPs in Samoa in 2019 may be described as follows.

2.2.1 Strategy for the Development of Samoa (SDS) 2017-2021

The SDS sets out Samoa's key priorities as a nation and the actions it proposes to take over a four year period to address these priorities. One of the key outcomes described in the SDS is Outcome 13 Environmental Resilience which addresses the need for better management and regulation of chemical and hazardous wastes to prevent contamination. The outcome is that Samoa's built environment will be better planned, designed and monitored to prevent adverse effects to the environment natural resources and the health of its human population.

2.2.2 National Environment Sector Plan (NESP) 2017-2021

The NESP describes the MNRE's vision, goal and an achievable framework for action to address the outcomes of a more sustainable and resilient environment as set out in the Strategy for the Development of Samoa (SDS). It is also based on the most recent State of the Environment (SOE) assessment (MNRE, 2013).

2.2.3 National Waste Management Strategy (NWMS) 2018-2023

The main objective of the Strategy is to reduce the risks to human health and the environment from chemicals through their sustainable management. It is designed to guide MNRE's work on chemicals management. It also provides a de-facto framework for the sustainable management of all chemicals through various stages of their life-cycle – procurement, transportation, storage, distribution, use and waste disposal.

2.2.4 The National Chemical Profile (NCP) 2010

The National Chemical Profile was an attempt to consider and evaluate the infrastructures and systems that facilitated the management of chemicals in Samoa. It involved conducting an in-depth investigation of the operational, technical, legal, financial and institutional issues related to chemical management; judged against international best practices. The NCP document provides a broad assessment of the hazardous chemical management situation in Samoa.

2.2.5 Chemical Capacity Assessment (CCA) 2010

The National Capacity Assessment identified the priority chemicals and set objectives for the development of the NIP. The assessment identified four sites considered to be hotspots mainly because of the contaminations around the sites from chemical spills. Actions were identified to either avoid future contact with area and/or cleaning up the contamination from the area.

2.3 Institutional Framework

The MNRE has the legal mandate to manage the POPs regime virtue of the WMA Section 15 (1) where the ministry shall be responsible for the effective implementation in Samoa of any international convention such as the Stockholm Convention. The other institutions which also play a role in ensuring the sound management of chemicals including new POPs and hold institutional responsibilities are as follows:

Ministry of Education, Sports and Culture (MESC)

The MESC is responsible for setting the school curriculum and therefore plays a crucial role in integrating teaching and learning materials related to environmental sustainability including chemicals and hazardous waste management at all levels.

Ministry of Customs and Revenue (MCR)

The MCR Customs Division (MCR-CD) are an important first line of defence in preventing the entry of POPs into Samoa They are responsible for broader control and conduct thorough inspections of planes and ships coming into Samoa for chemical and pesticide imports. Their Globalised Harmonised System records the volumes and quantities of all imports into Samoa.

Ministry of Finance (MoF)

The ministry harmonizes donor processes and systems to ensure integrated assistance towards meeting national development objectives and manage flow of external financing from initiatives like the SAICM initiative.

Ministry of Health (MoH)

The Health department is also another key institution with an important role in managing POPs. The Health Protection & Enforcement Division (HPED) collaborates with MNRE on hazardous waste issues affecting public health (known as health care wastes contaminated

by potentially infectious substances e.g. blood), human tissue, and/or potentially hazardous chemical substances (e.g. pharmaceuticals). Due to their biological, chemical and/or physical nature, these wastes present special hazards and other aesthetic considerations need to be managed during their generation, classification, segregation, packaging, handling, treatment and disposal.

2.4 Coverage Overview of the Stockholm Convention Obligations to the Samoan Regulatory Framework

ARTICLE 3	Measures to reduce or eliminate releases from intentional production and use

Prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex A to the Convention. Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention

Samoan Regulatory Framework

Nine of the 12 POPs originally listed under the Stockholm Convention are banned from importation under the Rotterdam Convention Prior Informed Consent procedure. There is insufficient data to definitely conclude that intentionally produced POPs listed in Annex A to the Convention as well as the 16 new POPs are being used. There is ample data from inventories and chemical profiles to show that 8 of the 12 original POPs were used before they were banned. However by the time of the 2004 NIP, the use of POPs (Aldrin, Dieldrin, Chlordane and DDT) had discontinued.

In terms of the POPs listed in Annex B to the Convention that allows for the registration of acceptable purposes for the production and use of the listed POPs and for the registration of specific exemptions for the production and use of the listed POPs, Samoa has not transmitted the appropriate written notification and other reporting requirements to the Stockholm Convention Secretariat to request and register Samoa's exemption for DDT even though it was targeted to be done by 2006 as stipulated in the Strategy for the Registration of Exemption.

National legislative frameworks have been established to ban POPs chemicals, regulate their importation and restrict their production and use but there is a need for comprehensive coverage rather than through a number of different laws. It has been suggested this could be done under a new MNRE Act or alternatively that a Chemicals Management Act be prepared to cover all areas of chemicals management not fully captured in the current legal framework. The Draft EMC Bill 2019 will most likely replace the environment related section of the LSE Act. The conventions to which the proposed

Legislation will apply focus on the CBD and related conventions for the conservation and management of the environment in general and do not cover the management of hazardous chemicals.

The WMA 2010 arguably covers all aspects of chemicals waste management except for handling and licensing (although regulations could be made with respect to these aspects). However, it mixes up management of hazardous chemicals and general waste and provides responsibility to MNRE to carry out all these functions. Waste and hazardous chemicals are two completely different contaminants and should be treated as such.

The Pesticides Regulation 2011 Section 10 makes it an offence for any person to import, manufacture, pack, repack, label, store, sell, distribute, advertise, apply, possess, or use any pesticide unless the pesticide has been registered under these regulations. None of the POPs listed in Annex A and B or any of the new POPs have been registered. The Pesticides Regulation however deals with pesticides which is a subset of the chemicals regime.

While a national policy for the management of toxic chemicals and wastes for Samoa was developed, it needs to be updated to reflect current times and trends. There is a new SDS 2017-2021, a new NESP 2017-2021 and to take into account as well as action Plans and priorities for the new POPs.

There is much need to strengthen the capacity of institutions and agencies responsible for regulating chemical management as the CWMU is understaffed and under resourced. The NTT/ SIACM PSC only meet on an ad hoc basis to discuss a live project activity. The Pesticides Technical Committee meets regularly but its technical capacity also needs to be strengthened to identify POPs proposed for importation under a different trade name. The same is true of customs and quarantine officers to detect POPs at the border.

ARTICLE 5 Measures to reduce or eliminate releases from unintentional production

Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention (Article 5) through an action plan or, where appropriate, a regional or sub-regional action plan within two years of the date of entry into force of this Convention for it, and subsequently implement it as part of its implementation plan.

Samoan Regulatory Framework

The main sources for unintentional releases of dioxins and furans are through uncontrolled and controlled combustion processes such as open fire cooking, burning of rubbish and motor vehicle exhausts. The latest balance sheet of dioxins and furans which take into

account all controlled and uncontrolled processes using the Toolkit for the Identification and Quantification of Dioxins and Furans inputs and releases (2012 version) estimate that Samoa emits about 1.34g TEQ/a of dioxins and furans into the atmosphere. This quantity represents a decrease of about 4% from the 2004 audit where the dioxin and furan levels were 1.4g TEQ/a. Emissions to air were the highest with 1.22 g TEQ/a (91% followed by residue emissions of 0,12 g TEQ/a (9%). Releases to water, land and product are negligible. This is low compared to other countries of the world but greater on per capita and land area basis. The decrease from 1.4g TEQ/a to 1.34g TEQ/a may be attributed to awareness programs for monitoring releases and impacts of POPs on the natural environment and human health.

The Strategy for the Reduction of Releases of Unintentional POPs was developed as Part of the initial NIP with the objective of reducing dioxins and furans by 20% by the year 2010 using 2003 as a baseline. The estimated annual average decrease has been 4.3%.

Many of the actions recommended in the Strategy remain unimplemented as shown in Annex A below. For example, setting emission standards for vehicles; enacting legislation to enforce emissions standards on motor vehicles and power generation; developing a long term plan to monitor dioxin and furan bioaccumulation in human tissues and the environment. It is noted that the Scientific Research Organisation of Samoa (SROS) has the technical capacity to carry out this work having tested human hair, water, atmosphere and air for mercury levels in 2018.

In the latest MNRE POPs –Priorities for the Action Plan 2018 (targeting the new POPs), one of the priorities is to reduce releases of unintentional formation of POPs from anthropogenic sources. One of the proposed actions/activities is to participate in the GEFPAS Persistent Organic Pollutants (POPs) Release Reduction Project. The project aims to reduce emissions of POPs particularly those that are produced unintentionally, in the 14 Pacific Island countries who are signatories to the Stockholm Convention. It proposes to do this through the introduction of integrated whole-system approaches to the environmentally sound management of solid and hazardous wastes.

ARTICLE 6 Measures to reduce or eliminate releases from stockpiles and wastes

Ensure that stockpiles and wastes consisting of, containing or contaminated with POPs are managed safely and in an environmentally sound manner.

Samoan Regulatory Framework

While there has been success in identifying disposal sites and disposing of contaminated stockpiles overseas under the POPs in PICs project, there has been little remedial work undertaken to clean up the contaminated sites. This is a glaring deficiency that has not been adequately addressed because such work requires specialized expertise and it is

expensive. Dedicated resources are needed to train staff in the safe handling and disposal of hazardous chemicals, procuring appropriate safety gear and essential equipment for this work and to pay for an expert/s to deliver it.

Greater public awareness of the disposal sites and of clean-up activities requiring public knowledge, participation and support is needed especially on customary lands and involving village communities. Clean-up and management plans for identified contaminated sites need to be completed.

Importers of chemicals are responsible for the disposal of chemicals they bring into the country. They are to dispose of them at their own cost. There is anecdotal evidence that some companies and individual operators have conveniently dug a hole and disposed of their stockpiles and wastes in contravention of the relevant provisions of the WMA 2010. Important measures to eliminate releases from stockpiles and waste include initiatives like the Aus AID/SPREP project that removed existing stockpiles of POPs and Persistent Toxic Substances (PTS) for destruction in Australia.

Unfortunately, the Government landfill does not have any facility at the landfill area in Upolu and Savaii dedicated to receiving and holding chemicals generally (medical waste facility being the exception). The MNRE is working with the private sector (Samoa Recycling and Waste Management Association) to address this key gap.

ARTICLE 7 Implementation plans

Develop and endeavour to implement a plan for the implementation of its obligations under this Convention. Transmit its implementation plan within two years of this Convention entering into force. Review and update, as appropriate, its implementation plan on a periodic basis. Integrate national implementation plans for persistent organic pollutants in their sustainable development strategies where appropriate.

Samoan Regulatory Framework

Samoa submitted its initial NIP to the Secretariat in 2004. The same year the Convention entered into force. During 2016 - 2019 under the Global Environment Facility (GEF)/United Nations Environment Programme (UNEP) project, the review and update of the NIP was conducted.

ARTICLE 9 Information exchange

Facilitate or undertake the exchange of information relevant to the reduction or elimination of the production, use and release of persistent organic pollutants; and alternatives to persistent organic pollutants, including information relating to their risks as well as to their economic and social costs.

Samoan Regulatory Framework

The Action Plan for Information Management and Research developed as part of the initial NIP calls for a national clearinghouse facility for information management and sharing to monitor POPs and PTS chemicals movements and status. While there has been much discussion on this front, this idea remains a work in progress. There is no formalized body called the NTT facilitating and sharing electronic data and information between agencies and institutions although collaboration exists among the various agencies and institutions under separate ministries where management of chemicals is on the agenda. No programmes exist to monitor POPs and PTS targeting specific sites and environmental media. There has also been no training for staff in this area.

Some research to determine the full extent and possible impacts of mercury levels in humans has been carried out by SROS. It is possible that they have also carried out studies on the current POPs bioaccumulation in animal and human tissues but the results of such a study have not been made public. It is unclear if any such study have been carried out by the MoH and NUS that was targeted in the Action Plan to do this work.

ARTICLE 10 Public information, awareness and education

Promote and facilitate awareness among its policy and decision makers and the public including vulnerable and most affected groups of all available information. Training of workers, scientists, educators and technical, managerial personnel and development and exchange of educational and public awareness materials.

Samoan Regulatory Framework

The initial NIP contained an Action Plan for Information Management and Research; an Action Plan for Public Awareness and an Action Plan for Capacity Building and Education.

MNRE and MAF have conducted many awareness raising programs on the impacts of POPs on human health and the environment. This has included national and community level workshops on what the POPs are and how they should be treated throughout their lifecycle.

In the Priorities for the Action Plan- New POPs completed in 2018, one of the priorities is to take measures to disseminate information through public awareness and education. This will involve training and awareness of the public and private sectors on all the POPs (original and new).

ARTICLE 11 Research, development and monitoring

Undertake appropriate research, development, monitoring and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives.

Samoan Regulatory Framework

A number of activities contained in the Action Plan remain a work in progress. For example:

- Develop a national clearinghouse facility for information management and sharing to monitor POPs and PTS' chemicals' movements and status. Its associated Performance Indicator is that Compatible databases are set up in MNRE, MAF, MoH, MCR (Customs), EPC and SWA among others.
- Initiate a programme of continued monitoring of potential contaminated sites and stockpiles. Associated Performance Indicators are (a) a monitoring programme is funded and is generating useful monitoring information, (b) an adequate number of people trained and directly working in the research programme; (c) a number of NGOs are linked to Greenpeace Fiji's Pacific POPs network and others.

3. ASSESSMENT OF NEW POPs INVENTORY IN SAMOA

3.1 Inventory Methodology (new POPs)

The updated inventory was carried out based on inventory report review, data collection; questionnaires from the toolkit, site visits, interviews, existing information, literature review and a number of analytical tests performed for the identification of new POPs. The data on trade of pesticides, electronic devices and products, vehicles, inks, toners, textiles, upholstery and fire-fighting foams were obtained from the Customs Division of MCR, Agriculture Store, Stationery provider, Upholstery companies and Samoa Fire & Emergency Services.

3.2 POPs

Samoa does not have POPs producing industries or factories for manufacturing other synthetic chemicals. However, all related products allowed for use in the country have been imported from abroad as far back in the 1950's (NIP, 2004). At present, Samoa is still importing and using chemicals in the form of insecticides and herbicides for modern agricultural techniques, agrochemical application and sustainable crop yields as well as preventing crop losses due to diseases and pests. These insecticides and herbicides do not contain any POPs and related compounds. There were several awareness programmes on POPs conducted from 2002 to 2004 during and after Samoa formulated the initial NIP. Since then, Samoa had developed regulations and policies on the usage, storage and importation of substances including pesticides[1,2] and hazardous chemicals[3].

The categories for which PFOS and its salts, PFOSF, PBDE, HBCD are suspected of being used as by products, direct exposure and released directly into the environment include electrical and electronic equipment, printing inks and toners, textiles and upholstery.

3.2.1 Inventory of PFOS

PFOS, its salts and PFOSF are usually used in surface treatments and are common in non-stick products, stain resistant fabrics and all-weather clothing. Given their surfactant properties, they have been historically used in a wide range of applications, including fire-

[1] Pesticides Regulations 2011, Ministry of Agriculture and Fisheries, Government of Samoa, http://www.maf.gov.ws

[2] Quarantine and Biosafety Act 2005, Ministry of Natural Resources and Environment, Government of Samoa, http://www.mnre.gov.ws

[3] Waste Management Act 2010, Ministry of Natural Resources and Environment, Government of Samoa, http://www.mnre.gov.ws

fighting foams, surface resistance/repellence to oil, water, grease or soil (UNEP 2012; Government of Brazil, NIP 2015).

For the development of the PFOS and related chemicals inventory, the working team was guided by the UNEP, "Draft revised guidance for the inventory of PFOS and related chemicals listed under the Stockholm Convention on POPs (UNEP, 2015). This inventory used the indicative and qualitative methods.

There is only one fire-fighting organisation in Samoa, the Fire and Emergencies Services Authority (FESA). The FESA reported that they had no stockpiles of PFOS or using PFOS-based foams. There were no pesticides use of PFOS salts in this report, since the information from the Agriculture Store and Quarantine division confirmed that Samoa is no longer importing pesticides containing POPs and its related compounds.

The information on other uses of PFOS and its salts for some applications are negligible since there are no alternatives to PFOS available in Samoa. The approximate data on goods quantities imported in Samoa after the first NIP that are suspected to contain PFOS and related compounds are given in the following table.

Table 1: PFOS and its related compounds

Category of goods	Estimated annual consumption (kg/yr)	PFOS amount content* (mg PFOS/kg** article)	PFOS quantity (kg/yr)
Paper and packaging	307,000	500-5000	153.5-1,535
Textiles, furniture, plastic and upholstery	187,915	500-5000	93.9-939.5
Toners and printing inks	15,750	100	1.58
Total			**248.9-2,474.5**

* *Draft PFOS BAT/BEP Guidelines* (Secretariat of the Stockholm Convention, 2012)
**1mg/kg=1ppm=0,0001%

3.2.2 Inventory of PBDEs in Electronic Electrical Equipment (EEE) and Waste Electronic Electrical Equipment (WEEE)

Polybrominated diphenyl ethers (PBDEs) are a group of industrial aromatic organobromine chemicals that have been used since the 1970s as additive flame retardants in many consumer products (UNEP, 2014). These chemicals are widely used in many industrial sectors for the production of a large number of goods and products. POP-PDBEs are used widely used in the electronics industry for the production of plastic skeleton of computer hardware and in the transportation industry for the production of warheads in vehicles (UNEP, 2014). PBDEs were produced with three different levels of bromure and have been characterised as c-penta, c-octa and c-decaBDE (UNEP, 2014). For the

preparation of the PBDEs inventory, the working team used UNEP's Guidance for the inventory of PBDEs listed under the Stockholm Convention on Persistent Organic Pollutant, (UNEP, 2014). The inventory of POPs-PBDEs covers products and goods that may contain POPs-PBDEs such as electric and electronic equipment and transport vehicles. There is no inventory data on EEE and WEEE available in Samoa. The content of POPs-PBDE which is present in TV-CRT and PC were calculated using the following data:

- Country Population
- Weight of the monitor: 25 kg per device (TV-CRT or PC average weight)
- Polymer content of CRT: 30%
- c-OctaBDE content, 0.87-2.54 kg/tonne for polymers used in CRT casings

A range of c-OctaBDE in CRT devices were calculated as using the following equation:

M_{PBDE} = [Number of CRTs/$capita_{Region}$] x population x 25 kg x 0.3 [0.00087 – 0.00254]

where:

M_{PBDE} is the amount of POP-PBDE in kg

It estimated that the total amount of POPs-PBDEs that comes from EEE is:

M_{PBDE} = 0.17[4] x 195,843 x 25 kg x 0.3 x 0.0017 = 425 kg

The POP-PBDEs (hexaBDE and heptaBDE) in the c-OctaBDE was calculated according to the homologue content of heptaBDE 43% and hexaBDE 11%. The preliminary inventory of POPs-BDEs on TV-CRT and PCs is shown in the table below:

Table 2: Preliminary inventory of POPs-PBDEs

Homologues	Distribution homologues (%)	Total c-OctaBDE (kg)
HexaBDE	11	46.75
HeptaBDE	43	182.75

The import of used cars, buses, trucks and other transport can be a major and ongoing source of POP-PBDEs particularly for low and middle-income countries and needs to be quantified. Since POPs-PBDEs were produced and used in the period from approximately 1975 to 2004, only vehicles produced during this period need to be inventoried for POP-PBDEs (UNEP, 2014). A preliminary inventory of POPs-PBDEs in the transport sector is not available in Samoa due to the lack of reliable data on registered, deregistered and recycling vehicles from 1975 to 2004. A more detailed inventory for the transport sector is recommended.

[4] Since there is no [Number of CRTs/$capita_{region}$] for Samoa and Oceania, thus using 0.17 for Asian average including Australasia (UNEP-POP-Guidance 2014 PBDE Inventory) (Source: Gregory, 2009).

3.2.3 Inventory of HBCD

HBCD is used as a flame retardant additive to reduce ignition of flammable polymers and textiles in buildings and vehicles, electronic equipment and electrical products (UNEP Guidance, 2015). The main application of HBCD is in polystyrene foam that is used in insulation boards, which are widely used in the building and construction sectors. Insulation boards with HBCD may also be found in transport vehicles, and in road and railway embankments (UNEP, 2010a). These polystyrene foams exist in two forms, as expanded polystyrene (EPS) and extruded polystyrene (XPS) foams, with HBCD concentrations ranging from 0.7% to 3.0%. The manufacture of EPS and XPS involves polymerisation and extrusion processes where HBCD is added in the process as one of the additives used (UNEP, 2015). HBCD has been on the world market since the 1960s. The wider use of HBCD in insulation boards started in the 1980s (UNEP, 2015). Since the use of HBCD in packaging is considered minor in most regions, only a fraction of these EPS and XPS might contain HBCD. However, monitoring revealed the use of HBCD containing EPS and XPS in packaging including food packaging (UNEP, 2014). The inventory of HBCD in the construction sector is not available due to the limited data on the percentages of EPS and XPS contained in building structures and insulation products (UNEP, 2015). Based on the approximate amount of textiles used in Samoa, the HBCD average content in these materials was calculated as shown in the table below:

Table 3: HBCD use in textile

Source name	Materials amount (kg)	HBCDs content (%)	Total amount of HBCDs (kg)
Textiles used in vehicles upholstery	120,900[5]	3	3,627
Textiles used in household furniture	187,915	3	5,638
Total	308,815		9,265

[5] Weight of vehicles imported from 2005-2009 (Imported vehicles data, Customs Division, MCR, 2019).

Data gaps and Recommendations

- Lack of reliable data on deregistered and recycling vehicles from 1975 to 2004;
- Lack of reliable data on imported, used and disposed PUR foams;
- Lack of reliable data on imported, used and disposed CRT-TVs and PCs;
- Lack of reliable data on imported,, used and disposed EPS and XPS in construction and building materials & packaging;
- Lack of reliable data on imported, used and disposed products containing HBCD that were in use and recycled;
- In order to reduce/eliminate emissions of by-products that may contain PFOS, it is necessary to control the importation of products that may contain PFOS and its related compounds;
- Detailed inventory of new individual POPs per sector is recommended;
- Control and continuous monitoring of emission sources of new POPs is necessary.

3.3 POPs Stockpiles and Wastes

According to this updated POPs inventory report, there is no evidence available of POPs pesticides and PCBs stockpiles sites in recent years. This is because Samoa has implemented major activities for reducing the release of unintentionally produced POPs pesticides to the environment. Samoa has also conducted major awareness programmes on the impacts on human health release and on strategies for the management of POPs and related compounds. There has been an improvement of existing legislation and regulations addressing POPs; the establishment of the Waste Management Act 2010 and consolidated education and public awareness. There were pesticides used which have been phased out and banned because of their hazardous properties. Currently, there is no facility for discharging or disposing hazardous wastes in Samoa; however plans and strategies have been implemented for shipment of waste off island for discharging and treating hazardous wastes (SPREP, 2000). Also no information is available on the existence of new POPs stockpiles and wastes (end of life vehicles, textile, polystyrene (XPS/EPS)).

3.4 POPs Contaminated Sites

There is no record of incineration of hazardous and municipal/general waste in Samoa. The sites of old and used transformers in the 1970s were considered as hot spots and contaminated sites (NIP, 2004). Currently, the survey team can neither identify nor find any recent information on any potential contaminated sites or hot-spots in Samoa. There are some activities from the initial NIP that were implemented including remedial actions on contaminated sites. Several research studies[6,7,8] revealed that there are microbiological

[6] Aleluia *T.,* 2017, Faculty of Science, National University of Samoa
[7] Patila *M.A.,*2017, Faculty of Science, National University of Samoa
[8] Taema *et al.,* 2016, Faculty of Science, National University of Samoa

and chemical contamination in some environmental compartments in Samoa but not related to new or unintentional produced POPs.

3.5 Unintentionally produced POPs (uPOPs)

Unintentionally produced POPs such as dioxins and furans and PCBs are chemicals listed under Annex B of the Stockholm Convention. The review of the inventory was made with the use of the "Toolkit for identification and quantification of dioxins and furans inputs and releases, version 2012" and other unintentionally POPs. The following procedures were used:

- Identifying types of activities likely to produce and release dioxins and furans in Samoa;
- Collating and compiling information related to the production process (activity rates) and to classify identified sources of releases;
- Using Standardised questionnaires provided in the Toolkit;
- Estimating released based on the information obtained in the previous stages using the Excel spreadsheet provided in support of the Toolkit.

The data summary of the updated inventory of dioxins and furans emissions in the various components is shown in **Table 4** below:

Table 4: Dioxin and furan emissions in Samoa (g TEQ/a) (2017)

Group	Source Groups	Annual Releases (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.066	0.000	0.000	0.000	0.000
2	Ferrous and Non-Ferrous Metal Production	0.000	0.000	0.000	0.000	0.000
3	Heat and Power Generation	0.980	0.000	0.000	0.000	0.000
4	Production of Mineral Products	0.000	0.000	0.000	0.000	0.000
5	Transportation	0.089	0.000	0.000	0.000	0.000
6	Open Burning Processes	0.068	0.000	0.002	0.000	0.000
7	Production of Chemicals and Consumer Goods	0.000	0.000	0.000	0.000	0.000
8	Miscellaneous	0.019	0.000	0.000	0.000	0.000
9	Disposal	0.000	0.000	0.000	0.000	0.119
10	Identification of Potential Hot-Spots	0.000	0.000	0.000	*NA*	*NA*
1-10	TOTAL	1.22	0.00	0.00	0.00	0.12
GRAND TOTAL		**1.34**				

NA = not available (this does not mean that it is nil but no reliable information available)

With the new assessment Toolkit (2012 version), Samoa estimated annual dioxin and furan releases of about 1.34 g TEQ/a. Emissions to air are the highest with 1.22 g TEQ/a (91%), followed by residue emissions representing 0.12 g TEQ/a (9%). Releases to water, land and product are negligible as shown in Figure 3 below.

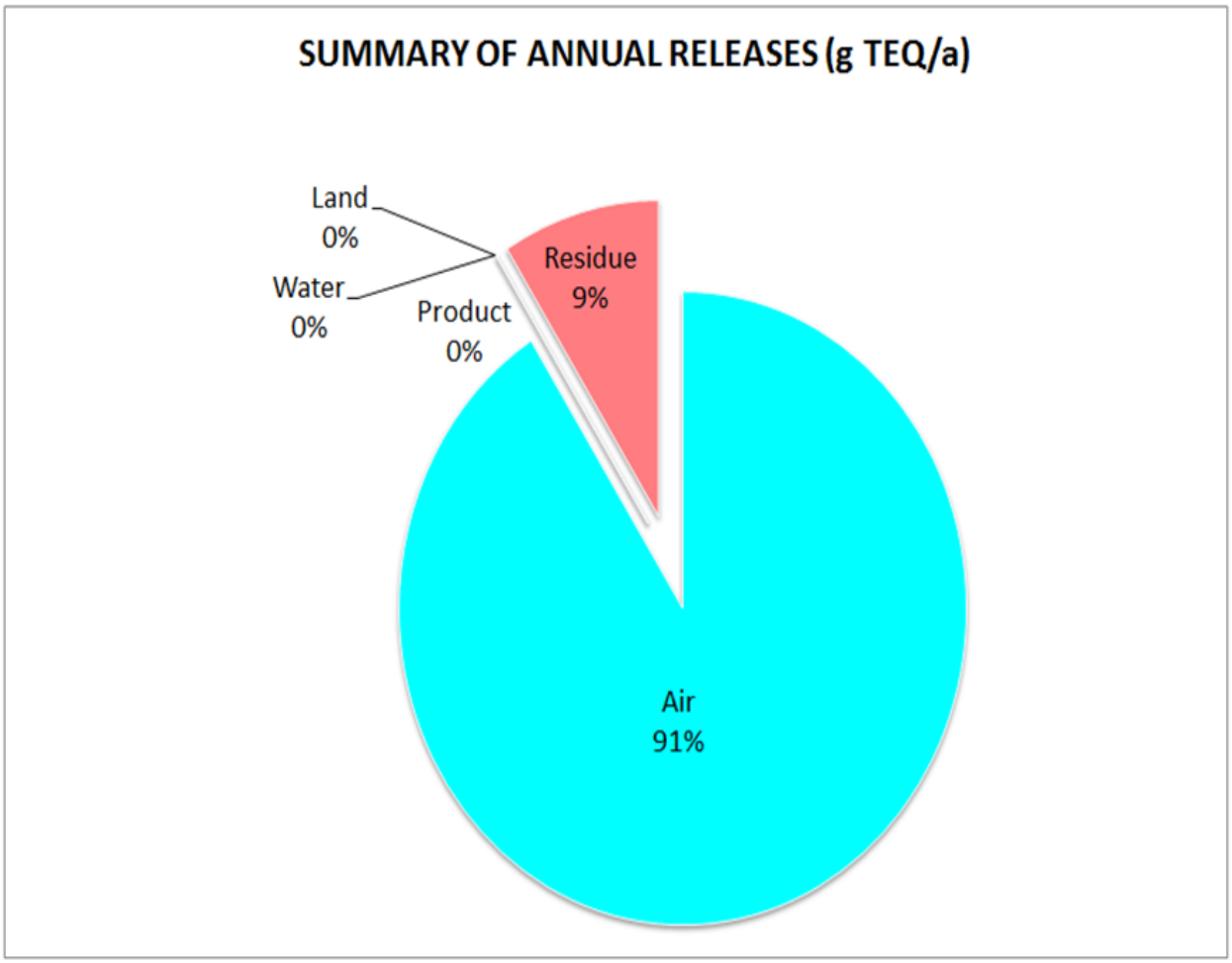

Figure 3: Summary of Annual Releases in Samoa (2017)

There are five source groups that account for the main dioxins and furans emissions to air representing 91% of total emissions. These sources of atmospheric emissions are classified in decreasing order: heat and power generation (80%), transportation (7%), open burning processes (6%), waste incineration (5%) and miscellaneous (2%) as shown in Figure 4 below.

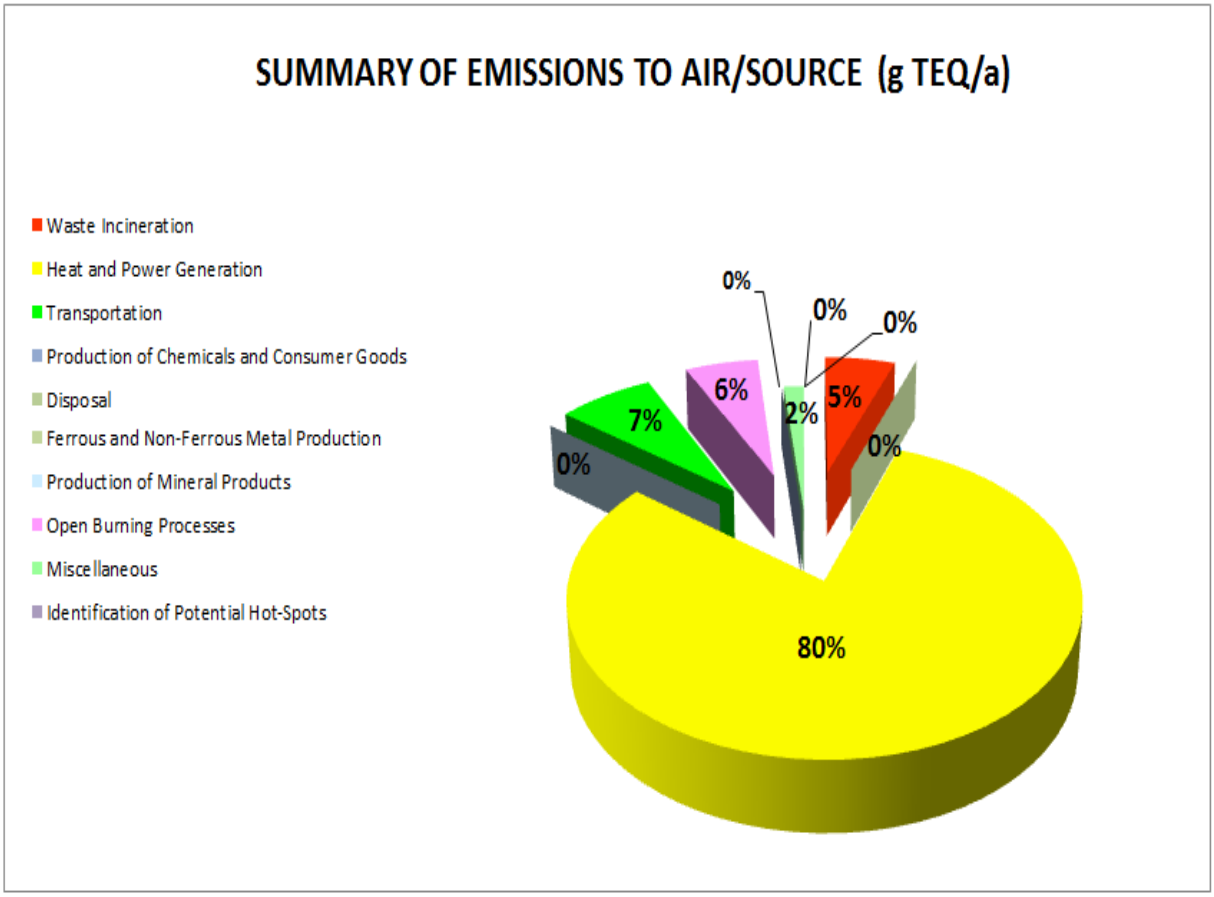

Figure 4: Summary of Emissions to Air/Source (2017)

Compared to 2002, the level of dioxin and furan emission in Samoa decreased from 1.4 g TEQ/a to 1.34 g TEQ/a per annum, representing a 4.3% average annual decrease. The heat and power generation sector with 0.980 g TEQ/a in the air is the highest source of dioxin and furan emission and the most important emissions resulted from household heating and cooking with biomass (wood, other biomass) (refer to Annex).

Furthermore, we noted among other sectors an increase in the emission from transportation which represents an increase from 0.003 g TEQ/a to 0.089 g TEQ/a in air and miscellaneous (crematoria and smoking cigarettes sub-categories) with an increase from 0.000 g TEQ/a to 0.019 g TEQ/a (refer to Annex). The total release of dioxins and furans from transport is 0.089 g TEQ/a (refer to Annex) is thirty times higher than 2002. This could be due to the increased number of fuel imported into Samoa and also this may be associated with how Samoa has implemented additional development activities over the years with a high demand of energy consumption resources.

The other two source categories have shown a drastic decrease in emissions from 0.797 g TEQ/a to 0.066 a TEQ/a in air for waste incineration and 0.245 g TEQ/a to 0.068 g TEQ/a in air for open burning processes (refer to Annex).

It is estimated that dioxins and furans release to air and residues from Miscellaneous sources in this review (0.000 g TEQ) is lower than 2002 (0.150 g TEQ/a). The decrease of the emissions could be due to the following reasons:

(i) the cost of cigarettes is expensive;

(ii) increased awareness programmes towards health maintenance and precaution;

(iii) the cost of cremation in the country is also expensive.

The total release of dioxins and furans from waste disposal in this review is 0.119 g TEQ/a, while in 2002 was 0.000 g TEQ/a. Based on the report , between 0.38kg and 0.48kg of municipality solid waste is generated daily per capita. All the waste in the main island of Upolu which is not burned (95%) is considered to be deposited to the controlled landfill.

Data Gaps and Recommendations

- Lack of reliable data on household cooking and biomass burning (wood);
- Appropriate measures have to be taken on biomass burning in order to reduce intentionally POPs emissions to all environmental compartments;
- Control and continuous monitoring of household cooking and biomass burning especially uncontrolled wood burning/burn for agricultural purposes;
- Stricter control of emissions from fuel quality and transport should be applied.

4. IMPLEMENTATION STRATEGY AND ACTION PLANS

4.1 Policy Statement

Samoa is a Party to the Stockholm Convention that seeks to protect human health and the environment with the aim to reduce or eliminate the production, use, trade, release and storage of POPs. The SDS, 2017-2021 provides an overview of the priorities the Government of Samoa will be progressing over the next four years and the strategic outcomes that Samoa have committed to achieve. One of the key outcomes described in the SDS is Outcome 13 Environmental Resilience which addresses the need for better management and regulation of chemical and hazardous wastes to prevent contamination.

4.2 Implementation Strategy

The implementation of the NIP will involve all sectors such as government ministries, corporations, institutions, non-government organisations and local communities/villages. The MNRE through the CWMU of DEC will have overall coordination of the POPs-NIP implementation.

The implementation of specific activities will involve:

- Key stakeholders (MoH, MAF, MCR, MoF, MESC, MWCSD);
- Institutions (NUS, USP, SROS);
- Regional organisation (SPREP);
- Local communities/villages.

Socio-economic Assessment for National Implementation Plan

For the update and review of NIP for POPs, a socio-economic assessment was prepared based on the UNEP methodology for NIP development and implementation. Based on the stakeholder's consultation, the socio-economic impacts of unsound management of POPs may include the following:

- Deterioration of the health of people: *POPs and its related compounds impose a series of adverse effects on the health of people which have been well documented by many researchers;*
- Nutrition: *availability of nutritious food;*
- Changes in the cost of living: *costs of medical treatments are extremely high;*
- Transportation: *rising fuel costs;*
- Lack of specific technical capacities: *skills and knowledge required to treat chemicals like POPs need to be developed;*

- Impact on vulnerable populations: *current Waste Management Act and Pesticides Regulations should be revised accordingly to minimise exposure to POPs of vulnerable populations particularly women, children and people with special needs;*
- Changes in demand in health sector: *specific capacity for remediating of damages caused by POPs needs to be developed.*

Recommendations

The unsound management of chemicals and wastes is becoming a major global concern due to the resulting negative environmental and public health impacts. Hence, several recommendations were suggested to address the issue, which include the following:

- Source reduction/prevention of wastes containing POPs and related compounds generation;
- Capacity building and development of technical knowledge, expertise for wastes recycling especially wastes containing POPs and related compounds;
- Provision of funding for identifying appropriate technologies for in-country treatment of wastes containing POPs and related compounds;
- Provision of funding for shipment of wastes off island for proper disposal and treatment of wastes containing POPs and related compounds;

Identification of Population at Risk

Population exposed to potential POPs risks can be divided into sub-groups according to the exposure level. Generally, sub-groups are the following:

- Agricultural workers/farmers through the use of POPs and pesticides;
- Waste pickers and contractors at the landfill;
- MNRE staff based at the landfill;
- Locals exposed to dioxin/furan released during food preparations using firewood and open burning activities;
- Contractors collecting wastes containing new POPs;
- Workers at the upholstery industry & recycling companies;
- Fire fighters exposed to fire-fighting foams (may contain new POPs).

Thus, awareness programmes were initiated and conducted to inform and raise awareness about the impact of POPs and their related compounds on the environment and local populations.

Awareness Programmes

Samoa has commenced education and awareness programmes to ensure the sustainability of the environment and health of local communities through the proper management of waste. The Waste Management section of the DEC of MNRE organises awareness programmes in schools, community consultations and workshops to enhance knowledge on waste management as part of the learning process.

Figure 5: School visit to landfill

Figure 6: Youth Community Consultation (Composting Green Waste)

Recommendations

A number of recommendations are presented below on how to improve national awareness campaign on the elimination of POPs and all related compounds at the levels of schools and local communities. The recommendations are as follows:

- Inter -school competition: Speech/Poster competition and Debates;
- National Science and Literacy week;
- National Science Fair;
- Incorporation of information on POPs and related compounds into School curriculum;
- School site visits to landfill and recycling companies;
- Public and community seminar on POPs and related compounds;
- Radio interviews and television documentaries;
- Public events to promote awareness such as at church and sports events;
- Published newspaper articles and pamphlet/brochures;
- Billboards on POPs and how to eliminate such compounds;
- Public demonstrations to promote the reduction of POPs emission (e.g) composting of green waste (Pu'apu'a EKFS Youth Composting of Green Waste Project) and Waste Minimization on segregation and composting.

4.3 Strategies and Action Plans

4.3.1. Priorities for the Action Plans for new POPs

Table 5 below provides a summary of proposed actions for new POPs, the Convention articles they address, the likely lead institution within Samoa, and the potential links to the SDGs. Each action plan is described more in-depth in the following section.

Table 5: Proposed Actions and Convention Articles

Priority	Components	Actions	Articles addressed	Lead Institution	SDG Links
1	Strengthen legal and institution arrangements to implement the Convention at a national level	Strengthen national legislative framework for the obligations related to the ban of new POPs in Samoa through: i. PUMA Act 2007 ii. Water Resource Management Act 2008 iii. Marine Pollution Prevention Act, 2008 iv. Waste Management Act 2010 v. Pesticides Regulation 2011 vi. Waste Management (Importation of Waste for Electricity and Energy Recovery) Regulations 2015 vii. Waste (Plastic Bag) Management Regulation 2019	9, 10, 15, 21, 22	MNRE	16, 17
1	Management of POPs pesticides	i. Development of an adequate legislative framework and policy ii. Develop/update POPs pesticides inventory iii. Life cycle management of POPs pesticides including handling, storage, transfer and disposal of POPs pesticides and wastes iv. Education and awareness of stakeholders (customs, farmers, NGOs and the public) v. Assessment of POPs pesticides and alternative used and implementation of substitution and IPM and organic farming.	3, 6, 9, 10, 11	MNRE	1, 2, 3, 6, 12

1	Management of PFOS, its salts and PFOSF in firefighting foam, insect baits with sulfluramid and metal plating (hard-metal plating)only in closed loop systems	i. Promote effective measures to reduce risks of exposure to PFOS and PFOSF for the identified uses by applying BAT/BEP ii. Ensure that residues of PFOS, its salts and PFOSF are disposed and managed in an environmentally sound manner	3, 5, 6, 9, 10, 11	MNRE	3, 6, 11, 12, 15
1	Management of PBDEs and HBCD containing products/articles	Promote measures to identify, manage and dispose products containing POP-PBDEs and HBCD in an environmentally sound manner	3, 5, 6, 9, 10, 11	MNRE	3, 6, 11, 12, 15
1	Reporting	i. Develop a mechanism for complying with the reporting requirements by submission of reports within the given deadlines ii. Setting up responsibilities for data compilation and filling the reporting form	15	MNRE	12
1	Provision of technical and financial assistance	i. Assessment of technical and financial needs in respect to NIP implementation matters in Samoa. ii. Make a thorough prioritisation of actions for which technical and financial assistance is needed, considering potential synergies of the needed actions.	13	MNRE	12
2	Environmentally sound management of WEEE and ELVs	Implement BAT/BEP for recycling companies for environmentally sound disposal and management of wastes containing POP-PBDEs	3, 5, 6, 9, 10, 11	MNRE and RWMA	3, 6, 11, 12, 15
3	Reduce Releases of Unintentionally formed POPs from Anthropogenic Sources	i. Improve government ministries, corporations and private sector knowledge on uPOPs impact on the environment, human health and uPOPs releases ii. Promote the implementation of BAT/BEP for	3, 5, 6, 9, 10, 11	MNRE	3, 6, 11, 12, 15

		release reduction			
3	Measures to disseminate information on POPs, public awareness and education on POPs	Promote training and awareness of the public and private sectors on POPs	3, 5, 6, 9, 10, 11	MNRE	3, 6, 11, 12, 15
3	Manage POPs contaminated sites	i. Develop regulatory framework for contaminated sites ii. Develop methodology to identify and prioritise sites contaminated with Annex A, B and C chemicals iii. Secure POPs contaminated sites and were conduct feasible remediation of contaminated sites	6	MNRE	3, 6, 12
3	Research development and monitoring	Establish the policy – science dialog for more targeted research based on national priorities related to POPs and other hazardous chemicals	11	MNRE, NUS, SROS	12

4.3.2 Legal and Institution Arrangements to Implement the Convention at a National Level

Plan: 1

Priority: 1

Convention articles addressed and requirements	
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 15	Parties to report to the Conference of the Parties (COP) on measures to implement the provisions of the Convention.
Article 21	Amendments to the Convention may be proposed by any Party and need to consider such proposal at any time.
Article 22	Adoption and amendments of annexes or any additional annexes may be proposed by any Party and need to consider such proposal.

Proposed Actions/Activities:

Strengthen national legislative framework for the obligations related to the ban and restrictions of new POPs in Samoa through the promotion of relevant amendments of:

i. PUMA Act 2007
ii. Water Resource Management Act 2008
iii. Marine Pollution Prevention Act, 2008
iv. Waste Management Act 2010
v. Pesticides Regulation 2011
vi. Waste Management ((Importation of Waste for Electricity and Energy Recovery) Regulations 2015
vii. Waste (Plastic Bag) Management Regulation 2019

Rationale:

This plan pursues to strengthen the national legislative framework for the obligations related to the ban of new POPs in Samoa. The plan seeks to update the existing policies, regulations and acts thus avoiding the development of new legislations and regulations.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, MoH, MAF, MoF, SROS, SBS, MWCSD, AG	16, 17	5 years	US $1 million

4.3.3 POPs pesticides

Plan: 2

Priority: 1

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Article 5	Measures to reduce or eliminate releases from unintentional production set out in Annex C.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

i. Updating the existent regulations to restrict/address all listed pesticides by banning and regulating of new/all listed POPs pesticides;
ii. Develop regulatory measures to combat illegal traffic of banned pesticides and counterfeit pesticides;
iii. Regulatory framework for good agricultural practice, IMP and organic farming;
iv. Develop/update POPs pesticides inventory;
v. General improvement of POPs pesticides and general pesticide management;
vi. Establishing of an empty container collecting and management system with specific attention to address the use and recycling of pesticides empty containers;
vii. Strengthen the inspection on pesticides for customs and for competent authority (market survey, sales, storage, usage and disposal including counterfeit and illegal pesticides);
viii. Supporting implementation and research on IPM/IVM, including the use of alternatives as a measure for reducing POPs pesticides;
ix. Education and capacity building on alternatives and organic farming and implementation.

Rationale:
The overall objective of the action plan in respect to pesticides is to stop POPs pesticides and to use less pesticides and to ensure a safe use of pesticides for environmental and human health.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, MoH, MCR, MAF	3, 6, 11, 12, 15	5 years	US $2 million

4.3.4 PFOS, its salts and PFOSF (in firefighting foam, insect baits with sulfluramid and metal plating (hard-metal plating) only in closed-loop systems)

Plan: 2

Priority: 1

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

Promote measures to identify, manage and dispose products containing PBDEs in an environmentally sound manner.

i. Identify and quantify the main uses of PFOS, its salts and PFOSF in Samoa;
ii. Promote effective measures to reduce risks of exposure to PFOS, its salts and PFOSF for the identified uses by applying BAT/BEP and substituting it by the most sustainable chemical and non-chemical solution;
iii. Ensure that wastes containing PFOS, its salts and PFOSF are managed and disposed in an environmentally sound manner;
iv. Revise procurement regulations to exclude the importation of products containing PFOS, its salts and PFOSF;
v. Assessment/listing if specific exemptions and/ or acceptable purposes are needed for PFOS, its salts and PFOSF (in particular for fire-fighting foams) in Samoa;
vi. Conducting building capacity in the proper management and disposal of products containing PFOS, its salts and PFOSF;
vii. Provide training and awareness raising for stakeholder groups on PFOS, its salts and PFOFS.

Rationale:

The Convention requires Parties to take effective measures to reduce the use of products/articles containing PFOS, its salts and PFOSF, identify feasible alternatives and to avoid its emission or release when it becomes wastes. Samoa is making substantial efforts to arrange for the collection and shipment of hazardous wastes for treatment.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, SPREP, MoH, MCR, MoF, SSAB, RWMA	3, 6, 11, 12, 15	5 years	US $2.5 million

4.3.5 POP-PBDEs

Plan: 3

Priority: 1

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

Promote measures to identify, manage and dispose products containing POP-PBDEs in an environmentally sound manner.

i. Identify and quantify the existent POP-PBDEs containing product/articles stockpiles in use and in storage in Samoa;

ii. Identify and quantify the amounts of WEEE and ELVs in Samoa;

iii. Prepare a programme to soundly manage and dispose after becoming wastes of products/articles that contain POP-PBDEs;

iv. Explore techniques and practices for waste management used by companies dealing with waste of electric and electronics and promote taking measures to reduce risks of exposure and waste management practices (e.g) by implementing BAT/BEP.

v. Conduct public awareness programmes on negative effects of POPs and ways to prevent or minimise the WEEE generation;

vi. Develop strategies for the registration of electronic devices, materials, including wastes containing POP-PBDEs entering in Samoa.

Rationale:

The action plan focuses on setting objectives and actions need to lead to managing and controlling POPs-PBDEs containing products still in use, currently recycled, stockpiled or landfilled. The implementation can only be successful if the overall management of EEE/WEEE and end of life vehicles waste is appropriately developed. This is considered and addresses in this action plan but need to be addressed in and linked to the larger frame of the national waste management action plan. This plan provides the final disposal and shipping activities undertaken in accordance with the Stockholm Convention and existing programmes for the environmentally sound disposal of POP-PBDEs containing wastes.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, SPREP, MoH, MCR, MoF	3, 6, 11, 12, 15	5 years	US $2.5 million

4.3.6 HBCD

Plan: 5

Priority: 1

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

Explore alternatives used by recycling companies for proper disposal and manage products containing HBCD in an environmentally friendly manner.

i. Identify and quantify the existent HBCD containing products/article stockpiles in use and in storage in Samoa;
ii. Prepare a programme to soundly manage and dispose after becoming wastes of product/articles that contain HBCD including demolition waste;
iii. Explore techniques and practices for waste management used by companies for proper management and disposal products containing HBCD including demolition wastes;
iv. Seek financial assistance for research institutions and waste management companies to acquire equipment that can detect HBCD in products for monitoring and environmentally sound management;
v. Support initiatives that promote the recycling of vehicle parts through Samoa's development partners and collaboration efforts with other countries.
vi. Amend existing regulations and acts on waste management to regulate the dismantling activity of vehicles and demolition waste management in Samoa;
vii. Development of a regulatory framework for HBCD in insulation;
viii. Assessment/listing if exemption needed for HBCD in insulation in Samoa
ix. Support existing programmes that promote the recycling of vehicle parts and shipment of POPs wastes off-island;
x. Promote the implementation of BAT/BEP for the use of HBCD in insulations;
xi. Promote the use of alternatives insulation materials.

Rationale:

This plan seeks to manage products/articles containing HBCD in an environmentally manner along the entire lifecycle. The implementation can only be successful if the overall management of HBCD containing waste is appropriately developed. This is considered and addressed in this action plan but need to be addressed in and linked to the larger frame of the national waste management action plan.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, RWMA, SPREP, MoH, MCR, MoF	3, 6, 11, 12, 15	5 years	US $2.5 million

4.3.7 Reduce Releases of Unintentionally formation POPs from Anthropogenic Sources

Plan: 6

Priority: 3

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Article 5	Measures to reduce or eliminate releases from unintentional production set out in Annex C.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

i. Establish policy and legal framework for reduction and minimisation of unintentional POPs, possibly within and integrated pollution prevention and control approach and considering the establishment of emission standards or limits for uPOPs for sources and in environmental media or food;

ii. Updated sources inventories for PCDD/F and possibly other listed uPOPs with data management and harmonization with related release inventories;

iii. Considering developing of an integrated database of pollutant releases (e.g. Dioxin/uPOPs, mercury, GHG; black carbon) and/or of a pollutant releases transfer register (PRTR);

iv. Reduce releases from open burning of wastes and biomass burning by improvement of waste management and promotion of the BAT/BEP;

v. Carry out workshops and seminars on the reduction/elimination actions and monitoring of sources;

vi. Prepare an engagement, dissemination and education plan for uPOPs including awareness raising campaigns on Dioxins and uPOPs and other pollutants of concern for relevant stakeholders and sources;

vii. Participate in the Global Monitoring Plan (GMP) of POPs of the UNEP in order to obtain information on trends and other countries in particular the Pacific region.

Rationale:

Activities are proposed for the action plan to reduce the release from unintentionally produced POPs (PCDD/PCDF and unintentional PCB, PCN, HCB and PeCB). In the action plan the activities have been set by considering the listing of the priority sources in Annex C of the SC, the contemporary releases as an outcome of the inventory process and considering point sources with potential risk to humans. This plan seeks to improve government ministries, corporations and the private sector knowledge on uPOPs impacts on the environment, human health and the sources of uPOPs releases and general measures for the reduction/elimination of uPOPs.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, SPREP, MoH, MCR, MoF	3, 5, 6, 11, 12, 15	5 years	US $3 million

4.3.8 Environmentally Sound Management of POPs Contaminated Sites

Plan: 7

Priority: 3

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Article 5	Measures to reduce or eliminate releases from unintentional production set out in Annex C.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

i. Develop/update legislation to set criteria for determining contaminated sites for relevant POPs, including on liability (polluter pays principle);
ii. Develop methodology to identify and prioritize POPs contaminated sites considering available guidance documents;
iii. Develop of inventory and database of potentially POPs contaminated sites;
iv. Secure POPs contaminated sites, and were feasible conduct remediation of contaminated sites.

Rationale:

Article 6 of the Stockholm Convention requires that Parties develop appropriate strategies for the identification of sites contaminated with chemicals listed in Annex A, B or C and if remediation of such sites is carried out to do it in an environmentally sound manner. The activities for the identification and assessment of POPs-contaminated sites should be harmonized with the general strategy of Samoa to assess and remediate contaminated sites and hotspots.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, SPREP, MoH, MCR, MoF, MAF	3, 5, 6, 11, 12, 15	5 years	US $2.5million

4.3.9 Disseminate Information, Public Awareness and Education

Plan: 8

Priority: 3

Convention articles addressed and requirements	
Article 3	Measures to reduce or eliminate releases from intentional production and use set out in Annex A and Annex B.
Article 5	Measures to reduce or eliminate releases from unintentional production set out in Annex C.
Annex 6	Measures to reduce or eliminate releases from stockpiles and wastes set out in Annex A, B or C.
Article 9	Information exchange to be facilitated between Parties regarding the reduction or elimination of the production, use and release of POPs and alternatives.
Article 10	Public information, awareness and education to be provided to the public on POPs and alternatives.
Article 11	Research, development and monitoring: Parties to encourage and/or undertake cooperation, research, development and monitoring pertaining to POPs to avoid the impacts of POPs on human health, socio-economic and cultural and environment.

Proposed Actions/Activities:

i. Adopt education and training materials on POPs & hazardous chemicals tailored for target groups (policy makers, industry, public, curricula) considering available materials and translate selected materials into the country languages;
ii. Carry out training and seminar programmes on chemical waste management focusing on POPs;
iii. Providing training and guidance for stakeholder groups that are directly exposed, treating equipment and waste containing POPs;
iv. Implement the activities to raise awareness and training for inspectors and customs, on the contents related to POPs management;
v. Compile and disseminate information materials available on alternatives to POPs;
vi. Incorporate information on Stockholm Convention on POPs into existing Primary and Secondary Schools curricula;
vii. Prepare and disseminate education plan on POPs;
viii. Carry out workshops on POPs at the community level.

Rationale:
This plan seeks to promote training and awareness programmes on POPs management to the public, at the community level and disclose information on POPs.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, MESC, MoF, SPREP	3, 6, 11, 12, 15	5 years	US $3 million

4.3.10 Reporting

Plan: 9

Priority: 1

Convention articles addressed and requirements	
Article 15	Report to the Conference of Parties (COP) on measures taken to implement the provisions of the Convention as well as the effectiveness of the measures taken.

Proposed Actions/Activities:

i. Develop a mechanism for complying with the reporting requirements by submission of reports within the given deadlines;
ii. Setting up responsibilities for data compilation and filling the reporting form;
iii. Provide periodically training on reporting obligations and reporting format and data collection and compilation processes;
iv. Compile information for reporting (qualitative and quantitative);
v. Internally approve and submit report to the secretariat (via Electronic Reporting System).

Rationale:

Article 15 of the Stockholm Convention on POPs mandates parties to report to the Conference of Parties (COP) on measures taken to implement the provisions of the Convention as well as the effectiveness of the measures taken. This Action Plan therefore aims at collecting/collating all information relevant to the provisions of the Convention, according to the reporting format, and reporting it to the secretariat and the COP.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE	12	4 years	US $1.5 million

4.3.11 Research, Development and Monitoring

Plan: 10

Priority: 3

Convention articles addressed and requirements	
Article 11	Undertake appropriate research, development, monitoring and cooperation on POPs

Proposed Actions/Activities:

i. Identify relevant national institutions with the potential to undertake research on POPs and other hazardous chemicals;
ii. Establish the policy – science dialog for more targeted research based on national priorities related to POPs and other hazardous chemicals;
iii. Establish capacities on health, exposure and risk assessment to POPs and other hazardous chemicals;
iv. Develop networks among identified research institutions on national and international level on POPs and other hazardous chemicals;
v. Improve the communication of POPs and other hazardous chemicals research/scientific findings to the policy and decision makers and to the public;
vi. Develop laboratory capacity and/or international cooperation for POPs and other hazardous chemicals considered relevant for the country, including establishing effective quality assurance and quality control system;
vii. Build the capacity for monitoring the POPs action plans implementation.

Rationale:

Article 11 of the Stockholm Convention provides that Parties undertake appropriate research, development, monitoring and cooperation on POPs. The overall research capacity on POPs contamination in the environment, food or humans is low and or not existing in Samoa. For POPs research and monitoring, international and regional cooperation is a feasible approach to progress on these topics. In this respect, capacity building activities offered in the frame of the Stockholm Convention such as the Global Monitoring Plan should be considered for possible participation. The research and monitoring of POPs and chemicals in general play a crucial role for informed decision and policy making. Strengthening of science-policy interface is a global endeavor towards which Samoa could play a role by taking measures to enhance its own at national level.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, NUS, SROS, SPREP, MoH	12	5 years	US $3 million

4.3.12 Technical and Financial Assistance

Plan: 11

Priority: 1

Convention articles addressed and requirements	
Article 13	Provide financial resources for carrying out the national implementation as to achieve the Convention's objectives

Proposed Actions/Activities:

iii. Assessment of technical and financial needs in respect to NIP implementation matters in Samoa.

iv. Make a thorough prioritisation of actions for which technical and financial assistance is needed, considering potential synergies of the needed actions.

v. Conduct assessment of potential financial and technical assistance sources/donors, including on the conditions applying in getting the assistance.

vi. Request/apply for financial assistance through proposal writing, taking into consideration each donor specificities.

Rationale:

The ability of the country to fulfil its obligations under the Convention depends on the existence of adequate financial and technical assistance. As a SIDS, Samoa needs technical and financial assistance and will seek this assistance when implementing its NIP. The following actions are suggested to enable the country obtain the needed financial and technical support required for the successful implementation of activities and actions to be carried out to achieve the Comvention objectives.

Lead Institution and stakeholders	SDG Links	Time Frame	Budget
MNRE, MoF, SPREP	12	5 years	US $1.5 million

4.4 Updating of Action Plans – Initial POPs

Prior to the development of the NIP, an initial POPs and Persistent Toxic Substance (PTS) inventory was compiled which revealed the presence of 8 of the banned 12 initial POPs targeted by the Stockholm Convention. Below are some priority actions that were implemented in the past years and the current status. These priority actions were identified from workshops and through consultations with relevant stakeholders (NIP, 2004).

OBJECTIVES	PRIORITIES	IMPLEMENTED AGENCY	STATUS
Eliminate the intentional release of POPs	Develop and implement national policy on chemical including POPs	MNRE	Completed
	Control the importation of chemicals including products with POPs content	MNRE, GEF & MCR	Completed
Reduce the unintentional production of POPs	Strengthen national regulatory framework to reduce the release of dioxin and furans	MNRE, GEF	Completed
	Reduce the burning of firewood for cooking	MNRE	Awaiting confirmation from relevant organisations
	Strengthen vehicle testing to ensure improved engine performance	MNRE, LTA, Private Sector	Completed
	Install proper air pollution control systems for all major incinerators and industries	MNRE, Private Sector	Awaiting confirmation from relevant organisations
	Assess and monitor the levels of dioxin and furans production	MNRE, GEF	Awaiting confirmation from relevant organisations
Reduce and/or eliminate releases from surplus stockpiles and chemical wastes	Develop database to support the sustainable management of chemicals	MNRE, GEF	Not implemented
	Assess the impact of POPs bio-accumulation in local animal tissue and humans	MNRE, GEF	Awaiting confirmation from relevant organisations

National coordination	Strengthen the functions and roles of MNRE for the sustainable management of POPs/PTS	MNRE	Completed
Public awareness	Conduct public awareness programmes on the sustainable management of POPs/NIP	MNRE	On going

Challenges and Gaps

The activities of the Action Plan and Priorities for the initial NIP of the Stockholm Convention were carried out. However, there were some challenges identified in which the delayed implementation of some activities. These include:

- Replacement of staff and managers that can lead to the discontinuity of some actions;
- Lack of expertise in the specialised area;
- Lack of IT systems for data/activities registry which hinders the rapid collecting and collating of information and recording the history of activities;
- Availability of funds.

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Waste Management (Importation of Waste for Electricity and Energy Recovery) Regulations 2015.
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ANNEX 1

Table I: Dioxins and Furans source-categories – Heat and Power Generation

Group	Cat.	Class	Source categories	Potential Release Route (µg TEQ/TJ)					Production TJ/a	Annual release				
				Air	Water	Land	Product	Residue		g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
3			**Heat and Power Generation**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Fossil fuel power plants**							**0.000**	**0**	**0**	**0**	**0.0**
		1	Fossil fuel/waste co-fired power boilers	35	ND	NA	NA	ND		**0.000**				
		2	Coal fired power boilers	10	ND	NA	NA	14		**0.000**				**0.000**
		3	Peat fired power boilers	17.5	ND	NA	NA	ND		**0.000**				
		4	Heavy fuel fired power boilers	2.5	ND	NA	NA	ND		**0.000**				
		5	Oil shale fired power plants	1.5	ND	NA	NA	ND		**0.000**				
		6	Light fuel oil/natural gas fired power boilers	0.5	ND	NA	NA	ND		**0.000**				
	b		**Biomass power plants**						**0**	**0.000**	**0**	**0**	**0**	**0.0**
		1	Mixed biomass fired power boilers	500	ND	NA	NA	ND		**0.000**				
		2	Clean wood fired power boilers	50	ND	NA	NA	15		**0.000**				**0.000**
		3	Straw fired boilers	50	ND	NA	NA	70		**0.000**				**0.000**
		4	Boilers fired with bagasse, rice husk etc.	50	ND	NA	NA	50		**0.000**				**0.000**
	c		**Landfill biogas combustion**						**0**	**0.000**	**0**	**0**	**0**	**0.0**
		1	Biogas-/landfill gas fired boilers, motors/turbines and flaring	8	ND	NA	NA	NA		**0.000**				
	d		**Household heating and cooking - Biomass**					µg TEQ/t Ash	**49,000**	**0.980**	**0**	**0**	**0**	**0.0**
		1	Contaminated wood/biomass fired stoves	1,500	ND	ND	NA	1,000		**0.000**				**0.000**
		2	Virgin wood/biomass fired stoves	100	ND	ND	NA	10		**0.000**				**0.000**
		3	Straw fired stoves	450	ND	ND	NA	30		**0.000**				**0.000**
		4	Charcoal fired stoves	100	ND	ND	NA	0.1		**0.000**				**0.000**
		5	Open-fire (3-stone) stoves (virgin wood)	20	ND	ND	NA	0.1	49,000	**0.980**				**0.000**
		6	Simple stoves (virgin wood)	100	ND	ND	NA	0.1		**0.000**				**0.000**
	e		**Domesting heating - Fossil fuels**					µg TEQ/t Ash	**0**	**0.000**	**0**	**0**	**0**	**0.0**
		1	High chlorine coal/waste/biomass co-fired stoves	1,700	ND	NA	NA	5,000		**0.000**				**0.000**
		2	Coal/waste/biomass co-fired stoves	200	ND	NA	NA	NA		**0.000**				
		3	Coal fired stoves	100	ND	NA	NA	5		**0.000**				**0.000**
		4	Peat fired stoves	100	ND	NA	NA	NA		**0.000**				
		5	Oil fired stoves	10	ND	NA	NA	NA		**0.000**				
		6	Natural gas or LPG fired stoves	1.5	ND	NA	NA	NA		**0.000**				
3			**Heat and Power Generation**							**0.980**	**0**	**0**	**0**	**0.0**

Table II: Dioxins and Furans source categories – Waste Incineration

Group	Cat.	Class	Source categories	Potential Release Route (µg TEQ/t)						Production t/a	Annual release					
								Residue			g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Fly ash	g TEQ/a Bottom Ash
				Air	Water	Land	Product	Fly Ash	Bottom Ash							
1			**Waste incineration**													
	a		**Municipal solid waste incineration**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Low technol. combustion, no APCS	3,500		NA	NA	0	75		**0.000**				**0.000**	**0.000**
		2	Controlled comb., minimal APCS	350		NA	NA	500	15		**0.000**				**0.000**	**0.000**
		3	Controlled comb., good APCS	30		NA	NA	200	7		**0.000**				**0.000**	**0.000**
		4	High tech. combustion, sophisticated APCS	0.5		NA	NA	15	1.5		**0.000**				**0.000**	**0.000**
	b		**Hazardous waste incineration**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Low technol. combustion, no APCS	35,000		NA	NA	9,000			**0.000**				**0.000**	**0.000**
		2	Controlled comb., minimal APCS	350		NA	NA	900			**0.000**				**0.000**	**0.000**
		3	Controlled comb., good APCS	10		NA	NA	450			**0.000**				**0.000**	**0.000**
		4	High tech. combustion, sophisticated APCS	0.75		NA	NA	30			**0.0000**				**0.000**	**0.000**
	c		**Medical waste incineration**							**22**	**0.066**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Uncontrolled batch combustion, no APCS	40,000		NA	NA		200		**0.000**				**0.000**	**0.000**
		2	Controlled, batch, no or minimal APCS	3,000		NA	NA		20	22	**0.066**				**0.000**	**0.000**
		3	Controlled, batch comb., good APCS	525		NA	NA	920	ND		**0.000**				**0.000**	
		4	High tech, continuous, sophisticated APCS	1		NA	NA	150			**0.000**				**0.000**	**0.000**
	d		**Light fraction shredder waste incineration**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Uncontrolled batch comb., no APCS	1,000		NA	NA	ND	ND		**0.000**					
		2	Controlled, batch, no or minimal APCS	50		NA	NA	ND	ND		**0.000**					
		3	High tech, continuous, sophisticated APCS	1		NA	NA	150			**0.000**				**0.000**	**0.000**
	e		**Sewage sludge incineration**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Old furnaces, batch, no/little APCS	50		NA	NA	23			**0.000**				**0.000**	**0.000**
		2	Updated, continuously, some APCS	4		NA	NA	0.5			**0.000**				**0.000**	**0.000**
		3	State-of-the-art, full APCS	0.4		NA	NA	0.5			**0.000**				**0.000**	**0.000**
	f		**Waste wood and waste biomass incineration**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Old furnaces, batch, no/little APCS	100		NA	NA	1,000			**0.000**				**0.000**	**0.000**
		2	Updated, continuously, some APCS	10		NA	NA	10			**0.000**				**0.000**	**0.000**
		3	State-of-the-art, full APCS	1		NA	NA	0.2			**0.000**				**0.000**	**0.000**
	g		**Animal carcasses burning**							**0**	**0.000**	**0**	**0**	**0**	**0.000**	**0.000**
		1	Old furnaces, batch, no/little APCS	500		NA	NA	ND	ND		**0.000**					
		2	Updated, continuously, some APCS	50		NA	NA	ND	ND		**0.000**					
		3	State-of-the-art, full APCS	5		NA	NA	ND	ND		**0.000**					
1			**Waste Incineration**								**0.066**	**0**	**0**	**0**	**0.000**	**0.000**

Table III: Dioxins and Furans source categories – Open Burning Processes

Group	Cat.	Class	Source categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
				Air	Water	Land	Product	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
6			**Open Burning Processes**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Biomass burning**						**0**	**0.000**	**0**	**0.000**	**0**	**0**
		1	Agricultural residue burning in the field of cereal and other crops stubble, impacted, poor burning conditions	30	ND	10	NA	NA		**0.000**		**0.000**		
		2	Agricultural residue burning in the field of cereal and other crops stubble, not impacted	0.5	ND	0.05	NA	NA		**0.000**		**0.000**		
		3	Sugarcane burning	4	ND	0.05	NA	NA		**0.000**		**0.000**		
		4	Forest fires	1	ND	0.15	NA	NA		**0.000**		**0.000**		
		5	Grassland and savannah fires	0.5	ND	0.15	NA	NA		**0.000**		**0.000**		
	b		**Waste burning and accidental fires**						**1,709**	**0.068**	**0**	**0.002**	**0**	**0**
		1	Fires at waste dumps (compacted, wet, high Corg content)	300	ND	10	NA	NA		**0.000**		**0.000**		
		2	Accidental fires in houses, factories	400	ND	400	NA	NA		**0.000**		**0.000**		
		3	Open burning of domestic waste	40	ND	1	NA	NA	1,709	**0.068**		**0.002**		
		4	Accidental fires in vehicles (per vehicle)	100	ND	18	NA	NA		**0.000**		**0.000**		
		5	Open burning of wood (construction/demolition)	60	ND	10	NA	NA		**0.000**		**0.000**		
6			**Open Burning Processes**							**0.068**	**0**	**0.002**	**0**	**0.000**

Table IV: Dioxins and Furans source categories – Transport

Group	Cat.	Class	Source categories	Potential Release Route (µg TEQ/t)					Consumption t/a *	Annual release				
				Air	Water	Land	Product	Residue		g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
5			**Transport**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**4-Stroke engines**						**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
		1	Leaded fuel	2.2	NA	NA	NA	NA		**0.000**				
		2	Unleaded gasoline without catalyst	0.1	NA	NA	NA	NA		**0.000**				
		3	Unleaded gasoline with catalyst	0.001	NA	NA	NA	NA		**0.000**				
		4	Ethanol with catalyst	0.0007	NA	NA	NA	NA		**0.000**				
	b		**2-Stroke engines**						**33,576**	**0.084**		**0**	**0**	**0**
		1	Leaded fuel	3.5	NA	NA	NA	NA		**0.000**				
		2	Unleaded fuel	2.5	NA	NA	NA	NA	33,576	**0.084**				
	c		**Diesel engines**						**49,519**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**
		1	Regular Diesel	0.1	NA	NA	NA	ND	49,519	**0.005**				
		2	Biodiesel	0.07	NA	NA	NA	ND		**0.000**				
	d		**Heavy oil fired engines**						**0**	**0.000**	**0**	**0**	**0**	**0**
		1	All types	2	NA	NA	NA	ND		**0.000**				
5			**Transport**							**0.089**	**0**	**0**	**0**	**0**

Table V: Dioxins and Furans source categories – Miscellaneous

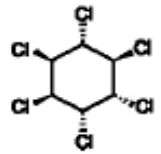
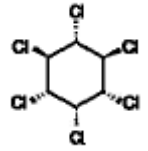
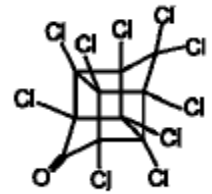
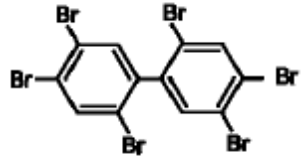
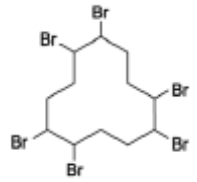
Group	Cat.	Class	Source categories	Potential Release Route (µg TEQ/t)					Production t/a	Annual release				
				Air	Water	Land	Product	Residue		g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Residue
8			**Miscellaneous**											
	a		**Drying of biomass**						**0**	**0.000**	**0**	**0**	**0.000**	**0.000**
		1	Highly contaminated fuel (PCP treated)	10	NA	ND	0.5	2,000		**0.000**			**0.000**	**0.000**
		2	Moderately contaminated fuel	0.1	NA	ND	0.1	20		**0.000**			**0.000**	**0.000**
		3	Clean fuel	0.01	NA	ND	0.1	5		**0.000**			**0.000**	**0.000**
	b		**Crematoria**						**208**	**0.019**	**0**	**0**	**0**	**0.000**
		1	No control (per cremation)	90	NA	NA	NA	ND	208	**0.019**				
		2	Medium control or open air cremations (per cremation)	10	NA	NA	NA	2.5		**0.000**				**0.000**
		3	Optimal control (per cremation)	0.4	NA	NA	NA	2.5		**0.000**				**0.000**
	c		**Smoke houses**						**0**	**0.000**	**0**	**0**	**0**	**0.000**
		1	Contaminated fuels	50	NA	ND	ND	2,000		**0.000**				**0.000**
		2	Clean fuels, no afterburner	6	NA	ND	ND	20		**0.000**				**0.000**
		3	Clean fuels, afterburner	0.6	NA	ND	ND	20		**0.000**				**0.000**
	d		**Dry cleaning**						**0**	**0**	**0**	**0**	**0**	**0.000**
		1	Heavy textiles, PCP-treated, etc.	NA	NA	NA	NA	3,000						**0.000**
		2	Normal textiles	NA	NA	NA	NA	50						**0.000**
	e		**Tobacco smoking**						**972**	**0.0001**	**0**	**0**	**0**	**0.0000972**
		1	Cigar (per million items)	0.3	NA	NA	NA	0.3		**0.000**				**0.000**
		2	Cigarette (per million items)	0.1	NA	NA	NA	0.1	972	**0.000**				**0.000**
8			**Miscellaneous**							**0.019**	**0**	**0**	**0.000**	**0.000**

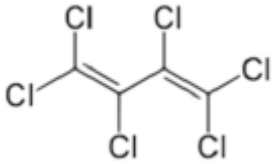
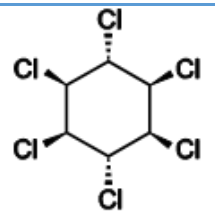
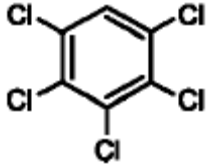
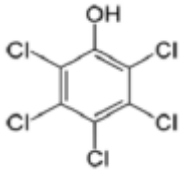
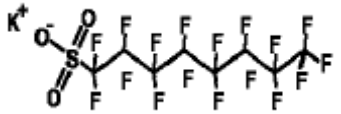
Table VI: Dioxins and Furans source categories – Disposal / Landfill

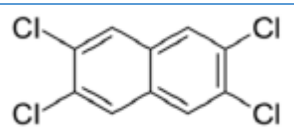
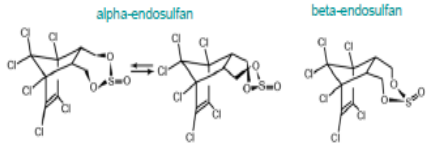
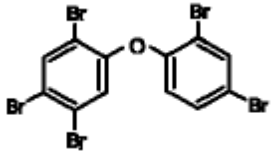
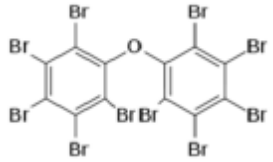
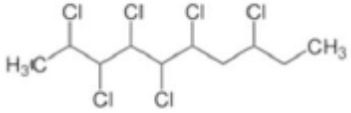
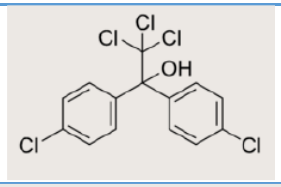
			Source categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
Group	Cat.	Class		Air	Water	Land	Product	Residue		g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Residue
9			**Disposal**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Landfills, Waste Dumps and Landfill Mining**						**23,871**	**0.000**	**0.001**	**0.000**	**0.000**	**0.119**
		1	Hazardous wastes	NA	5	NA	NA	NA			**0.000**			
		2	Mixed wastes	NA	0.5	NA	NA	50			**0.000**			**0.000**
		3	Domestic wastes	NA	0.05	NA	NA	5	23,871		**0.001**			**0.119**
	b		**Sewage/sewage treatment**						**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
		1	Mixed domestic and industrial inputs						*0*		*0.000*	*0*	*0*	*0.000*
			No sludge removal	NA	10	NA	NA	NA			**0.000**			
			With sludge removal	NA	1	NA	NA	200			**0.000**			**0.000**
		2	Urban and industrial inputs						*0*		*0.000*	*0*	*0*	*0.000*
			No sludge removal	NA	1	NA	NA	NA			**0.000**			
			With sludge removal	NA	0.2	NA	NA	20			**0.000**			**0.000**
		3	Domestic inputs						*0*		*0.000*	*0*	*0*	*0.000*
			No sludge removal	NA	0.4	NA	NA	NA			**0.000**			
			With sludge removal	NA	0.4	NA	NA	4			**0.000**			**0.000**
	c		**Open water dumping**						**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
		1	Mixed domestic and industrial wastewater	NA	0.005	NA	NA	NA			**0.000**			
		2	Urban and peri-urban wastewater	NA	0.0002	NA	NA	NA			**0.000**			
		3	Remote environments	NA	0.0001	NA	NA	NA			**0.000**			
	d		**Composting**						**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
		1	Organic wastes separated from mixed wastes	NA	NA	NA	50	NA					**0.000**	
		2	Clean compost	NA	NA	NA	5	NA					**0.000**	
	e		**Waste oil disposal**						**0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
		1	All fractions	ND	ND	ND	ND	ND						
9			**Disposal/Landfill**							**0.000**	**0.001**	**0**	**0.000**	**0.119355**

ANNEX 2

18 New POPS (Source: UNEP, 2019)

CHEMICAL NAME	SOURCES OF POPs	STRUCTURE
Alpha hexachlorocyclohexane	Pesticides	
Beta hexachlorocyclohexane	Pesticides	
Chlordecone	Pesticides	
Hexabromobiphenyl	Industrial chemicals	
Hexabromocyclododecane	Industrial chemicals	

Hexabromodiphenyl ether and heptabromodiphenyl ether	Industrial chemicals	
Hexachlorobutadiene	Industrial chemicals, Unintentional production	
Lindane	Pesticides	
Pentachlorobenzene	Pesticides, Industrial chemicals, Unintentional production	
Pentachlorophenol and its salts and esters	Pesticides	
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)	Industrial chemicals	

Polychlorinated naphthalenes	Industrial chemicals, Unintentional production	
Technical endosulfan and its related isomers	Pesticides	
Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)	Industrial chemicals	
Decabromodiphenyl ether (commercial mixture, c-DecaBDE)	Industrial chemicals	
Short-chain chlorinated paraffins (SCCPs)	Industrial chemicals	
Dicofol	Pesticide	
Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds	Industrial chemicals