



MINAMATA CONVENTION ON MERCURY

Initial Assessment Report for Samoa

June 2018



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FOREWORD

Mercury is the most volatile metal and its vapour is highly toxic. It has many applications and uses. It is a poor conductor of electricity and it alloys easily with other metals such as silver, tin and gold. Mercury is a compound that can be found naturally in the environment; it can be found in the elemental form as organic mercury compounds or as mercury salts. However, there are also numerous human-induced sources that release mercury directly into soil, water or air, for instance the inappropriate disposal of materials containing mercury or mercury-related compounds, application of agricultural pesticides and unregulated burning of coal and fuel oil, municipal wastes containing mercury.

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The Convention was adopted on 10 October 2013 at a Diplomatic Conference held in Kumamoto, Japan. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water. Controlling the anthropogenic releases of mercury throughout its lifecycle has been a key factor in shaping the obligations under the Convention. Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the requirement for the development of national controls on artisanal and small-scale gold mining.

The Convention also addresses the interim storage of mercury and mercury compounds other than waste mercury, and the disposal of mercury wastes, sites contaminated by mercury as well as health issues. The overall objective of the Minamata Initial Assessment (MIA) is to assist the countries in preparing for the implementation of the Minamata Convention in order to enable policy and strategic decision-making and to prioritize areas for future interventions. Samoa signed the Minamata Convention on 10 October 2013 and deposited its instrument of ratification on 24 September 2015.

This MIA report, is part of Samoa's effort to meet provisions of the Convention; the Ministry

of Natural Resources and Environment as the lead implementing agency together with other development partners are responsible for the implementation of the MIA project to achieve the primary objective of the Convention – protecting the environment and human health from adverse effects of mercury and its related compounds.



A handwritten signature in black ink that reads "Fiame N. Mataafa". The signature is fluid and cursive, written over the bottom of the portrait.

Honourable Fiame Naomi Mataafa
Minister - Ministry of Natural Resources and Environment
Government of Samoa

ACKNOWLEDGEMENTS

The Ministry of Natural Resources and Environment of Samoa in close collaboration with the United Nations Development Programmes (UNDP), the United Nations Institute for Training and Research (UNITAR) and the Steering Committee, wishes to thank all government ministries, private sector and individuals who have contributed and participated in the implementation of the Minamata Initial Assessment (MIA) project. The project would not have been possible without the dedication and commitment of these government ministries and individuals.

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EXECUTIVE SUMMARY

Samoa signed the Minamata Convention on Mercury on October 10th, 2013 and ratified it on 24 September 2015. Samoa is therefore a Party to the Minamata Convention that seeks to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

The Global Environmental Facility (GEF) has developed a set of pre-ratification activities, called Minamata Convention Initial Assessments (MIA). These activities are designed to prepare countries for treaty ratification and implementation. In addition, the MIAs assist countries with development of tools and strategies to inform government ministries, agencies, non-governmental organisations (NGO) and the public on activities related to the Convention.

Samoa does not have mining or industries giving rise to emissions and releases of mercury. However, Samoa continues to import some products that may contain mercury. The import of such mercury-

added products will need to be banned from 2020. Samoa also uses dental amalgam and will need to prepare a plan to phase down amalgam use.

The inventory of mercury emissions and releases for Samoa, prepared using the UNEP toolkit, shows that most emissions and releases come from waste management: in particular how mercury-added products are managed as they become waste. According to the inventory, the total mercury releases are 50kg per year and the two most significant anthropogenic sources of mercury are:

1. use and disposal of other products: 67% (33 kg Hg/y), and
2. the application, use and disposal of dental amalgam fillings: 13% (6 kg Hg/y).

Rest of the emissions (20%) is shared between different smaller source-categories as illustrated in the Figure 1 below:

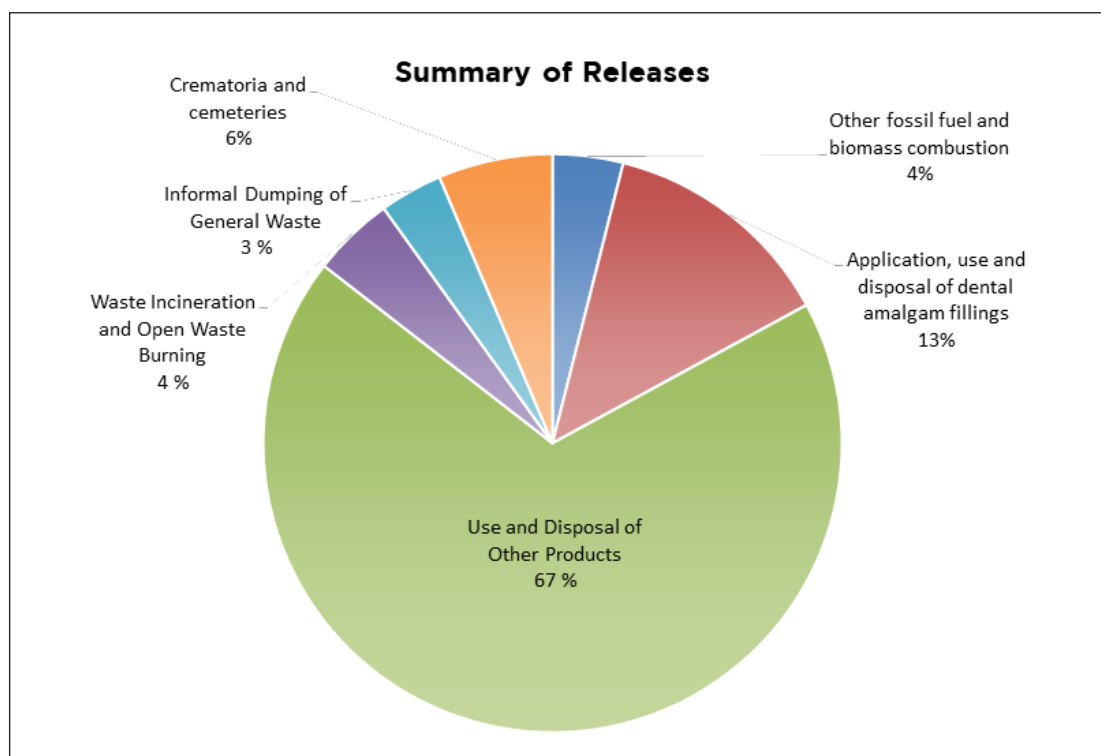


Figure 1: Summary of Releases in Samoa

In terms of policy and legislations, there is no specific legislation in Samoa specifically addressing the risks presented by mercury on the environment and human health. The legal review of Samoa's obligations under the Minamata Convention provides a comprehensive overview of the legal instruments that can be utilised to regulate the sound management of mercury and its related compounds. However, Samoa, as a Party to the treaty, will need to incorporate the provisions of the Minamata Convention into national legislation and to implement actions to meet its obligations to reduce emissions and releases of mercury arising from anthropogenic activity. A series of

actions is proposed including:

- the replacement of all mercury containing instruments from the health system;
- a comprehensive plan to improve dental health and incorporating a phase-down in the use of dental amalgam;
- combining mercury reduction and energy efficiency objectives to accelerate the phase-out of mercury-added lighting in particular from public services and institutions; and
- the separation and collection of

mercury wastes from municipal solid waste.

It is unlikely that the quantity of mercury wastes arising in Samoa would justify the establishment of a national facility for its final disposal. It follows that facilities for the temporary storage and packing of mercury wastes will be needed together with agreement with a development partner to ship mercury wastes, in accordance with

the Basel and Waigani Conventions, for final disposal.

It is estimated that the total cost of these actions would be US\$18 million but it is clear that a large part of these costs can be incorporated into national planning towards the Sustainable Development Goals, in particular in relation to human health and waste management. The summary of the provisions of the convention is presented in the introduction section of the document.

LIST OF ACRONYMS

ADB	Asian Development Bank
CEO	Chief Executive Officer
CIN	Chemical Information Network
CHWM	Chemical and Waste Management Unit
DPSIR	Drivers Pressures States Impacts Response
EPC	Electric Power Corporation
FAO	Food Agriculture Organisation
FY	Financial Year
GEF	Global Environment Facility
GoS	Government of Samoa
GDP	Gross Domestic Product
HDI	Human Development Index
Hg	Mercury
IEA	Integrated Environmental Assessment
INC	Intergovernmental Negotiating Committee
KI	Kilo litre
LSE	Lands Survey and Environment
MAF	Ministry of Agriculture and Fisheries
MCIL	Ministry of Commerce Industry and Labour
MEAs	Multilateral Environmental Development
MESC	Ministry of Education Sports and Culture
MIA	Minamata Initial Assessment
MI	Mega litre
MNRE	Ministry of Natural Resources and Environment

MoF	Ministry of Finance
MoH	Ministry of Health
MfR CD	Ministry for Revenue – Customs Division
MWCSD	Ministry of Women, Community and Social Development
NCP	National Chemical Profile
NUS	National University of Samoa
PEEP 2	Promoting Energy Efficiency in the Pacific – Phase 2
PUMA	Planning and Urban Management Agency
SAICM PSC	National Strategic Approach to International Chemical Management Project Steering Committee
SBS	Samoa Bureau of Statistics
SPCZ	South Pacific Convergence Zone
SOE	State of the Environment
SO	Southern Oscillation
SRWMA	Samoa’s Recycling & Waste Management Association
SROS	Scientific Research Organisation of Samoa
SUNGO	Samoa Umbrella Organisation of Non-Government Organisation
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
USP	University of the South Pacific
WHO	World Health Organization
WMA	Waste Management Act

INTRODUCTION

As an element, mercury is persistent in the environment and is naturally released into the air as vapour during natural processes such as volcanic activity, weathering of rock, water body movement, forest fires and biological activity. While natural releases continue, they do not account for the considerable increase in environmental mercury levels since the on-set of the industrial era. It is clear that significant mercury is released from a range of human activities. It is now estimated that roughly 10% of the emissions of mercury to the atmosphere are from natural processes; a further 30% are generated by current human activity and the remaining 60% are re-emissions of mercury already in the environment, mostly as a result of previous human activity (UNEP, 2013a).

Activities contributing to anthropogenic mercury releases include the processing of some base metal ores, the burning of coals and hydrocarbon fuels, the open use of mercury in industrial processes, in artisanal and small-scale gold mining, and the breakage and improper disposal of mercury-added products.

Mercury is considered by the World

Health Organization as one of the top ten chemicals or groups of chemicals of major public health concern (WHO, 2017). All forms of mercury are toxic although the risk of intoxication to humans varies considerably as some forms are less harmful than others.

With the first Global Mercury Assessment (UNEP, 2002) came widespread recognition that the nature and behaviour of mercury in the environment, in particular its abilities for long-range transport in the atmosphere, its persistence and its ability to bio-accumulate in certain food-chains leading to significant adverse effects on both human health and the environment, are of global concern requiring concerted and coordinated global action (UNEP, 2013b).

Agreement to negotiate a legally-binding instrument to restrict anthropogenic releases of mercury, with the objective to protect human health and the environment, was reached by UNEP's Governing Council in 2009 that requested UNEP to convene an Intergovernmental Negotiating Committee (INC) beginning in 2010. After a series of INC meetings, the treaty text was agreed

by 147 governments on 19 January 2013 in Geneva, Switzerland.

The text of the Convention was adopted and opened for Country signature at the Diplomatic Conference held in Kumamoto and Minamata, Japan, from 7 to 11 October 2013. The Convention entered into force on 16 August 2017. Samoa became a signatory to the Convention on 10 October 2013 and ratified it on 24 September 2015. Samoa is therefore a Party to the Minamata Convention on Mercury. So far, 128 countries have signed the convention and 74 countries have ratified it.

The Minamata Convention sets out a range of control measures to ban new mercury mines and phase-out existing ones; to phase-out or reduce mercury use in a number of industrial processes; to phase out the manufacture, import and export of certain mercury-added products and to phase down the use of others; to reduce emissions to air and releases to land and water; and to address mercury use in artisanal and small-scale gold mining. The Convention also addresses interim storage of mercury; disposal of waste mercury; and sites contaminated by mercury. The Convention promotes strategies and programmes to identify and protect populations at risk from mercury poisoning and encourages efforts to monitor mercury concentration in environmental media, including fish and seafood.

Samoa, in common with many other developing countries, does not produce

mercury or use it in any industrial process. However, mercury-added products are imported and used. As a result, discarded mercury-added products enter local waste management systems. Furthermore, and in common with the populations of other Small Island Developing States, the Samoan population is reliant on fish species that have been shown to accumulate significant mercury. These factors provide the stimulus for Samoa to become a Party to the Minamata Convention and to work to protect its environment and its population from the adverse effects of anthropogenic emissions and releases of mercury.

In order to determine the actions necessary to meet its obligations as a Party to the Convention, Samoa has undertaken work to develop this Minamata Convention Initial Assessment (MIA). To assist the government of Samoa in developing the MIA, the country has received support from the Global Environmental Facility (GEF) for a project “Strengthen national decision making towards ratification of the Minamata Convention and build capacity towards implementation of future provisions.” This project has been executed by the Ministry of Natural Resources and Environment and implemented by the United Nations Development Programmes (UNDP), with technical assistance and support provided by the United Nations Institute for Training and Research (UNITAR).

The MIA contains the following components:

- Initial Inventory of mercury and

identification of sources of emissions and releases

- Assessment of the policy, regulatory and institutional framework available and needed for the implementation of the provisions included in the Convention text
- Preliminary review of potential populations at risk and potential health risks together with an assessment of

potential gender dimensions related to mercury in Samoa

- Assessment of the awareness and understanding of mercury amongst the public and a description of efforts to increase public awareness
- Implementation plan including outline proposals for key actions necessary to implement the convention in Samoa.

Chapter 1:

NATIONAL BACKGROUND INFORMATION

1.1 Geography and Population

Samoa is a small, volcanic Pacific island nation which lies between latitudes 13°25'S and 14°05'S and longitudes 171°23'W and 172°48'W (Figure 1). There are four inhabited and four uninhabited islands (Figure 1) giving a total land area of about 2935 km² (MNRE, 2005). The bulk of the nation comprises the two largest islands of Upolu and Savaii with land areas of 1820 km² and 1113 km² respectively (Steiner, 1980). Most of the mass of these two islands is of volcanic origin and consisting of basalt derived from subcrustal magmatic matter common to the Pacific basin (Wright, 1963; Burgess, 1987). Most of the land is arable with lush, tropical vegetation and rainforests. Due to its proximity to the equator, Samoa has a climate that is classified as tropical rainy. 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 soils of Samoa are almost entirely volcanic derived, except for a few small areas of coastal (coral) sands (Lee, 2009). Equitable rainfall, temperature and good soil properties tend to minimise the impact of relatively low fertility on plant production. The main crops produced are coconut (*Cocos nucifera*), cocoa (*Theobroma cacao*) and banana (*Musa* spp.). A major staple, as well as export crop, was taro (*Colocasia esculenta*), but production has declined due to taro leaf blight (*Phytophthora colocasia*). Because of the destructive effects of cyclones and taro blight, farmers have sought to diversify to ta'amu (*Alocasia* spp.), ava



Figure 2. Map of Samoa Islands (CIA, 2016)

(*Piper methysticum*), and cattle production (MNRE, 2010).

The latest Samoa census in 2016 recorded a population size of 196,315 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 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).

Samoa's human development is considered high by World standards where it is ranked 104th out of the 188 countries that provided information needed to generate the Human Development Index¹ for 2015. Samoa's HDI of 0.704 is higher than the mean average for SIDS (0.667) and it compares favourably with the mean indices for long and healthy life (Samoa: 73.3 years; World: 71.6 years); and knowledge (Samoa: 12.9 years; World 12.3 years). Table 1 below compares Samoa with other countries in terms of HDI.

TABLE 1

HDI for Samoa Compared to Other Countries

HDI Rank	COUNTRY	HDI
1	Norway	0.949
2	Australia	0.939
13	New Zealand	0.915
60	Palau	0.788
91	Fiji	0.736
101	Tonga	0.721
104	Samoa	0.704
127	Federated States of Micronesia	0.638
134	Vanuatu	0.597
137	Kiribati	0.588
154	Papua New Guinea	0.516
156	Solomon Islands	0.515

(Source: Socio-Economic Impact Mercury Report, 2018)

1.2 Political and Economic Profile

The country's nominal GDP stood at SAT\$1.9 billion (~US\$47.5 billion) in the FY 2014/15 while the real GDP was SAT\$1.7 billion for the same period with the GDP make-up of 10% Primary sector, 24% Secondary sector and 66% Tertiary sector. GDP per capita for this FY was SAT\$10,104.

Samoa is a parliamentary democracy with a parliament composed of the Head of State and a legislative assembly of 49 members elected in a five year cycle through universal suffrage. Only chiefly

(matai) title holders are eligible to run for the elections.

The Prime Minister, who must be a member of the Fono² and be supported by a majority of its members, is appointed by the head of state. The Prime Minister chooses 12 members to form the cabinet, which has charge of executive government. The head of state must give their assent to new legislation before it becomes law. The Fono has 49 members, 47 elected in 41 constituencies by universal adult suffrage, to be contested only by matai title holders (chiefs of aiga, or extended families, of whom there are around 25,000), and two elected from separate electoral rolls

comprising those of foreign descent. The Fono sits for five-year terms. Until 1991 only the matai were eligible to vote, but following a plebiscite universal adult suffrage was introduced in time for that year's elections. The matai, whose office is elective for life, still administer local government in the traditional manner. They are trustees for customary land held on behalf of the people, which make up about 80 % of all the land in the country.

Development initiatives at the national level such as electricity, water, social services, infrastructure, education, health and others are the responsibility of the national government. Villages, of which there are 310, have their own representatives that are known by the national government and while implementing activities or projects at village level, there is a need to consult the village representatives.

1.3 Profiles of Economic Sectors

Samoa has, with the exception of the limited extraction of construction materials, no mining industry. Manufacturing industry is largely limited to the transformation of agricultural and fisheries produce. Energy demand for Samoa is currently met from three main sources: biomass (47%), fossil fuels (45%) and hydropower (8%) (ee-Pacific, 2017)³. The Government-owned Electric Power Corporation (EPC) is responsible for generating, transmitting and distributing electrical power to all

communities. Electricity is generated principally by diesel generators and by hydropower but clean and renewable sources of energy are increasingly used both domestically and institutionally and are actively encouraged by the national energy policy. This policy also encourages demand-side management through increased efficiency, in particular through schemes such as Promoting Energy Efficiency in the Pacific (PEEP) that has identified and inventoried energy inefficient equipment, such as mercury vapour lamp street lighting, for phase out and replacement. Samoa does not manufacture consumer products but relies on imports from other countries. The range of items imported includes many of the mercury-added products listed in Annex A of the Convention although certain public sectors, including the health service, have already made efforts to change procurement practices to exclude the purchase of mercury-added items. Products such as cosmetics, soaps, batteries and electrical and lighting products that might all contain mercury are available on the open market. Dental amalgam remains the preferred restorative material in dental practice. It follows that mercury is entering waste streams as these products reach end of life and are discarded. Ultimately, this mercury may be emitted to the atmosphere as mercury-containing waste is burned or may be released to land and water through land-filling or direct disposal into water courses.

Waste composition in Samoa is not

available, but a study carried out in 2013 by ADB determined that waste composition in the Pacific Island Countries comprised 60 % by weight of organic or biodegradable materials whilst paper, plastic, glass and metals formed 6 % to 12 % of the waste by weight (ADB, 2013).

Estimated figures show that, for Upolu, the generation of waste was between 0.38 to 0.48 kilograms per person per day, depending on income, extent of urbanization and other factors (ADB, 2013). No survey of waste generation and composition has been carried out for Savaii Island.

On Upolu, domestic wastes are collected and transferred for safe disposal to the Tafaigata sanitary landfill facility. Wastes arriving at Tafaigata are subject to separation with recyclable and hazardous materials separated for specific treatment. Medical wastes are incinerated at the site. The landfill is equipped with a basic system to collect leachate. About 5% of Upolu

households still practise informal dumping and open burning on land or dumping into rivers and the ocean (ADB, 2013).

Savaii Island does not have an engineered landfill, the island is still facing numerous problems with the management of wastes. Informal dumping, open burning of waste or dumping waste at the coast are practised on Savaii.

1.4 Overall Environmental Status in Samoa

The latest assessment of the state of the environment (SOE) of Samoa was conducted in 2012 to determine the health of Samoa's biophysical environment (SOE, 2013). In an integrated environmental assessment (IEA) framework using the DPSIR (Drivers-Pressures-States-Impacts-Response) analytical model and a habitat-based approach, eight types of habitats were identified as comprising Samoa's biophysical environment (Table 2).

TABLE 2

Key Habitats of Samoa's Biophysical Environment

Habitats	Main Species
1. Upland and Cloud Forest	Upland and cloud forests
2. Lowland	Cultivated areas and lowland forests
3. Coastal	Mangroves and wetlands, coastal forests and strand vegetation, coastal marshes & beaches
4. Inshore and Offshore Marine	Seamounts, corals, all benthic and pelagic marine organisms
5. Freshwater bodies, Rivers and Streams	Rivers and Streams, lakes, freshwater, springs, groundwater, riparian zones, wetlands
6. Rural and Urban Built Environment	Population, housing, sanitation, waste, environmental safeguards, energy consumption
7. Protected Areas	Protected areas, sanctuary and Key Biodiversity Areas (KBAs)
8. Atmosphere, Weather and Climate	GHG, ozone and ODS emissions, eco-system based adaptation (NAPA implementation)

(Source: MNRE, 2013)

The key drivers of environmental change in these habitats include the country's small size and geographical isolation, demographics, accessibility of resources and land tenure systems, economic development, evolving consumption patterns and lifestyles, climate change and climate variability (SOE, 2013). The main pressures on these habitats include invasive species, natural disasters, waste, land, air and marine pollution, unsustainable use of resources and poor sanitation and poorly designed development activities (MNRE, 2013). These factors and the vulnerability of Samoa to natural disasters and

extreme events due to its central location in the Pacific means that the country's environment is expected to continuously evolve to cope with and adapt to these pressures.

Samoa have ratified and signed numerous international Multilateral Environmental Agreements (MEAs) (Conventions and Protocols) and most of them are tied to the GEF strategic priorities. The list of relevant conventions ratified by Samoa and national planning frameworks is clarified in Table 3 below.

TABLE 3

List of Relevant Conventions and National/Regional Plans or Programmes⁴

Rio Conventions + National Planning Frameworks	Date of Ratification / Accession
Montreal Protocol (Substances that deplete the Ozone layer)	1992, 2001
UN Convention on Biological Diversity (CBD)	1994
UN Framework Convention on Climate Change (UNFCCC)	1994
UNFCCC National Adaptation Plans of Action (NAPA)	1994
Strategic Action Programmes (SAPs) for Shared International Water-Bodies	1997
Strategic Action Programmes (SAPs) for shared international water-bodies	1997
UN Convention to Combat Desertification	1998
Kyoto Protocol	2000
CBD National Biodiversity Strategy and Action Plan (NBSAO)	2001
Cartagena Protocol on Biological Safety	2003
SC National Implementation Plan (NIP)	2006
UNCCD National Action Programmess (NAP)	2007
GEF National Capacity Self-Assessment (NCSA)	2007
Stockholm Convention on Persistent Organic Pollutants (POPs)	2008
UNFCCC National Communications (1st, 2nd, 3rd)	2010
Nagoya Protocol on Access and Benefit Sharing (ABS)	2014
Minamata Convention on Mercury	2015

1.5 Environmental Risk Profile

Samoa is vulnerable to the adverse impacts of natural disasters and climate change. Cyclones cause considerable damage to natural forests as well as to agriculture and infrastructure. Earthquakes and related tsunamis present a considerable threat to a nation where human activity is concentrated on the narrow, low-lying coastal strip. Sea level rise and the changing climatic conditions represent serious long-term threats. In addition, increased human activity has increased deforestation, soil erosion, natural habitat loss, overfishing and the advance of invasive species (Lee, 2009).

For the Samoan government, pollution arising from the growing volume of solid and hazardous waste is considered a major threat to the environment. Samoa is participating in regional efforts to improve waste management, including through the export of recyclable wastes in accordance with the Waigani and Basel Conventions. Similarly, the lack of drainage and waste water treatment and management schemes means that used water and liquid waste flow untreated into the sea putting vulnerable shallow marine habitats at risk, increasing human health risks and reducing ecosystem value to local people and the tourism industry.

Chapter 2: MERCURY INVENTORY AND IDENTIFICATION OF EMISSIONS AND RELEASES IN SAMOA

2.1 Inventory Methodology

The national mercury inventory was prepared by a team of experts under the supervision and guidance of the Ministry of Natural Resources and Environment, as a part of the Minamata Initial Assessment (MIA) project. The main objective for preparing the inventory was to identify the key sources of mercury releases in Samoa and the results of the initial inventory are shown in Tables below. The process of preparing the inventory began in February 2017, when UNITAR organized a training on the toolkit methodology in Apia, Samoa. The training was attended by the expert

team responsible for the inventory, as well as a wide range of different stakeholders from government institutions, civil society and private sector.

This mercury release inventory was made with the use of the “Toolkit for identification and quantification of mercury releases” made available by UN Environment⁵. This initial inventory was developed using the Level 1 Toolkit, where pre-determined factors used in the calculation of mercury inputs to society and releases are utilized. These factors are derived from data on mercury inputs and releases from the relevant mercury source types from available literature and other relevant

data sources such as research and policy documents. Reference year of 2016 has been used, if not otherwise stated.

Using the toolkit, input and releases estimates were calculated for the following mercury source-categories:

- Energy consumption and fuel production;
- Domestic production of metals and raw materials;
- Domestic production and processing with intentional mercury use;
- Waste treatment and recycling;

- General consumption of mercury in products as metal mercury and as mercury containing substances;

- Crematoria and cemeteries.

2.2 Summary of Mercury Releases in Samoa

An aggregated presentation of the results for main groups of mercury release sources in Samoa is presented in Table 4, whereas detailed presentations of mercury inputs for all mercury release sources present in Samoa are shown in the respective sections of this chapter.

TABLE 4

Mercury Releases Sources in Samoa

Source Category	Source present Y/N
Energy consumption	
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y
Biomass fired power and heat production	Y
Coal combustion in large power plants	N
Other coal uses	N
Combustion/use of petroleum coke and heavy oil	N
Use of raw or pre-cleaned natural gas	N
Use of pipeline gas (consumer quality)	N
Charcoal combustion	N
Fuel production	
Oil extraction	N
Oil refining	N
Extraction and processing of natural gas	N

Mercury Releases Sources in Samoa (continued)

Source Category	Source present Y/N
Primary metal production	
Mercury (primary) extraction and initial processing	N
Production of zinc from concentrates	N
Production of copper from concentrates	N
Production of lead from concentrates	N
Gold extraction by methods other than mercury amalgamation	N
Alumina production from bauxite (aluminium production)	N
Primary ferrous metal production (pig iron production)	N
Gold extraction with mercury amalgamation - without use of retort	N
Gold extraction with mercury amalgamation - with use of retorts	N
Other materials production	
Cement production	N
Pulp and paper production	N
Production of chemicals	
Chlor-alkali production with mercury-cells	N
VCM production with mercury catalyst	N
Acetaldehyde production with mercury catalyst	N
Production of products with mercury content	
Light sources with mercury (fluorescent, compact, others: see guide-line)	Y
Skin lightening creams and soaps with mercury chemicals	Y
Hg thermometers (medical, air, lab, industrial etc.)	N
Electrical switches and relays with mercury	N
Batteries with mercury	N
Manometers and gauges with mercury	N
Biocides and pesticides with mercury	N
Paints with mercury	N
Production of recycled of metals	
Production of recycled ferrous metals (iron and steel)	Y
Production of recycled mercury ("secondary production")	N

Mercury Releases Sources in Samoa (continued)	
Source Category	Source present Y/N
Waste incineration	
Open fire waste burning (on landfills and informally)	Y
Incineration and open burning of medical waste	Y
Incineration of municipal/general waste	N
Incineration of hazardous waste	N
Sewage sludge incineration	N
Waste deposition/landfilling and waste water treatment	
Controlled landfills/deposits	Y
Informal dumping of general waste *1	Y
Waste water system/treatment	Y
Use and disposal of products with mercury content	
Dental amalgam fillings ("silver" fillings)	Y
Thermometers	Y
Other glass Hg thermometers (air, laboratory, dairy, etc.)	Y
Preparations of fillings at dentist clinics	Y
Light sources with mercury	Y
Fluorescent tubes (double end)	Y
Compact fluorescent lamp (CFL single end)	Y
Batteries with mercury	Y
Mercury oxide (button cells and other sizes); also called mercury-zinc cells	Y
Other button cells (zinc-air, alkaline button cells, silver-oxide)	Y
Other batteries with mercury (plain cylindrical alkaline, permanganate, etc., see guideline)	Y
Skin lightening creams and soaps with mercury chemicals	Y
Laboratory chemicals	Y
Other laboratory and medical equipment with mercury	Y
Use - from fillings already in the mouth	N
Disposal (lost and extracted teeth)	N
Medical Hg thermometers	N

Mercury Releases Sources in Samoa (continued)

Source Category	Source present Y/N
Engine control Hg thermometers and other large industrial/speciality Hg thermometers	N
Electrical switches and relays with mercury	N
Other Hg containing light sources (see guideline)	N
Polyurethane (PU, PUR) produced with mercury catalyst	N
Paints with mercury preservatives	N
Medical blood pressure gauges (mercury sphygmomanometers)	N
Other manometers and gauges with mercury	N
Crematoria and cemeteries	
Crematoria	Y
Cemeteries	Y

It should be noted that some of the minor mercury release source types might be present in Samoa.

However, due to the lack of reliable data on these sources, these sources were not included in the detailed source identification and quantification work.

TABLE 5

Miscellaneous Mercury Sources not included in the Quantitative Inventory with Preliminary Indication of Possible Presence

Source Category	Source present Y/N
Production of other recycled metals	Y
Educational uses	Y
Combustion of oil shale	N
Combustion of peat	N
Geothermal power production	N
Production of lime	N
Production of light weight aggregates (burnt clay nuts for building purposes)	N
Production of other chemicals (than chlorine and sodium hydroxide) in Chlor-alkali facilities with mercury-cell technology	N
Polyurethane production with mercury catalysts	N
Seed dressing with mercury chemicals	N
Infra-red detection semiconductors	N
Bougie tubes and Cantor tubes (medical)	N
Gyroscopes with mercury	N
Vacuum pumps with mercury	N
Mercury used in religious rituals (amulets and other uses)	N
Mercury used in traditional medicines (ayurvedic and others) and homeopathic medicine	N
Use of mercury as a refrigerant in certain cooling systems	N
Light houses (levelling bearings in marine navigation lights)	N
Mercury in large bearings of rotating mechanic parts in for example older waste water treatment plants	N
Tanning	N
Pigments	N
Products for browning and etching steel	N
Certain colour photograph paper types	N
Recoil softeners in rifles	N
Explosives (mercury-fulminate a.o.)	N
Fireworks	N
Executive toys	N

2.2.1 Identified Mercury Sources and Summary of Mercury Inputs to Society

Table 6 shows which anthropogenic mercury release sources were identified as present or absent in Samoa. Only source types positively identified as present are included in the quantitative assessment in this report. Mercury inputs to society

should be understood here as the mercury amounts made available for potential releases through economic activity in Samoa. This includes mercury intentionally used in products such as thermometers, blood pressure gauges and fluorescent light bulbs. It also includes mercury mobilised via extraction and use of raw materials which contain mercury in trace concentrations.

TABLE 6

Present Source-Categories and Summary of Mercury Inputs to Society

Source category	Source present?	Activity Rate	Unit	Estimated Hg input, Kg Hg/y
	Y/N?			Standard Estimate
Energy consumption				
Combustion/use of diesel, gas-oil, petroleum, kerosene, LPG and other light to medium distillates	Y	82 805	Oil product combusted, t/y	0
Biomass fired power and heat production	Y	49 000	Biomass combusted, t/y	1
Coal combustion in large power plants	N	0	Coal combusted, t/y	-
Other coal uses	N	0	Coal used, t/y	-
Combustion/use of petroleum coke and heavy oil	N	0	Oil product combusted, t/y	-
Use of raw or pre-cleaned natural gas	N	0	Gas used, Nm ³ /y	-
Use of pipeline gas (consumer quality)	N	0	Gas used, Nm ³ /y	-
Charcoal combustion	N	0	Charcoal combusted, t/y	-

Present Source-Categories and Summary of Mercury Inputs to Society (continued)

Source category	Source present?	Activity Rate	Unit	Estimated Hg input, Kg Hg/y
	Y/N?			Standard Estimate
Fuel production				
Oil extraction	N	0	Crude oil produced, t/y	-
Oil refining	N	0	Crude oil re-fined, t/y	-
Extraction and processing of natural gas	N	0	Gas produced, Nm ³ /y	-
Primary metal production				
Mercury (primary) extraction and initial processing	N	0	Mercury produced, t/y	-
Production of zinc from concentrates	N	0	Concentrate used, t/y	-
Production of copper from concentrates	N	0	Concentrate used, t/y	-
Production of lead from concentrates	N	0	Concentrate used, t/y	-
Gold extraction by methods other than mercury amalgamation	N	0	Gold ore used, t/y	-
Alumina production from bauxite (aluminium production)	N	0	Bauxite processed, t/y	-
Primary ferrous metal production (pig iron production)	N	0	Pig iron produced, t/y	-
Gold extraction with mercury amalgamation - without use of retort	N	0	Gold produced, kg/y	-
Gold extraction with mercury amalgamation - with use of retorts	N	0	Gold produced, kg/y	-
Other materials production				
Cement production	N	0	Cement produced, t/y	-
Pulp and paper production	N	0	Biomass used for production, t/y	-

Present Source-Categories and Summary of Mercury Inputs to Society (continued)

Source category	Source present?	Activity Rate	Unit	Estimated Hg input, Kg Hg/y
	Y/N?			Standard Estimate
Production of chemicals				
Chlor-alkali production with mercury-cells	N	0	Cl2 produced, t/y	-
VCM production with mercury catalyst	N	0	VCM produced, t/y	-
Acetaldehyde production with mercury catalyst	N	0	Acetaldehyde produced, t/y	-
Production of products with mercury content				
Light sources with mercury (fluorescent, compact, others: see guideline)	Y	0	Mercury used for production, kg/y	0
Skin lightening creams and soaps with mercury chemicals	Y	1	Mercury used for production, kg/y	1
Hg thermometers (medical, air, lab, industrial etc.)	N	0	Mercury used for production, kg/y	-
Electrical switches and relays with mercury	N	0	Mercury used for production, kg/y	-
Batteries with mercury	N	0	Mercury used for production, kg/y	-
Manometers and gauges with mercury	N	0	Mercury used for production, kg/y	-
Biocides and pesticides with mercury	N	0	Mercury used for production, kg/y	-
Paints with mercury	N	0	Mercury used for production, kg/y	-

Present Source-Categories and Summary of Mercury Inputs to Society (continued)

Source category	Source present?	Activity Rate	Unit	Estimated Hg input, Kg Hg/y
	Y/N?			Standard Estimate
Use and disposal of products with mercury content				
Dental amalgam fillings ("silver" fillings)	Y	196 315	Number of inhabitants	8
Thermometers	Y	19	Items sold/y	0
Light sources with mercury	Y	54 500	Items sold/y	1
Skin lightening creams and soaps with mercury chemicals	Y	1	Cream or soap sold, t/y	15
Laboratory chemicals	Y	196 315	Number of inhabitants	2
Other laboratory and medical equipment with mercury	Y	196 315	Number of inhabitants	7
Electrical switches and relays with mercury	N	196 315	Number of inhabitants	-
Batteries with mercury	N	8	t batteries sold/y	8
Polyurethane (PU, PUR) produced with mercury catalyst	N	196 315	Number of inhabitants	-
Paints with mercury preservatives	N	0	Paint sold, t/y	-
Medical blood pressure gauges (mercury sphygmomanometers)	N	0	Items sold/y	-
Other manometers and gauges with mercury	N	196 315	Number of inhabitants	-
Production of recycled of metals				
Production of recycled ferrous metals (iron and steel)	Y	21	Number of vehicles recycled/y	0
Production of recycled mercury ("secondary production")	N	0	Mercury produced, kg/y	-

Present Source-Categories and Summary of Mercury Inputs to Society (continued)

Source category	Source present?	Activity Rate	Unit	Estimated Hg input, Kg Hg/y
	Y/N?			Standard Estimate
Waste incineration				
Incineration and open burning of medical waste	Y	22	Waste incinerated, t/y	1
Open fire waste burning (on landfills and informally)	Y	1 709	Waste burned, t/y	2
Incineration of municipal/general waste	N	0	Waste incinerated, t/y	-
Incineration of hazardous waste	N	0	Waste incinerated, t/y	-
Sewage sludge incineration	N	0	Waste incinerated, t/y	-
Waste deposition/landfilling and waste water treatment				
Controlled landfills/deposits	Y	23 871	Waste land-filled, t/y	24
Informal dumping of general waste *1	Y	8 606	Waste dumped, t/y	9
Waste water system/treatment	Y	456 250	Waste water, m3/y	2
Crematoria and cemeteries				
Crematoria	Y	208	Corpses cremated/y	1
Cemeteries	Y	1 041	Corpses buried/y	3
TOTAL of quantified inputs*1*2*3				50

The following figure illustrates the mercury inputs to society.

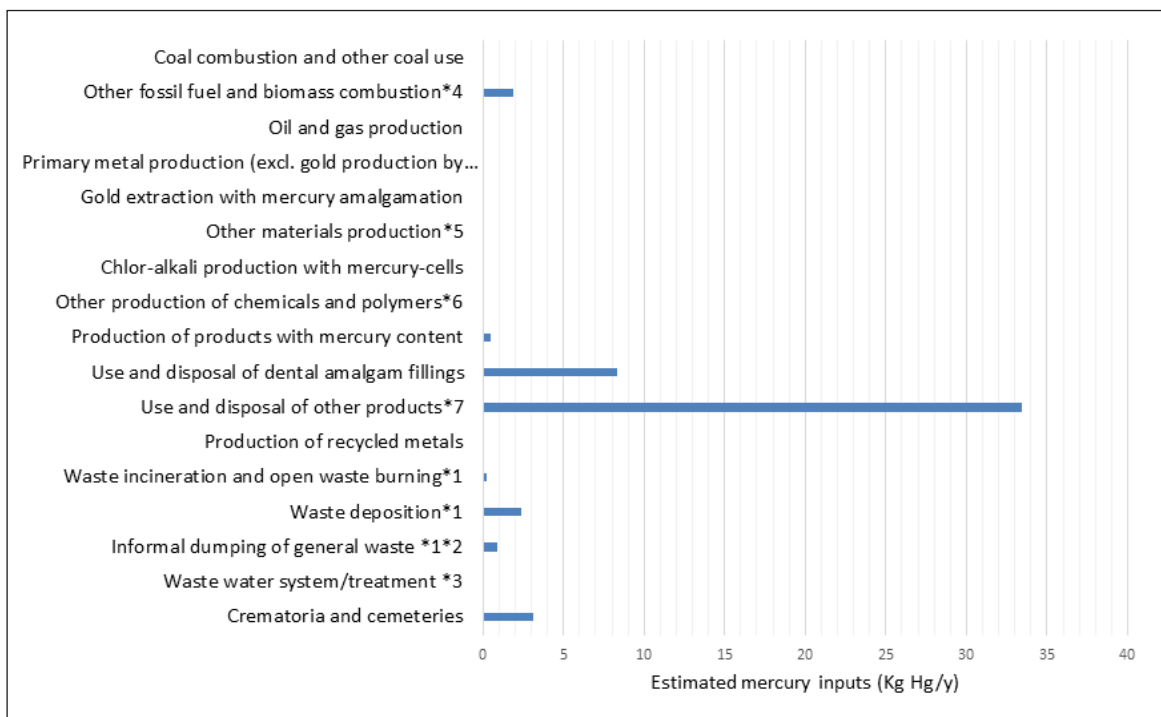


Figure 3: Mercury Inputs to Society

2.2.2 Summary of Mercury Releases

In the Table 7 below, a summary of mercury releases from all source categories present is given. The key mercury releases here are releases to air (the atmosphere), to water (marine and freshwater bodies, including

via waste water systems), to land (soil and ground water), to general waste, and to sectors-specific waste treatment. An additional output pathway is “by-products and impurities” which designate mercury flows back into the market with by-products and products where mercury does not play an intentional role.

TABLE 7

Summary of Mercury Releases

Source Category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Energy consumption						
Coal combustion in large power plants	-	-	-	-	-	-
Other coal uses	-	-	-	-	-	-
Combustion/use of petroleum coke and heavy oil	-	-	-	-	-	-
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	0.5	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	-	-	-	-	-	-
Use of pipeline gas (consumer quality)	-	-	-	-	-	-
Biomass fired power and heat production	1.5	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	-	-	-	-	-	-
Fuel production						
Oil extraction	-	-	-	-	-	-
Oil refining	-	-	-	-	-	-
Extraction and processing of natural gas	-	-	-	-	-	-
Primary metal production						
Mercury (primary) extraction and initial processing	-	-	-	-	-	-
Production of zinc from concentrates	-	-	-	-	-	-
Production of copper from concentrates	-	-	-	-	-	-
Production of lead from concentrates	-	-	-	-	-	-

Summary of Mercury Releases (continued)

Source Category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Gold extraction by methods other than mercury amalgamation	-	-	-	-	-	-
Alumina production from bauxite (aluminium production)	-	-	-	-	-	-
Primary ferrous metal production (pig iron production)	-	-	-	-	-	-
Gold extraction with mercury amalgamation - without use of retort	-	-	-	-	-	-
Gold extraction with mercury amalgamation - with use of re-torts	-	-	-	-	-	-
Other materials production						
Cement production	-	-	-	-	-	-
Pulp and paper production	-	-	-	-	-	-
Production of chemicals						
Chlor-alkali production with mercury-cells	-	-	-	-	-	-
VCM production with mercury catalyst	-	-	-	-	-	-
Acetaldehyde production with mercury catalyst	-	-	-	-	-	-
Production of products with mercury content						
Hg thermometers (medical, air, lab, industrial etc.)	-	-	-	-	-	-
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury (fluorescent, compact, others: see guideline)	0.0	0.0	0.0	0.0	0.0	0.0

Summary of Mercury Releases (continued)

Source Category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Batteries with mercury	-	-	-	-	-	-
Manometers and gauges with mercury	-	-	-	-	-	-
Biocides and pesticides with mercury	-	-	-	-	-	-
Paints with mercury	-	-	-	-	-	-
Skin lightening creams and soaps with mercury chemicals	0.0	0.0	0.1	0.0	0.1	0.0
Use and disposal of products with mercury content						
Dental amalgam fillings ("silver" fillings)	0.2	2.8	0.4	0.3	1.4	1.4
Thermometers	0.0	0.1	0.0	0.0	0.1	0.0
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury	0.4	0.0	0.4	0.0	0.5	0.0
Batteries with mercury	2.0	0.0	2.0	0.0	3.9	0.0
Polyurethane (PU, PUR) produced with mercury catalyst	-	-	-	-	-	-
Paints with mercury preservatives	-	-	-	-	-	-
Skin lightening creams and soaps with mercury chemicals	0.0	14.3	0.8	0.0	0.0	0.0
Medical blood pressure gauges (mercury sphygmomanometers)	-	-	-	-	-	-
Other manometers and gauges with mercury	-	-	-	-	-	-
Laboratory chemicals	0.0	0.6	0.0	0.0	0.6	0.6
Other laboratory and medical equipment with mercury	0.0	2.4	0.0	0.0	2.4	2.5

Summary of Mercury Releases (continued)

Source Category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Production of recycled of metals						
Production of recycled mercury ("secondary production")	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	0.0	0.0	0.0	0.0	0.0	0.0
Waste incineration						
Incineration of municipal/general waste	-	-	-	-	-	-
Incineration of hazardous waste	-	-	-	-	-	-
Incineration and open burning of medical waste	0.5	0.0	0.0	0.0	0.0	0.1
Sewage sludge incineration	-	-	-	-	-	-
Open fire waste burning (on landfills and informally)	1.7	0.0	0.0	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment						
Controlled landfills/deposits	0.2	0.0	0.0	-	-	-
Informal dumping of general waste *1	0.9	0.9	6.9	-	-	-
Waste water system/treatment *2	0.0	2.2	0.0	0.0	0.2	0.0
Crematoria and cemeteries						
Crematoria	0.5	0.0	0.0	-	0.0	0.0
Cemeteries	0.0	0.0	2.6	-	0.0	0.0
TOTAL of quantified releases*1*2	10.0	20.0	10.0	0.0	20.0	0.0

Notes to table above: *1: The estimated quantities include mercury in products which has also been accounted for under each product category. To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS. *2: The estimated release to water includes mercury amounts which have also been accounted for under each source category. To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS.

2.2.3 Output Pathways

Table 8 below provides general descriptions and definitions of the output pathways to air, water, land, by-products and impurities, general waste and sector-specific waste treatment.

TABLE 8

Description of Output Pathways

Calculation Result Type	Description
Estimated Hg input, Kg Hg/y	The standard estimate of the amount of mercury entering this source category with input materials, for example calculated mercury amount in coal used annually in the country for combustion in large power plants.
Air	Mercury emissions to the atmosphere from point sources and diffuse sources from which mercury may be spread locally or over long distances with air masses. For example from: <ul style="list-style-type: none"> • Point sources such as coal fired power plants, metal smelter, waste incineration; • Diffuse sources such as small-scale gold mining, informal burning of waste with fluorescent lamps, batteries, thermometers.
Water	Mercury releases to aquatic environments and to waste water systems; point sources and diffuse sources from which mercury will be spread to marine environments (oceans), and freshwaters (rivers, lakes, etc.). For example releases from: <ul style="list-style-type: none"> • Wet flue gas cleaning systems on coal fired power plants; • Industry, households, etc. to aquatic environments; • Surface run-off and leachate from mercury contaminated soil and waste dumps
Land	Mercury releases to the terrestrial environment: General soil and ground water. For example releases from: <ul style="list-style-type: none"> • Solid residues from flue gas cleaning on coal fired power plants used for gravel road construction. • Uncollected waste products dumped or buried informally • Local un-confined releases from industry such as on site hazardous waste storage/burial • Spreading of sewage sludge with mercury content on agricultural land (sludge used as fertilizer) • Application on land, seeds or seedlings of pesticides with mercury compounds

Description of Output Pathways (continued)

Calculation Result Type	Description
By-products and impurities	<p>By-products that contain mercury, which are sent back into the market and cannot be directly allocated to environmental releases, for example:</p> <ul style="list-style-type: none"> • Gypsum wallboard produced from solid residues from flue gas cleaning on coal fired power plants. • Sulphuric acid produced from desulphurization of flue gas (flue gas cleaning) in non-ferrous metal plants with mercury trace concentrations • Chlorine and sodium hydroxide produced with mercury-based chlor-alkali technology; with mercury trace concentrations • Metal mercury or calomel as by-product from non-ferrous metal mining (high mercury concentrations)
General waste	<p>General waste: Also called municipal waste in some countries. Typically, household and institution waste where the waste undergoes a general treatment, such as incineration, landfilling or informal dumping. The mercury sources to waste are consumer products with intentional mercury content (batteries, thermometers, fluorescent tubes) as well as high volume waste like printed paper and plastic with small trace concentrations of mercury.</p>
Sector specific waste treatment /disposal	<p>Waste from industry and consumers which is collected and treated in separate systems, and in some cases recycled; for example:</p> <ul style="list-style-type: none"> • Confined deposition of solid residues from flue gas cleaning on coal fired power plants on dedicated sites. • Hazardous industrial waste with high mercury content which is deposited in dedicated, safe sites • Hazardous consumer waste with mercury content, mainly separately collected and safely treated such as batteries, thermometers, mercury switches, lost teeth with amalgam fillings. • Confined deposition of tailings and high volume rock/waste from extraction of non-ferrous metals

In Samoa, the main output pathways can be illustrated with the following graphs (Figure 3-Figure 6, where the main

contributing source-categories are then easy to spot.

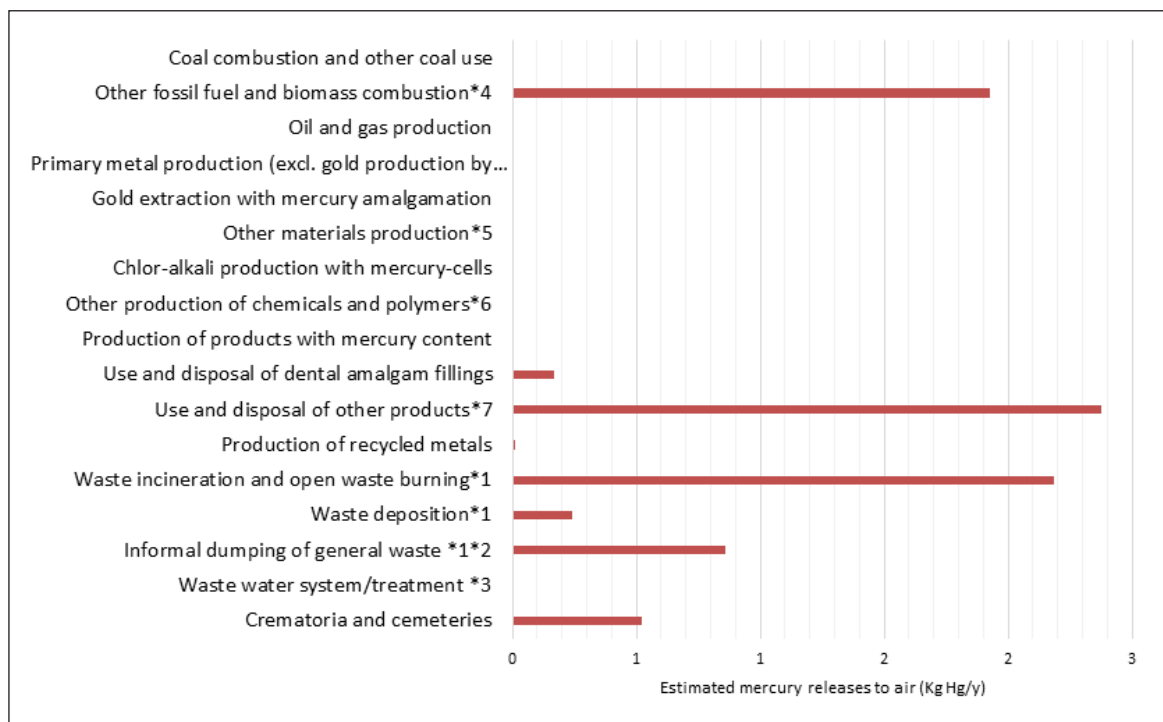


Figure 4: Estimated mercury releases to air in Samoa

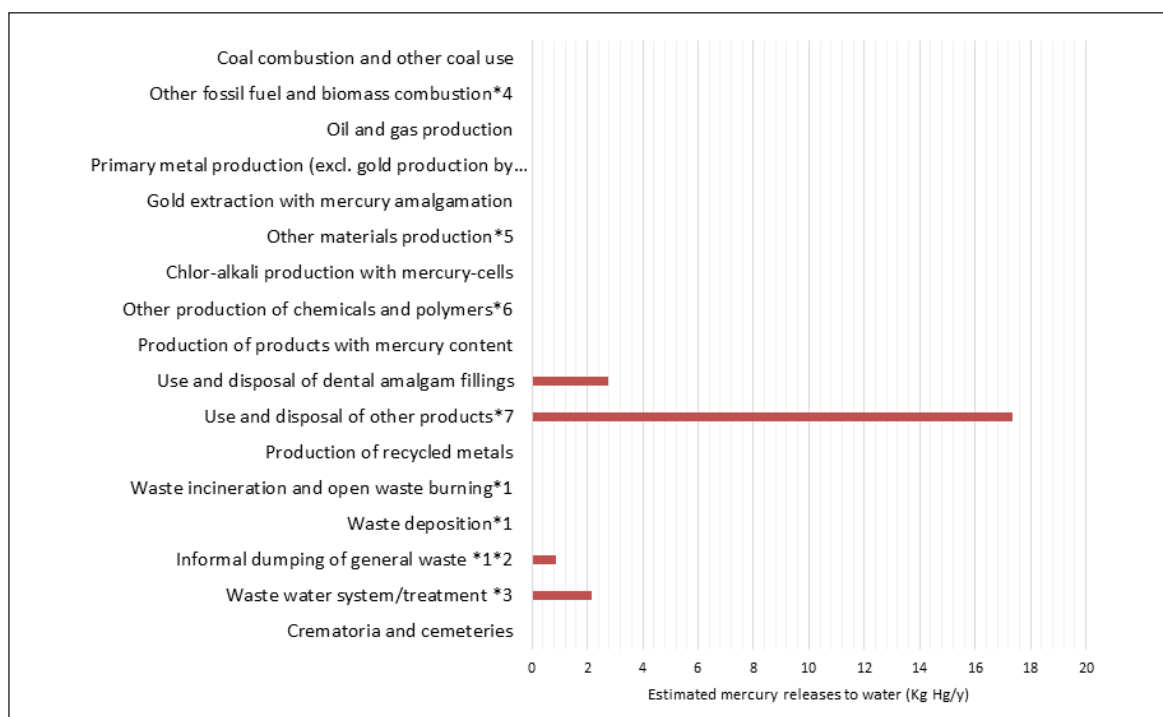


Figure 5: Estimated mercury releases to water in Samoa

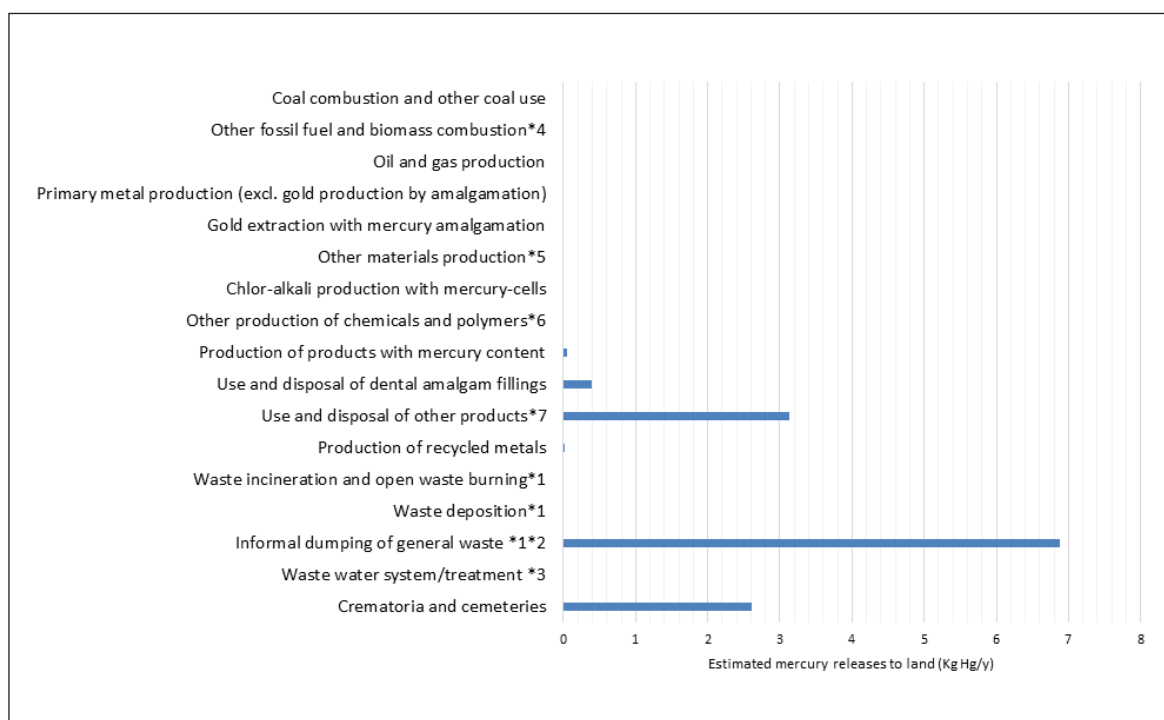


Figure 6: Estimated mercury releases to land in Samoa

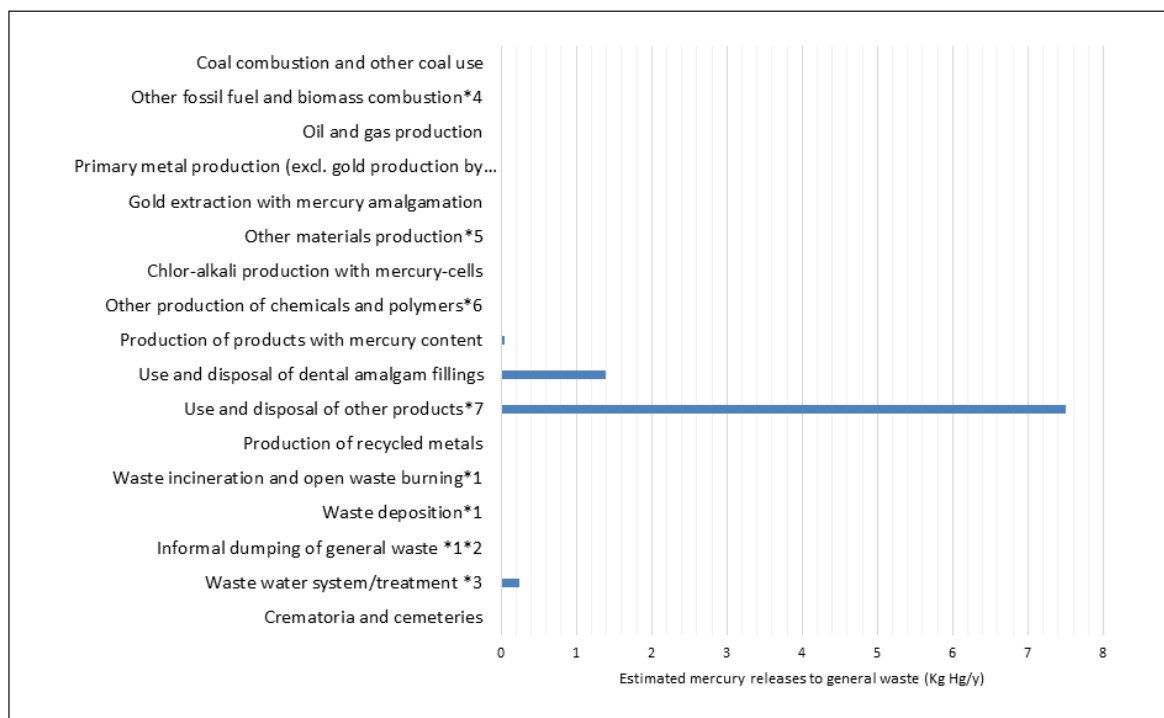


Figure 7: Estimated mercury releases to general waste in Samoa

2.3 Data and Inventory on Energy Consumption and Fuel Production

The growing demand for energy in Samoa is met with fossil fuels (transportation, electricity), biomass (cooking and heating), hydropower generation (electricity) and solar power (electricity), where transportation is the single largest energy consuming sector. As with many small island developing state (SIDS), Samoa is highly dependent on import, since all the diesel and gasoil used in transportation and

power generation needs to be imported. Energy consumption and fuel production accounts only 4% of the total mercury emissions and releases in Samoa (2kg Hg). This is understandable, since there are no fuel productions or coal combustion in Samoa. The whole category consists of consumption of refined petroleum products and biomass. The table below gives a detailed account on how much mercury is estimated to be included and therefore also released into environment. Since mercury is a volatile element, based on the calculations, all the mercury can be estimated to be emitted to air⁶.

TABLE 9

Energy Consumption in Samoa

Source category	Activity rate		Estimated Hg input, Kg Hg/y
Energy consumption	Annual consumption/production	Unit	Standard estimate
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	82 805	Oil product combusted, t/y	0
Biomass fired power and heat production	49 000	Biomass combusted, t/y	1

(Source: MoF, Government of Samoa)

Combustion/Use of Diesel, Gasoil, Petroleum, Kerosene, LPG and other light to medium distillates

There are two main power stations in Samoa, the newly built Fiaga Power station (23 MW), which is located in Upolu island in Apia and generates almost 85 million

kWh per year and a smaller Salelologa power station (4MW), which is located in Savaii. Both of these main power stations use diesel as fuel and generate 67% of total electricity production. There are also a number of smaller diesel generators used around the islands. Hydroelectric plants provide a further 24% with the remainder

provided by solar plants (Electric Power Corporation, Annual Report 2015-2016).

For this inventory, the data for the energy consumption and fuel production was acquired from the Ministry of Finance (2015). Table 10 below shows the total quantity of specific fuel types being imported and Table 11 shows the annual fuel consumption. The number of imported fuel in Samoa has increased over the years; this may be associated with how Samoa is more developed over the years with a high demand of energy consumption resources.

TABLE 10

Fuel Imports

Fuel Type ⁷	Quantity (KI)
ULP	31,480.89
ADO	46,683.93
DPK	14,755.69
Total (KI)	92,920.51
Total (t)	77,309.86

TABLE 11

Annual Fuel Consumption

Fuel Type	Quantity (KL)
ADO	49,518.66
DPK	15,222.25
LPG ⁸	0
MOGAS/Petrol	33,576.20
Lubricants oil	1208.68
Total (KL)	99,525.79
Total (t) ⁹	82,805.46

Biomass fired power and heat production

The most typical biomass being used for power and heat production is ordinary firewood used for cooking and heating the houses. According to the FAO data¹⁰ a total of 49,000t of firewood is burned annually in Samoa. According to some sources¹¹, small amount of coconut residues are used for electricity production and making of charcoal. However, there is no reliable information on this.

2.3.1 Sub-Category - Fuel Production

There are no oil extraction, oil refining and extraction/processing of natural gas in Samoa.

2.4 Data and Inventory on Domestic Production of Metals and Raw Materials

2.4.1 Sub-Category - Primary Metal Production

There is no domestic extraction, production of metals (zinc, copper, lead, aluminium) in Samoa.

2.4.2 Sub-Category - Other Materials Production

There is no domestic production of cement, pulp and paper in Samoa. There are only companies in Samoa that control

the mixing of cement and trade.

2.5 Data and Inventory on Domestic Production and Processing with International Mercury Use

2.5.1 Sub-Category - Production of Chemicals

There are no production of chemicals in Samoa.

2.5.2 Sub-Category - Production of Products with Mercury Content

There is no production of products with mercury in Samoa.

2.5.3 Sub-Category - Production of Recycled of Metals

There is no domestic production of recycled metals with mercury in Samoa.

2.5.4 Sub-Category - Production of Recycled Ferrous Metals (iron and steel)

There is at least one company which recycles ferrous metals in Samoa. According to the information received, in 2016 they recycled the total of 21 cars. As Samoa cannot treat the scrap metal, the valuable parts are removed and the remaining metal body is crushed and cubed to facilitate economical

transportation. As switches used in cars typically contain mercury, car recycling is a potential source of mercury in Samoa, as some of the mercury can be released to environment during the process.

2.6 Data and Inventory on Waste Handling and Recycling

Generally speaking, wastes are quite well managed in Samoa. The natural beauty of the islands is a reason for pride for locals, and one cannot observe that much litter in the environment. The country has one engineered landfill in the main island of Upolu, which has been constructed in cooperation with the Japanese development organisation, JICA (Japan International Corporation Agency). Different wastes are also segregated to some extent, and for example collected batteries are shipped to be recycled in Japan, as they cannot be treated in Samoa. However, different waste streams combined form a remarkable mercury source in Samoa, contributing up to seven percent (4kg) to the total releases.

Based on the inventory results, it shows that out of the waste handling activities in Samoa, the open burning of waste results greatest releases of mercury to air (2 kg), whereas informal dumping of general waste causes significant releases to land (6.9 kg). It is noticeable to mention that even if landfilling (controlled landfills/deposits) contain relatively great amount of mercury

(24kg), there are hardly any direct releases to air, water or land, as the mercury exists mainly in the mercury-added products being deposited. However, it must also be recognized that depositing mercury waste or mercury containing waste in general engineered landfills, is not a sustainable way of treating such hazardous waste. The mercury waste and mercury containing waste should be segregated and treated in environmentally sound manner¹², thus resulting smaller mercury concentrations in municipality solid waste.

2.6.1 Sub-Category – Waste Incineration

Incineration of medical waste: Samoa utilizes a modern two-chamber medical waste incinerator, but it is not enhanced with a mercury-specific filters. Based on the data received from Samoa, 12 yellow containers of medical waste are brought to be incinerated daily. A visit to the waste

treatment facility proved that containers were not always full. Medical waste is also very porous, and it was estimated that each container would contain an average of 5kg of medical waste. Medical wastes from hospitals/clinics may be incinerated with other medical wastes and so contributes to emissions. Therefore, it was estimated that a total of 60kg of medical waste is produced daily and furthermore 22 tons annually.

2.6.2 Sub-Category – Waste Deposition/Landfilling

Based on the report mentioned earlier, between 0.38kg and 0.48kg municipality solid waste is generated daily per capita. For this report, the upper limit has been used, as the reported figures are small compared to what has been regionally reported by the World Bank¹³. The following table summarizes the municipality solid waste (MSW) management in Samoa.

TABLE 12

Municipal Solid Waste Generation in Samoa

	SAMOA	UPOLU	SAVAII + MANONO + APOLIMA
Population	195,125	143,418 (73.5%)	51,707 (26.5%)
MSW Generated (t) ¹⁴	34185.9	25127	9059.0
MSQ Openly burned (t)	1709.3	1256.3	453.0
MSW Not Burned (t)	32486.6	23870.5	8606.7
MSW Deposited in controlled landfills (t) ¹⁵	23870.5	23870.5	0
MSW Informally dumped ¹⁶	8606.1	0	8606.1

Controlled landfills/deposits

All the waste in Upolu which is not burned is considered to be deposited on the controlled landfill. The country has one engineered landfill in Upolu, which has been constructed in cooperation with the Japanese development organization, JICA.

Informal dumping of general waste

All the waste in the other islands which is not burned is considered to be informally dumped, as there are no engineered landfills on other islands. It must be noted that there are dedicated areas in other islands, where municipal solid waste is deposited, but as they are not engineered landfills, it is technically same as informal dumping when mercury releases are considered.

Waste water system/treatment

There is a waste water treatment plant in the Upolu Island in Apia. According to the data available¹⁷, the treatment plant has a daily capacity of 1.25Ml. Using this as an estimation of the amount of waste water treated daily, we can estimate that a total of 456.25Ml (456250m³) of waste water is treated annually.

2.6.3 Test for Waste and Wastewater default factors

In this inventory, default input factors were used for the estimation of mercury

releases from general waste treatment and wastewater treatment. The default factors were based on literature data of mercury contents in waste and wastewater, and these data were only available from developed countries. The test made for general waste compared the calculated inputs to all waste sub-categories with the sum of general waste outputs from intentional mercury uses in products plus processes using data from the Inventory level 1 spreadsheet. The calculations made indicated that the default input factors for general waste heavily over-estimate the mercury releases from these sub-categories. After adjusting the input factors for Informal waste burning, Controlled landfills/deposits and Informal dumping of general waste from the default 5g Hg/t to 1g Hg/t, the numbers are now closer to each other as expected. However, the waste streams still appear to contain more mercury than the total estimated from the mercury-added products consumed in the country. There are three possible mutually non-exclusive explanations for this small discrepancy:

- The consumption estimates for mercury-added products are too low;
- The waste generation figures are too high;
- The input factor for waste is still too high (1g Hg/t).

2.7 Data and Inventory on General Consumption of Mercury in Products as Metal Mercury and as Mercury Containing Substances

At Level 1, consumption of some mercury-added products is calculated automatically. These calculations for the product groups listed below were based on the data on population, electrification rate and dental personnel density as suggested by the methodology of this inventory.

TABLE 13

Data Types Used as Activity Rates

Sub-Category	Data Types Used as a Activity Rates
Dental amalgam fillings (“silver” fillings)	Population, density of dental personnel
Electrical switches and relays with mercury	Population, electrification rate (percent of population with access to electricity)
Polyurethane (PU, PUR) produced with mercury catalyst	Population, electrification rate (percent of population with access to electricity)
Other manometers and gauges with mercury	Population, electrification rate (percent of population with access to electricity)
Laboratory chemicals	Population, electrification rate (percent of population with access to electricity)
Other laboratory equipment with mercury	Population, electrification rate (percent of population with access to electricity)

2.7.1 Sub-category – Dental Amalgam Fillings

There are approximately 40 dental practitioners working in the Public Dental Health Services and three private dental clinics. In Samoa, dental amalgam is widely used and is the preferred dental restorative

material by dental practitioners because it is very strong, durable, affordable and most importantly, it is how most dentists have been trained and are thus comfortable with the process. According to information received from the dental clinic, Samoa imported the mercury-silver mixture from New Zealand.

TABLE 14

Data Used as Activity Rates for Samoa

Country	Population in 2010 (or as recent as available data allow; UNSD, 2012)	Dental personnel per 1000 inhabitants	Electrification rate, % of population with access to electricity
Samoa	196,315	0.175	93

The data in Table 14 above was used as an input to the Toolkit. For most countries the estimates are based on authoritative international data sources (population data: UNSD; Dental data: WHO; Electrification data: IEA).

2.7.2 Sub-category - Thermometers

Medical mercury thermometers: Mercury-filled thermometers are no longer sold in Samoa. In all hospitals and health clinics, mercury thermometers have been replaced with digital thermometers.

Non-medical mercury thermometers: Most other glass thermometers are imported for educational purposes (research and science laboratories). The quantity of mercury thermometers in schools could not be quantified. The inventory results showed that around 19 units of laboratory mercury thermometers are sold annually. It is important to notice that mercury thermometers used for scientific purposes and calibration are excluded from the list of products to be phased out in 2020.

2.7.3 Sub-category - Light Sources with Mercury

The UN Comtrade database was used to estimate annual consumption of various mercury-added products including light sources. The average has been taken of the years 2011-2015 to better estimate the annual consumption. The UN Comtrade does not separate fluorescent tubes and compact fluorescent lamps. Based on the discussion during the UNITAR training in February 2017, an estimation was made that 75% of the reported lamps are tubes and the rest are compact fluorescent lamps. The figures were used in the Toolkit.

2.7.4 Sub-category - Skin Lightening Creams and Soaps with Mercury Chemicals

In Samoa, the information from MfR has in its record in relation to soaps and cosmetics do not reveal in the Description of Goods whether any of the soaps and cosmetics containing mercury. A search for mercury as an ingredient on the labels on soaps, cosmetics, hair treatment products was conducted on 20 shops. These shops are the prime wholesale and retail outlets in Samoa. The search failed to find the word

mercury or words associated with mercury (mercurous chloride, calomel, mercuric, mercurio), on any of the soaps or skin lightener labels.

2.7.5 Sub-category – Medical Blood Pressure Gauges (mercury sphygmomanometers)

Mercury-containing sphygmomanometers are no longer used in Samoa and have been replaced by digital devices.

Data gaps and priorities for potential follow up:

From the inventory perspective, mercury-added products is one of the source-categories which require the most effort, since the data is difficult to obtain. For this source-category, UN Comtrade database has therefore been used to estimate annual consumption of various mercury-added products. The main limitation is that UN Comtrade uses only 6-digit HS Commodity codes, which does not always offer the required resolution. This leaves room for error, as for example, UN Comtrade doesn't indicate whether typical cylindrical alkaline batteries contain mercury.

2.8 Data and Inventory on Crematoria and Cemeteries

Burial is the most common resting method in Samoa, and there is only one cremation facility in Samoa which is built next to the Tafaigata National cemetery. The below

value of 208 was used as an input to the toolkit.

The amount of bodies annually buried is based on the following information:

- Death rate: 5.3 deaths/1,000 population (2017 est.).
- Population: 196,315
- $196,315 \times 5.3/1000 = 1041$.

The amount of bodies cremated is based on the following information:

- An average of 4 bodies cremated per week
- 52 weeks of operation in a year
- $52 \times 4 = 208$

2.9 Summary of Inventory Results

The main findings in Samoa are as follows: The total mercury releases are 50kg per year and the two most significant anthropogenic sources of mercury are:

1. use and disposal of other products: 68% (33 kg Hg/y), and
2. the application, use and disposal of dental amalgam fillings: 13% (6 kg Hg/y).

Rest of the emissions (19%) is shared between different smaller source-categories as illustrated in the following graphs:

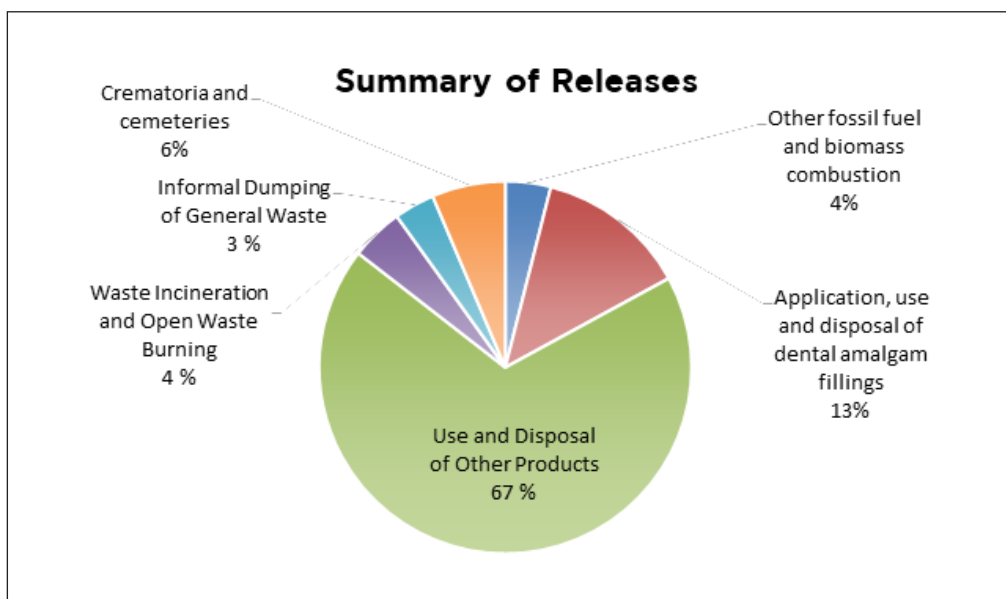


Figure 8: Summary of Releases in Samoa

In Samoa, most of the mercury is released to water, and the following figure summarizes the main release pathways in Samoa.

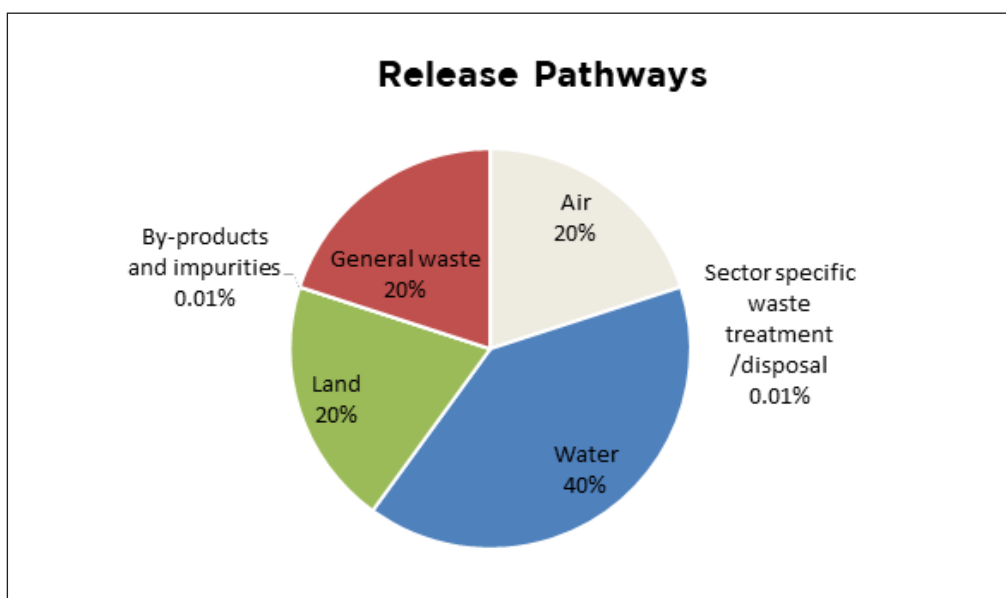


Figure 9: Release Pathways in Samoa

An aggregated presentation of the results for main groups of mercury release sources is presented below:

TABLE 15

Summary of Mercury Inventory Results

Source Category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y							Percent of total releases *3*4
		Air	Water	Land	By-products and im-purities	General waste	Sector specific waste treat-ment / disposal	Total releases *3*4*5	
Coal combustion and other coal use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Other fossil fuel and biomass combustion	1.9	1.9	0.0	0.0	0.0	0.0	0.0	2	4 %
Oil and gas production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Primary metal production (excl. gold pro-duction by amalgamation)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Gold extraction with mercury amalgamation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Other materials production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Chlor-alkali production with mercury-cells	-	-	-	-	-	-	-	0	0 %
Other production of chemicals and poly-mers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Production of products with mercury con-tent*1	0.5	0.0	0.0	0.1	0.0	0.1	0.0	0	0 %
Application, use and disposal of dental amalgam fillings	8.3	0.2	2.8	0.4	0.3	1.4	1.4	6	13 %

Summary of Mercury Inventory Results (continued)

Source Category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y							Percent of total releases *3*4
		Air	Water	Land	By-products and im-purities	General waste	Sector specific waste treat-ment / disposal	Total releases *3*4*5	
Use and disposal of other products	33.4	2.4	17.3	3.1	0.0	7.5	3.1	33	67 %
Production of recycled metals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0 %
Waste incineration and open waste burn-ing*2	2.2	2.2	0.0	0.0	0.0	0.0	0.1	2	4 %
Waste deposition*2	23.9	0.2	0.0	0.0	-	-	-	0	0 %
Informal dumping of general waste *2*3	8.6	0.9	0.9	6.9	-	-	-	2	3 %
Waste water system/treatment *4	2.4	0.0	2.2	0.0	0.0	0.2	0.0	0	0 %
Crematoria and cemeteries	3.1	0.5	0.0	2.6	0.0	0.0	0.0	3	6 %
TOTALS (rounded) *1*2*3*4*5	50	10	20	10	0	10	0	50	99 %

*1 To avoid double counting of mercury in products produced domestically and sold on the domestic market (including oil and gas), only the part of mercury inputs released from production are included in the input TOTAL. *2: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration, waste deposition and informal dumping is included in the total for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of the Toolkit. *3: The estimated quantities include mercury in products which has also been accounted for under each product category. To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS. *4: The estimated input and release to water include mercury amounts which have also been accounted for under each source category. To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS. *5: Total inputs do not necessarily equal total outputs due to corrections for double counting (see notes*1-*3) and because some mercury follows products/metal mercury which are not sold in the same country or in the same year.

2.10 Implications of the Inventory Results for Samoa as a Party to the Minamata Convention

Samoa is a Party to the Minamata Convention on Mercury. The goal of that treaty, and thus of Samoa as a Party to it, is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. To meet its obligations under a number of the articles of that treaty, a range of actions needs to be taken.

With regard to *Article 3, Mercury supply sources and trade*, Samoa has no mining and no industries using mercury so does not extract, import or stock mercury. To ensure this remains the case in the long term, Samoa should introduce a regulation in near future on the ban of imports/exports of mercury and its related products.

With regard to *Article 4, Mercury-added products*, listed in Annex A part I have been imported in the past and are probably still being imported although there are no direct data. Samoa will need to prohibit imports and make further investigations to determine which products may contain mercury. Samoa uses dental amalgam (listed in Annex part II) so will need to prepare a phase-down plan in accordance with the provisions set out in the Annex.

With regard to *Article 5, Manufacturing*

processes in which mercury or mercury compounds are used, Samoa has no manufacturing processes intentionally using mercury. Samoa may need to consider a combination of measures to ensure that no such industries can be established.

With regard to *Article 7, Artisanal and small-scale gold mining (ASGM)* is a major source of mercury to the environment. There is no ASGM in Samoa.

With regards to *Article 8, Emissions*, Samoa does not possess coal-fired power plants or industrial boilers. It has no nonferrous metal processing and no cement clinker production. A small medical waste incinerator is operational. Samoa will need to examine waste incineration practices for opportunities to reduce emissions.

With regard to *Article 9, Releases*, the releases of mercury identified in the Inventory are principally from waste management and dealt with under Article 11.

With regard to *Article 10, environmentally sound interim storage of mercury, other than waste mercury*, Samoa has a small central store for dental amalgam. Operational arrangements at this store will need to be examined to ensure that they meet the requirements of Article 10. Improvements to the storage arrangements will form part of the dental amalgam phase-down plan prepared in response to Article 4.

With regard to *Article 11, Mercury wastes*, mercury wastes form the largest contributor to total mercury emissions and releases. Samoa will need to consider how best to reduce emissions and releases from the waste sector, in particular through the improved management of end-of-life mercury-added products.

With regard to *Article 12, Contaminated sites*, the inventory indicates few source categories likely to give rise to contaminated sites. Most likely to be contaminated are

waste management facilities. A strategy and management plans for identifying and assessing these sites will be required as part of wider initiatives to improve waste management.

With regard to *Article 16: Human Aspects* and *Article 18: Public Information, Awareness and Education*, the inventory helps to identify certain populations that may be at risk of exposure to mercury and will need to be protected.

Chapter 3: POLICY, REGULATORY AND INSTITUTIONAL FRAMEWORK ASSESSMENT

3.1 Legal Instruments for Managing Chemicals (including Mercury)

3.1.1 Legal Instruments

The legal review of Samoa's obligations under the Minamata Convention provides a comprehensive overview of the legal instruments that can be utilised to regulate the sound management of mercury and should be read in conjunction with this profile. A comparison of the obligations and provisions of the Minamata Convention on Mercury and policy and regulatory measures in place in Samoa is set out in Annex 2. This annex identifies gaps in the current regulatory framework that need to be added to ensure the sound management of chemicals including mercury and, in particular, to meet the requirements of the

Minamata Convention.

3.1.2 Waste Management Act 2010

Although the WMA 2010 does not specifically refer to mercury, it regulates the importation, use, storage, distribution and disposal of hazardous chemicals, including regulations, environmental and public health standards and codes of practice and therefore, it can be amended to include mercury among the hazardous chemicals subject of the Act.

3.1.3 Lands Survey Environmental Act 1989

Under the Lands Survey Environment Act 1989 (LSE) the MNRE principal functions include the control and management of hazardous and potentially hazardous substances including the management of

the manufacture, use, storage, transport and disposal of such substances (section 95(c)(iii)). Mercury is a hazardous and potentially hazardous substance is therefore covered within the principal functions of the Ministry.

Regulations can be made under LSE section 146(t) regulating or prohibiting the pollution of air, water, or land, and the depositing or dumping of litter, rubbish, or any substance of a dangerous, noxious, or offensive nature. Taking into account the principal function of the Ministry above regulatory power a regulation could be made that sets conditions in relation to mercury-added products importation (its use, storage and export).

Regulations could also be made under the Lands Survey and Environment Act to phase out the use of mercury-added products by 2020 (Article 4, Part 1 of Annex A). The regulation could also extend to a ban on mercury/mercury compounds covered in the Convention (as is Samoa's sovereign right as well other mercury/mercury compounds not covered in the Convention (Article 3.2 (a) and (b))). The advantage of addressing mercury/mercury compounds and mercury-added products through a regulation made under the Lands and Survey Act is that they are not deemed to be wastes (which they are not technically as are being used) but which they would be, if they had to be regulated under the Waste Management Act. An example of this was done with the Lands, Surveys and Environment (Plastic Bags)

Regulations as amended 2013 where persons who distributes, sells, supplies, or uses for trade any plastic bag imported into Samoa contrary to these Regulations commits an offence.

3.1.4 Planning Urban Management Act 2004

The PUMA act provides for Codes of Environmental Practices to define methods and/or procedures to be followed by consultants, designers and contractors for the avoidance or mitigation of adverse environmental effects that may arise out of infrastructure development projects. A Code of Environmental Practice is recommended in relation to buildings and sites (landfill) that store or contain hazardous chemicals/pesticides and hazardous waste.

3.1.5 Occupational Health and Safety Act 2004

The Occupation, Health and Safety Act (OHS) 2004 makes provision for the safety, health and welfare of people at work in Samoa and to establish procedures for the administration of these matters. Under the Act (section 13) an employer must take appropriate steps to control hazards which are identified and assessed as posing a threat to the safety, health or welfare of employees, and where practicable, the hazard must be eliminated. In terms of sound management of mercury this would have relevance for waste contractors employees as well as NUS, USP, SROS employees. For fragile products like in

some light bulbs, employers should also be advising their employee on matters such as breakages and the safety procedure to be followed.

3.2 Non Regulatory Mechanisms for Managing Chemicals (including mercury)

3.2.1 Strategy for the Development of Samoa 2017-2021

The Strategy for the Development of Samoa (SDS) is the national road map for the development of Samoa. Key SDS Outcome 13 Environmental Resilience addresses the better management and regulation of chemical and hazardous waste to prevent contamination. The strategy states that Samoa's built environment will be better planned, designed and monitored to prevent adverse impacts to the environment and its natural resources and the health of the human population.

3.2.2 National Environmental Sector Plan (NESP) 2013-2016

The NESP provides the blueprint to guide and monitor the work of the MNRE responsible for the management of hazardous chemicals and waste. In the plan targets are set and reported against. Facilitating Samoa's implementation of

the Strategic Approach to International Chemicals Management (SAICM) falls under the Chemical and Hazard Waste Management Unit (CHWM). Some of the SAICM outputs that have been developed include the:

- *National Chemical Management Policy 2008-2018 (NCMP)* - It is designed to guide MNRE's work on chemicals management. It provides a de-facto framework for the sustainable management of all chemicals through the various stages during their life-cycle – procurement, transportation, storage, distribution, use and waste disposal. Its objectives include: increasing awareness on chemicals, building capacity on the effective utilisation or application of chemicals, improving the safe disposal or treatment of chemical waste, enhancing the sustainable management of chemicals and developing regulatory framework to monitor or enforce the sustainable management of chemicals.
- *National SAICM Implementation Plan* - The focus of the NSIP is primarily to facilitate the implementation of the CMS to achieve the agreed goal of the Johannesburg Plan of Implementation from the World Summit on Sustainable Development whereby significant adverse effects on human health and the environment from the use and production of chemicals were to be minimized by the year 2020. This would be done through the improved governance of chemicals, improved

knowledge and information, reduced risks from exposure to hazardous substances, decreased illegal international traffic and strengthened capacity building and technical cooperation.

- *The National Chemical Profile* completed in 2010 (NCP) considered and evaluated the infrastructures and systems to facilitate the management of chemicals in Samoa. It looked at the operational, legal, financial and institutional issues related to chemical management judged against international best practice.

3.2.3 Ministries, Agencies and Other Governmental Institutions Managing Chemicals

The key institutions that have a distinct but collective responsibility in ensuring a sound management of chemicals at various stages of its life cycle:

Ministry of Agriculture and Fisheries

The Ministry of Agriculture and Fisheries (MAF) is responsible for administering the Pesticides Act and regulations that regulate the use of pesticides and chemicals used in agriculture. It is responsible for administering the pesticides licensing system for controlling the importation of pesticides and monitors the proper storage and handling of pesticides. It has a role to share information on how it regulates pesticides containing mercury with MNRE and to ensure approaches

between the Ministries regarding the consistent and sound management of pesticides containing mercury.

Ministry of Education Sports and Culture

The Ministry of Education, Sports and Culture (MESCC) is responsible for school scientific development and laboratory chemicals that may contain mercury for educational purposes. It has a role to ensure mercury is stored in a sound environment manner consistent with Samoa's obligations under the Minamata Convention.

Ministry of Foreign Affairs

The Ministry of Foreign Affairs (MFA) is the Political Focal Point for the over 100 conventions that Samoa is a Party to including the Minamata Convention on Mercury. It is responsible for ensuring compliance with the administrative articles of the Convention.

Ministry of Finance

The Ministry of Finance (MoF) allocates funds received from overseas donors for hazardous and chemical waste projects and programmes. The MoF is also responsible for overall monitoring and evaluation the Strategy for the Development of Samoa (SDS) which targets the minimization of chemical and hazardous waste. It has a role to query whether national objectives and targets in relation to the sound management of chemicals including mercury are being met under the SDS

monitoring and evaluation framework.

Ministry of Natural Resources and Environment

The Ministry of Natural Resources and Environment (MNRE) leads the management of Samoa's environment and natural resource¹⁸. The work done by the MNRE is guided by the government priorities under the SDS, community values, aspirations, the state and condition of natural resources, legislative and policy mandates. There are two Waste Management Unit within the Division of Environment and Conservation, **(1) Chemical & Hazardous Waste Management Section (CHWM)** is responsible for chemical and hazardous waste management and ensuring (1 principal and senior officer), and provides technical compliance with Samoa's obligations under the many hazardous chemical and waste conventions (Basel, Minamata, Stockholm, Rotterdam, Waigani), **(2) Solid Waste Section (SWM)** is often responsible to the solid waste management including the managing of the collection and disposal of solid municipal waste at the Tafaigata Landfill (1 principal, 2 seniors, 2 officers, assistants landfill staff). A national project steering committee (SAICM PSC) established under the SAICM initiative is coordinated by the CHWM and chaired by the Chief Executive (CEO) of MNRE. It meets to promote the sound management of hazardous chemicals. It draws on the knowledge and work of the relevant ministries, research institutions, regional and bi-lateral development agencies, the non-

government sector and the community representatives. Notwithstanding the above, institutional arrangements of the National Chemical Profile (NCP) concluded in 2010 that the CHWM unit will be responsible for the overall management of chemicals as a number of different agencies are mandated with control of specific chemicals or aspects of chemicals management.

Ministry of Health

The Ministry of Health (MoH) provides the government and the Minister of Health with advice as to strategies, policies and plans concerning the development, resourcing provision and management of health services. In addition, MoH has a role to ensure safe operating procedures for the use of mercury and mercury added products. It also has a role to ensure medical waste including disused mercury waste and dental amalgam is properly stored for collection and disposal. There are no recorded deaths from mercury poisoning in Samoa. There is no available data on how many patients have been poisoned from mercury or case of elevated mercury levels. The Ministry has a role to provide and share such records.

Ministry for Revenue – Customs Division

The Ministry of Revenue- Customs Division (MfR-CD) is responsible for border control authority and the inspection of all chemical imports, record keeping of volumes and quantities imported into Samoa and

enforcement of relevant legislation.

Ministry of Women, Community and Social Development

The Ministry of Women, Community and Social Development (MWCSO) plays a vital part in the development of Samoa's 310 villages. Village representatives meet ministry officials monthly to discuss development concerns and learn of government strategies. Hazardous and Chemical waste is one of these concerns. The ministry's Family and Community Wellbeing Programmes promotes village, household, improve living conditions in the villages, contributing to child and maternal health and general environmental cleanliness, including composting, in over 200 villages.

National University of Samoa

The functions of the University, within the limits of its resources, are: the acquisition and transmission of knowledge by teaching, consultancy, community learning and research and the promotion of the economic and social development of Samoa. The potential of NUS to contribute to Samoa's capacity in hazardous chemical management is significant. The existing Bachelor of Science degree and Post-graduate Programmes with a major in Environmental Science provides a solid foundation in environmental chemistry and biology/ecology that is essential to hazardous waste management. This will offer MNRE, other government agencies and the private sector, a ready source

of well-trained graduates to serve their increasing needs in this crucial area. With regard to environmental monitoring, NUS has functioning laboratories but would need additional funding for more sophisticated instrumentations and chemicals to be able to contribute to any initiatives in this area.

Samoa Bureau of Statistics

Samoa Bureau of Statistics (SBS) provides statistics on chemicals procured for use in agriculture, health, education and industry. It can also provide data and information on mercury derived from other government sectors such as MfR-CD, MoH, EPC, and MNRE.

Scientific Research Organisation of Samoa

Scientific Research Organisation of Samoa (SROS) was established by Act of Parliament that has as part of its objectives to ensure effective training for researchers and technical research mainly into renewable energy and food technology and undertake environment impact assessments. It has the technical capacity to test for mercury in products (like canned tuna) and on human hair.

Samoa Umbrella Organisation of Non-Government Organisations

Samoa Umbrella Organisation of Non-Government Organisations (SUNGO) have an important role ensuring that government laws and policies such as the sound management of mercury are being

properly implemented. They also have strong links to village communities and can assist in the national effort to promote the sound management of chemicals.

Villages Councils around Samoa

The village councils are a very important institution that hold the social and cultural fabric of Samoan society together. The Village Fono selects a Pulenuu (mayor) every three years, who is the main spokesperson between the village and the Government. They have the authority to make by-laws that affect over 80% of Samoa's land, rivers, and sea areas adjacent to the village. They could for example regulate against burning practices and dumping in areas under village jurisdiction.

University of the South Pacific

The USP School of Agriculture (USP) has a Department of Soil Science and Agricultural Engineering that offers formal courses in Fundamentals of Soil Science, Soil Fertility, Plant Nutrition and Soils, and Water and Structures Engineering as part of the Diploma, Bachelor, Masters and PhD degrees in Agriculture. Close collaboration between USP and the Institute of Research and Training in Agriculture facilitates the transfer and dissemination of knowledge and information to users including technical field people, scientists, policy makers, students and farmers. Other departments at USP offers courses that deal with issues related to the management of agricultural chemicals such as fertilizers and pesticides. These courses include Plant Protection

and Pest and Disease Management.

Samoa's Recycling & Waste Management Association

Samoa's Recycling & Waste Management Association (S.R.W.M.A.) for businesses committed to recycling was established in Samoa in January 2018 with support from U.N Environment. The association works together to share ideas on waste management in an environmentally friendly manner and promote recycling of waste consistent with the growing fight against pollution around the world. The Samoa Recycling & Waste Management Association is the first of its kind in the Pacific Island Countries. It will allow recyclers in Samoa to promote their business and speak in one voice with the related government agencies and international donors on their aspirations and concerns for the recycling business¹⁹.

3.3 Inter-Agency Commissions and Coordinating Mechanisms

Inter-agency commissions may be defined as formal bodies mandated by law to carry out its functions while coordinating mechanisms are often informal interagency committees formed to manage a project or activity. They are listed in Table 16 below.

TABLE 16

Inter-agency Commissions and Coordinating Mechanisms

Mechanism	Focus	Secretariat	Members	Legislative Mandate
SAICM PSC	Activities under the SAICM Samoa project	MNRE	>10	No legislative mandate, but endorsed by the Cabinet Development Committee
PTC	Licensing system for pesticide import and use MAF	Pesticide Registrar	5	Pesticides Act PTC chaired by the Ministry of MAF
DAC	Disaster preparedness, recovery and rehabilitation	MNRE Disaster Management Office (DMO)	40	Disaster and Emergency Act, DAC chaired by the CEO of MNRE
PUMA Board Environmental Impact Assessment	Approval projects >\$1 million	MNRE PUMA	10	Planning and Urban Management Act, Board chaired by the Minister of MNRE

The SAICM-PSC is a coordinating mechanism for the SAICM Samoa project, chaired by the CEO of MNRE and managed by the MNRE-CHWM unit. It is the main decision-making body of the SAICM project, with membership comprising the MNRE, MAF, MFAT, MOH, MfR, MESC, SBS, MOF, MCIL, SROS, MNRE-Ozone Unit, MNRE-Meteorology Division and SUNGO. The existing inter-agency commissions relevant to mercury management are the PTC, dealing with pesticides. The Disaster Advisory Committee (DAC) and the Planning and Urban Management Agency (PUMA) Board both occasionally deal

with chemicals - DAC during chemical related disasters and the PUMA Board for environmental impact assessment of chemical projects. The National Chemical Profile noted that the fragmented nature of the coordinating mechanisms, however, is a constant problem as often one secretariat is unaware of what the others are doing. As part of the proposed chemical information network (CIN), the National Chemical Profile recommended that a formal feedback system be established to facilitate communication between MNRE and the inter-agency commissions and coordinating mechanisms for

HCM. MNRE requires regular updates and information from these bodies for effective management, especially those from the existing PTC. Information such as banned or restricted chemicals and license holders, for instance, is currently not readily available.

Information Management, Access and Use

Data and information on chemicals are important to facilitate informed decision-making on its effective management. Currently, there is no coordinated approach to the dissemination of information from lead ministries to other Government ministries. Information flows, where they exist, depend largely on the individuals within the agencies that receive or collect the information. There is also no coordinated approach to the exchange of information between Government agencies and other stakeholders outside of the Government. The Chemical Information Network (CIN) under the SAICM initiative (once operational) will provide a system to facilitate the exchange of national and international information and data between the regulating agencies and among the Government and non-Government stakeholders.

Technical Infrastructure

Only SROS has the equipment and capacity to support scientific and technical chemical research. SROS has an Atomic Absorption

Spectrometer which can be used for the mercury analysis of food. It needs additional equipment for methylmercury analysis that can conduct gas chromatographic GC/ECD instrumentation. Although SROS has in house capacity to carry out much needed scientific research on mercury, it is over stretched in terms of technical and financial resources. With necessary support it would be well placed to test more extensively for mercury in the environment. It is open to collaborative research with overseas institutions (e.g from Japan, New Zealand).

Chemical Emergency Preparedness, Response and Follow Up

Chemical disasters have been identified as one of the main hazards to consider in a National Disaster Management Plan. A chemical hazard plan and agency response and a chemical disaster early warning system has been in the pipeline for a number of years and should be operationalised. The most recent notable chemical accident was in 2016 when there was an explosion at one of the diesel fuel storage tanks on the wharf at Matautai that triggered off a fire²⁰.

Policy and Regulatory measures in place and remaining gaps in ensuring a sound management of chemicals including mercury to meet the requirements of the Minamata Convention is presented in Annex 2 of this document.

3.4 Implications of the Inventory Results for Samoa as a Party to the Minamata Convention

Samoa is a Party to the Minamata Convention on Mercury. The goal of that treaty, and thus of Samoa as a Party to it, is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. To meet its obligations under a number of the articles of that treaty, a range of actions needs to be taken.

With regard to *Article 3, Mercury supply sources and trade*, there is no current export/import or stock of mercury, but Samoa needs to establish specific regulations to prevent the possibility of trade in the future.

With regard to *Article 4, Mercury-added products*, Samoa needs to ban the import of Annex A part 1 products, providing customs with full authorisation to prevent and prohibit imports of products containing mercury and related compounds.

With regard to *Article 5, Manufacturing processes in which mercury or mercury compounds are used*, Samoa has no manufacturing processes intentionally using mercury. Samoa may need to

consider a combination of measures to ensure that no such industries can be established.

With regards to *Article 8, Emissions*, Samoa does not possess coal-fired power plants or industrial boilers. It has no nonferrous metal processing and no cement clinker production and there are no plans to establish such facilities. A small medical waste incinerator is operational. Samoa will need to examine waste incineration practices for opportunities to reduce emissions.

With regard to *Article 10, environmentally sound interim storage of mercury, other than waste mercury*, Samoa has a small central store for dental amalgam. Operational arrangements at this store will need to be examined to ensure that they meet the requirements of Article 10. Improvements to the storage arrangements will form part of the dental amalgam phase-down plan prepared in response to Article 4.

With regard to *Article 11, Mercury wastes*, mercury wastes form the largest contributor to total mercury emissions and releases. Samoa will need to consider how best to reduce emissions and releases from the waste sector, in particular through the improved management of end-of-life mercury-added products.

Chapter 4:

IDENTIFICATION OF POPULATIONS AT RISK AND GENDER DIMENSIONS

4.1 Identification of Populations at Risk and Potential Gender Dimensions

Mercury is the most volatile metal and its vapour is highly toxic. It has many applications and uses. It is a poor conductor of electricity and it alloys easily with other metals such as silver, tin and gold. Mercury is a compound that can be found naturally in the environment. It can be found in the elemental form as organic mercury compounds or as mercury salts.

Mercury vapour can diffuse from the lungs into the bloodstream and cross the blood-brain barrier, resulting in serious damage to the central nervous system. In addition, elemental mercury and methylmercury are toxic to the central and peripheral nervous systems. The inhalation of mercury vapour can produce harmful effects on the

nervous, digestive and immune systems, lungs and kidneys, and may be fatal. The primary health effect of methylmercury is impaired neurological development. The inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested. Neurological and behavioural disorders may be observed after inhalation, ingestion or dermal exposure of different mercury compounds (WHO, 2017).

Generally, the two groups are more sensitive to the effects of mercury, which are:

- (i) Foetuses are most susceptible to developmental effects due to mercury that can adversely affect a baby's growing brain and nervous system. They are exposed through the passage of methylmercury across the placenta from the mother. High exposure of the foetus is the result of the mother's high

exposure, typically arising from her consumption of fish and shellfish or from her occupational exposure.

(ii) People who are regularly exposed to high levels of mercury. This group includes populations with diets featuring significant amounts of fish and shellfish, such as those that rely on subsistence fishing, or people who are occupationally exposed (World Health Organisation, 2017).

4.1.1 Populations at risk through the use of mercury-added products

Mercury is used in a variety of devices and measuring instruments in the healthcare sector. In relation to dental amalgam, mercury vapour may be released to air during the preparation phase. The initial mercury inventory also shows that mercury discarded during the filling process finds its way into the waste water stream. Samoa's National Dental Unit and private clinics are not fitted with special traps to capture mercury from being washed into drains. While disused amalgam (extracted from patients) from the Dental Health Unit does find its way to the Medical Waste Incinerator where it is then incinerated, private clinics dispose of their disused amalgam with their general waste which ends up at the landfill at Tafai'gata. Thus **dental workers** may become contaminated through the preparation of amalgam. Waste amalgam, either remaining from preparation or removed from patients is mostly discarded

into solid waste or enters waste water systems, potentially contaminating waste disposal and water treatment facilities and posing risks to workers there.

Samoa continues to import battery cells containing mercury and this is confirmed in import entry data. The importers are mainly government institutions (for research) and businesses. Interviews with the three watch repair shop managers in Samoa confirmed that disused cell batteries are thrown out with the general waste. One watch shop owner indicated that in his country of origin, disused cell batteries were kept for special collection but because there was no law requiring this in Samoa it was put into the general waste. There is a possibility that the **workers** at these areas are likely to be at risk of mercury exposure. The risk is almost negligible but better waste management is advisable.

According to the National Mercury Inventory, light sources with mercury release only 1.2 kg per year even though 54,500 fluorescent tubes (double end) and Compact Fluorescent Tubes (CFL single end) annual items were sold in Samoa annually over the period 2011-2015. The relatively low amounts may be justified on the basis that they generally pose no threat to human health or the environment while they are intact and are in use. However many tubes and bulbs are made of thin glass and are prone to breaking. They become capsules of poison when where mercury vapour escapes. There is no data available on whether they are disposed of

intact or broken and disposed of in pieces. Many households break the used tubes and either put it in with the general waste or bury in a private pit. There is a possibility that these *households* are likely to be at risk of mercury exposure.

Whether mercury exists in some soaps and cosmetics imported into Samoa in the 1 ton / per year volume ascribed to it, remains to be verified. A search for mercury as an ingredient on the labels on soaps, cosmetics, hair treatment products was conducted on 20 shops listed in the National Mercury Profile. These shops are the prime wholesale and retail outlets in Samoa. The search failed to find the word mercury or words associated with mercury (mercurous chloride, calomel, mercuric, mercurio), on any of the soaps or skin lightener labels. The soaps were imported mainly from Australia, New Zealand, China, Philippines, Thailand and Indonesia. There are no skin lightening creams and soaps with mercury produced in Samoa. However, the quantity recorded in the National Mercury Inventory was imported for cremation purposes. The workers in funeral parlours using the creams containing mercury are also at risk. There is a possibility that the *workers* at the Cremation facility are also at risk of mercury exposure.

4.1.2 Groups engaging in waste management activities

Mercury waste from disused products is collected as part of general waste service and transported by standard waste compactor/ open top trucks sub-contracted to government. The service operates twice a week all around Samoa and provision is also made for the smaller islands of Manono and Apolima. Where necessary, *business enterprises* and in private vehicles also transport their own rubbish to the landfill. *Contractors* also deal directly with commercial and institutional establishments, collecting and transferring their waste to the disposal facility. The disposal and transferring of general wastes containing mercury products are likely to put these contractors and business workers at particular risk. In addition, MNRE allows 20 *waste pickers*²¹ collecting recycling materials (aluminium cans, scrap metals) and transports them to the Pacific Recycle Company. The MNRE staff based at the landfill are monitoring these waste pickers. There is a possibility that these waste pickers are at risk of mercury exposure.



Figure 10: Waste pickers at the landfill

4.1.3 Groups with regular exposure to high levels of mercury

Fish and fishing is important to Samoa, both economically and socially. About a quarter of all households receive some income from fishing. Fish (fresh, frozen and canned) are an important feature of the Samoan diet, and on average households consume fish most days of the week (FAO, 2018). Mercury cannot be eliminated by cooking and those who regularly eat large amounts of fish and other seafood and are reliant on the fishing industry may be at greater risk to mercury toxicity. There are no medical records of any official deaths from mercury poisoning or records of patients with elevated and unsafe mercury levels in their systems that could point to

a particular sector at risk²². The reported cases of fish and seafood poisoning have all been attributed by the Scientific Research Organisation of Samoa (SROS) and by the Ministry of Health (MoH) to histamine poisoning²³. However, a regional study supported by the Secretariat of the Minamata Convention Secretariat hosted by UN Environment, reveals that women of childbearing age living in a number of Pacific Island countries, have elevated levels of mercury in their bodies (IDEA Consultants, 2017). Researchers hypothesized that the Pacific Island participants may have a higher mercury body burden than other locations as a result of their relatively high consumption of predatory fish species (IDEA Consultants, 2017).

Despite the risks to the health of women

and young families, communication to these groups about the health risks they face, including from mercury exposure, is often targeted at the male heads of households in some villages and may not reach those at particular risk. At present, families have options to mitigate such risks like for instance, participating in awareness programmes facilitated by MNRE, MoH and MWCSO ; facilitating OHS activities in communities ; providing assistance to government and regional officials in implementing risk programmes and assessments including mercury exposure.

4.2 Implications of the Assessment Results for Samoa as a Party to the Minamata Convention

With regard to *Article 4: Mercury-added products*, the removal of mercury-added products from the marketplace after the phase out date of 2020, combined with the promotion of mercury-free alternative products, is likely to be the most effective measure to prevent exposure to the mercury such products contain. Where products remain in use, in particular within the healthcare sector, training in handling breakages and spillages of mercury, information on exposure risks, and Programmes to replace mercury instruments with mercury-free alternatives are likely to be important. With regard to dental amalgam, it can be assumed that dental professionals working in dental clinics are at risk of mercury exposure

through the processing of dental amalgams and the measures set out in Part II of Annex A form the basis of a phase-down initiative.

With regard to *Article 11 : Mercury wastes*, more comprehensive and effective measures and further efforts are needed to better understand the waste generation in Samoa. The current Waste Management Act should be revised accordingly to minimise the exposure to mercury of vulnerable populations particularly women, children and people with special needs.

With regard to *Article 16: Health aspects*, the inventory highlights the potential exposure to mercury of a number of population groups including a large proportion of the population reliant of potentially contaminated local fish species, those engaged in waste management activities, and those handling mercury-containing products, including amalgam, in the health sector. Samoa will wish to consider strategies and Programmes to identify and protect these and other populations at risk pursuant to paragraph 1.

With regard to *Article 18 Public information*, informing the public, creating awareness and education are all critical to the management of hazardous chemicals including mercury. An understanding of how chemicals can be harmful to human and environment will pave the way towards a better public response and participation in chemical management initiatives. The MWCSO works in most villages in Samoa,

actively promote environmental cleanliness. The Village Fono also has an important role to play and public awareness and education outreach programmes. MNRE has been active in creating awareness and understanding of its workers and public in environmental issues through internal and external meetings, national and community workshops. MNRE supports Waste Awareness Day every year, publishes monthly environmental newsletters and conducts annual seminars on environmental issues at the National University of Samoa.

With regard to *Article 19: Research, Development and Monitoring*, Samoa receives technical assistance support capacity building and enabling activities in hazardous chemical management. It has also received technical and grant assistance from regional organisations of which it is a member as well as bilateral assistance. Samoa needs to extend local and join regional evaluating and monitoring network, particularly of target freshwater and marine fish species.

Chapter 5:

AWARENESS AND UNDERSTANDING OF WORKERS AND THE PUBLIC

Government ministries, NGOs, CSOs, minority groups and all communities of Samoa recognise that education and awareness are important steps to ensure the sustainability of the environment and good health of people 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, through the generation of wastes including mercury in household level. All of these are relevant to the actions Samoa will need to take to implement the Minamata Convention.

5.1 School Awareness Programmes

The main objective of conducting school awareness programmes is to bring positive changes amongst children, teachers, parents and public at large, in adhering to effective waste management system within their community by creating awareness and understanding the concept of hazardous wastes including mercury and its impacts to the environment and health. For every financial year work plan, at least two schools and community awareness will conduct programmes on waste management issues. Schools are randomly selected including requests from other schools to participate in future

programmes. Approximately 200 plus students and 20 teachers in each school participates in the awareness programme.

Schools that were actively participated in our programmes in the last financial year were, Neiafu and Samoa Primary schools. Presentations, educational awareness materials were presented to further their knowledge on the effects of hazardous wastes if they are not properly managed at schools, homes and everywhere else. Questions and answers session was given to children and teachers to raise questions on waste management issues. During Environment Week, Biodiversity Day or Water and Forest Day, the ministry invites representatives from each school and communities to participate in activities and programmes.



Figure 11: School Awareness Programmes

5.2 Community Programmes

Community awareness is conducted so that the people living in rural and urban

areas understand the threats hazardous waste contributed to their environment and health. One reason for this process to be effective is for the people to understand the underlying root causes of these threats, and how they are going to support minimizing the problems. Village representatives from different minority groups, civil society, and people with special needs are invited to attend awareness programmes and environmental activities.

Consultations through National Environment annual celebrations, Waste Presentations in both English and Samoan language, posters and brochures were used to strengthen the better management of hazardous wastes including mercury.



Figure 12: Community Awareness Programmes

5.3 Other Relevant Partnerships

MNRE is promoting its partnership with the private sector in ensuring awareness campaigns will reach all corners of the country, and the dissemination of



Figure 13: Recycling and Waste Management Association

materials will improve public information on hazardous wastes and mercury. The Samoa Recycling and Waste Management Association (SRWMA), as one of them, was the new association set up in Samoa for businesses wanting to commit in recycling. It is the first kind of association in the Pacific and it is a response to the Cleaner Pacific 2020 Strategy. One of the activities set out in their work plan is to raise public awareness campaign promoting waste reduction, and emphasizing the risks posed by hazardous wastes and chemical including mercury, in terms of handling, storage and disposal. The association is in close networking with the Waste Management section in designing promotional materials and setting awareness booths for any special events to be celebrated in the country.

5.4 Implications of the Assessment Results for Samoa as a Party to the Minamata Convention

With regard to *Articles 3, 4, 5, 8, 9, 10, 11, and 12*: officials in government ministries

and private sector with responsibilities for the implementation of mercury management will require training and capacity building in order to implement the measures necessary to meet Samoa's obligations. Campaigns to provide information and engage key economic sectors with regard to the replacement of mercury-containing products and processes and to the reduction of mercury emissions and releases will be important in changing their behaviour and are included as appropriate in the action plans set out in Chapter 6. The plans address different stakeholders so the awareness campaigns will need to be targeted to these different audiences. The combined experience of MNRE, MoH and MWSCD will be important to reach these different groups effectively.

With regard to *Article 18 Public information, awareness and education*, MNRE has undertaken awareness activities relating to mercury with stakeholders and the public. In addition, MWSCD and MoH have undertaken public awareness in relation to waste management, recycling, maternal and child health and healthy diet.



Figure 15: Awareness raising materials

Chapter 6:

PRIORITY AREAS FOR IMPLEMENTATION OF THE CONVENTION

Samoa is a Party to the Minamata Convention on Mercury.

The goal of that treaty, and thus of Samoa as a Party to it, is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

To meet its obligations under the treaty, a range of actions needs to be taken. These actions include making the necessary regulatory and administrative arrangements for the proper working of the convention at the national level; prohibiting the import of mercury-added products and managing their environmentally sound disposal as they become waste; reducing emissions from waste incineration; and identifying populations at risk of mercury intoxication and providing enhanced health services for those found to be affected.

The outline plans set out below form a

set of priority actions that arise from the initial assessment described in previous chapters. As work to implement the Minamata Convention progresses and as further information about mercury issues in Samoa becomes available, there will be a need to review and, if necessary, modify the actions proposed here or to add new initiatives.

Although Samoa is fortunate in not having many of the industrial facilities and artisanal activities that give rise to mercury emissions and releases, the actions that it will need to take will require careful coordination and cooperation between government institutions, between government and the private sector, and, most importantly between government and communities and the public.

During the development of this initial assessment, it has become clear that Samoa has benefitted, and continues

to benefit, from many programmes supported by Samoa's development partners that have served to reduce the nation's mercury burden. Programmes to support health services, to boost energy efficiency, amongst others have worked to replace mercury-added products and improve their waste management and disposal. The action plans outlined below seek to continue this approach by highlighting such links and opportunities to "mainstream" activities in support of

the Minamata Convention within broader national policies and strategies. In so doing, the proposed actions can support Samoa's efforts towards the achievement of the Sustainable Development Goals.

Table 17 below, provides a summary of proposed actions, the Convention articles they address, the likely lead institution within Samoa, and the potential links to the SDGs. Each plan is described more fully in the following section.

TABLE 17

Summary of Proposed Actions and Convention Articles

Plan	Title and components	Articles addressed	Lead Institution	SDG links
1	Legal and institution arrangements to implement the convention at the national level	14, 17, 18, 21, 26, 27	MNRE	16, 17
2	Phasing out mercury medical instruments	4, 11, 14,	MoH/ NHS	3
3	Phasing down of dental amalgam:	4, 11, 14, 18	MoH/ NHS	3, 6
4	Separation and collection of waste mercury-added products	4, 11, 14, 17	MNRE	7, 11, 12
5	Collection, storage and disposal of mercury wastes by environmentally sound means:	11, 14	MNRE	11, 12, 15
6	Identification and protection of populations at risk	16, 17, 18, 19	MoH /NHS	3, 4, 5, 10, 14

Plan: 1

Priority: 1

Baseline and Findings from the Mercury Inventory:

As a Party to the Minamata Convention, Samoa has accepted the obligations imposed on it by the Convention. This includes taking actions to implement the technical articles of the treaty; overseeing the progress of such work, and administering Samoa's relationship with the Conference of the Parties.

Convention articles addressed and requirements:

Article 14: Capacity building, technical assistance and technology transfer; Parties to cooperate to deliver capacity building and technical assistance, and to promote diffusion of and access to environmentally sound alternative technologies.

Article 17: Information exchange to be facilitated between Parties regarding viable alternatives to mercury-added products.

Article 18: Public information, awareness and education to be provided to the public to boost understanding of effects of exposure to mercury and to promote alternatives.

Article 21: Parties to report to the COP on measures to implement the Convention.

Article 26: Amendments to the Convention and its annexes, or additional annexes, may be proposed at any time and Parties need to consider such proposals.

Article 27: For certain actions, Party may apply for exemptions under Article 6.

Objective/s:

To manage implementation of the Minamata Convention at the National Level.

Rationale:

This plan seeks to incorporate the obligations of the Minamata Convention into national legislation and to ensure the effective management of the Convention at the national level. The plan seeks to use, wherever possible, existing acts and regulations, thus avoiding lengthy development of dedicated legislation. However, it does not preclude incorporating necessary action within an encompassing legal instrument such a National Environment Sector Plan.

Lead institution and other stakeholders:

MNRE, MoH, SBS, MWCSO, SROS, MoF, MAF

Existing Programmes Linkages:

Chemicals and Waste Management Unit, MNRE, Health Care Waste, MoH

SDG Links:

16, 17

Time Frame:

- a) 3.5 years
- b) and
- c) long-term

Budget:

US\$ 1 million

Proposed Actions/Activities:

a) Incorporate obligations of the Minamata Convention into national legislation; in particular:

(i) Within the LSE Act (1989) and, as necessary, within the Food and Drug Act (1968): prohibit the import of mercury-added products listed in Annex A Part I after 2020 and not allow the import of materials for dental amalgam other than in encapsulated form.

(ii) Within the PUMA Act and Regulations (2007): not allow development consent for industrial facilities using mercury processes listed in Annex B Part I and require proposals to establish other facilities using mercury processes, such as, but not limited to, those listed in Annex B Part II to be subject to Environmental Impact Assessment including an assessment of BAT/BEP and the suitability and viability of mercury-free alternative processes.

(iii) Within the WMA Act (2010) and, as necessary within the LSE and Village Fono Acts: Require the separation and separate collection and treatment of mercury wastes, including waste mercury-added products, from general municipal solid waste.

(iv) Within the Water Resource Management Act (2008): Not allow the discharge of dental amalgam wastes to waste water systems and require dental treatment facilities to be equipped with and to use managed waste traps to collect waste dental amalgam.

(v) Within the PUMA Act (2007) and its Codes of Environment Practice: provide for the establishment of environmentally sound facilities for the storage of mercury wastes.

(vi) Within the OHS Act 2002: Include requirements for training in the safe handling of waste mercury and mercury-added products for those engaged in the maintenance and replacement of such products.

b) Assign responsibilities and build capacities for the management of the Convention at national level including: designating an information focal point, assigning staff and allocating resources for the development and implementation of action plans, reporting etc. as necessary to fulfil Samoa's obligations as a Party, including the raising of funding for implementation from within related national strategies and development assistance programmes.

c) Establish and maintain a system for the regular collection, storage, manipulation, interpretation and reporting of data and information pertaining to Samoa's emissions and releases of mercury, its sources of such emissions and releases, and other information as required in implementing the Convention and reporting the progress of such implementation to the Conference of the Parties.

d) Add mercury to actions addressed by Chemicals and Waste Management Unit (MNRE) Health Care Waste (MoH).

e) Development of sound management mercury policy and implementation plan with MNRE as the implementing institution.

f) Develop / implement strategies and programmes to protect population from exposure to mercury and mercury compounds, setting targets for mercury exposure reduction, where appropriate, and public education, with the participation of public health and other involved sectors.

g) Financing local research into deleterious effects of mercury on environment and health.

h) Integrating inter-agency database providing data and information on the use of mercury products throughout its life cycle.

6.2

Phasing out Mercury Medical Instruments

Plan: 2

Priority: 2

Baseline and Findings from the Mercury Inventory:

The medical sector holds a significant component of the national burden of mercury-added products. Efforts to remove mercury medical instruments have begun but are incomplete. Retired equipment is stored at medical centres with no final disposal planned.

Convention articles addressed and requirements:

Article 4: Mercury-added products, Annex A Part I; Import of products to be prohibited by end 2020.

Article 11: Wastes to be managed and disposed of in an environmentally sound manner.

Article 14: Capacity building, technical assistance and technology transfer; Parties to cooperate to deliver capacity building and technical assistance, and to promote diffusion of and access to environmentally sound alternative technologies.

Objective/s:

To replace and dispose of mercury medical instruments from the National Health Service.

Rationale:

Import of non-electronic measuring devices must stop by the phase out date of 2020 set out in Annex A Part I. Public health facilities have halted purchase of mercury-containing thermometers and are progressively replacing a range of mercury-containing instruments with digital alternatives. However, mercury instruments remains in use whilst 'retired' mercury instruments are stored in hospitals and clinics. Given that :

- the overall small numbers of mercury medical instruments in the country;
- the difficulty of establishing environmentally sound management for the small number of instruments becoming waste each year.

This plan proposes a short programmes to replace all remaining medical instruments containing mercury and to collect and dispose of all retired instruments in an environmentally sound manner in accordance with the Basel and Waigani Conventions. Training for medical staff in the use, care and maintenance of the replacement, mercury-free, instruments forms an important component of the programme to ensure that standards of medical care are maintained.

Lead institution and other stakeholders:

MoH, NHS, MNRE (WMU)

Existing Programmes Linkages:

The plan is considered consistent with the current Health Sector Plan (2008-2018), in particular element 2.1.3, *Improved health care physical infrastructure and equipment*, and with the National Health Care Waste Policy (2006).

SDG Links:

3

Time Frame:

2 years

Budget:

US\$ 2 million

Proposed Actions/Activities:

- a) Revise procurement rules to exclude purchase of medical instruments containing mercury;
- b) Complete phase-out of mercury thermometers;
- c) Replace all mercury sphygmomanometers and other items of equipment containing mercury, building capacity in the use of replacement instruments;
- d) Collect and store 'retired' equipment (offsite);
- e) Pack and ship equipment for environmentally sound waste disposal.

6.3

Phasing down Dental Amalgam

Plan: 3

Priority: 2

Baseline and Findings from the Mercury Inventory:

Dental amalgam remains the preferred dental restorative material in Samoa. While Samoa has received assistance in improving the safety of amalgam preparation processes, dental clinics are not equipped to manage amalgam wastes in an environmentally sound manner. Some amalgam wastes are collected and incinerated with other hazardous medical wastes, contributing to mercury emissions, the remaining amalgam wastes are released with waste water, contributed to mercury releases.

Convention articles addressed and requirements:

Article 4: Mercury-added products, Annex A Part II: Articles to be phased down by taken measures set out in the annex;

Article 11: Wastes to be managed and disposed of in an environmentally sound manner.

Article 14: Capacity building, technical assistance and technology transfer; Parties to cooperate to deliver capacity building and technical assistance, and to promote diffusion of and access to environmentally sound alternative technologies.

Article 18: Public information, awareness and education to be provided to the public to boost understanding of effects of exposure to mercury and to promote alternatives.

Objective/s:

- To reduce the use of amalgam as a dental restorative material;
- To avoid the emission and release to the environment of mercury in amalgam waste.

Rationale:

The Convention requires Parties to take measures to reduce the use of dental amalgam and to avoid its emission or release when it becomes waste. While efforts have been made to improve the handling of amalgam during preparation and as waste, these efforts have not reduced overall use. Furthermore, current arrangements are not adequate to prevent emissions and releases of mercury from amalgam waste. Amalgam wastes are likely to be generated in small quantities for many years to come. It follows that such wastes will require secure storage prior to periodic shipments for final disposal (established in plan 5).

Lead institution and other stakeholders:

MoH, NHS, MNRE (CHWM)

Existing Programmes Linkages:

Current Health sector plan (in particular element 1 Health promotion and primordial prevention; 2.1.3, Improved health care physical infrastructure and equipment; and 2.1.6 Development of public dental health programmes. National Health Care Waste Policy (2006). JICA AID, 2018.

SDG Links:

3, 6

Time Frame:

3 years

Budget:

US\$ 2 million

Proposed Actions/Activities:

- a) Revise procurement to purchase and import dental amalgam only in encapsulated form;
- b) Minimize amalgam use, particularly amongst those most at risk of mercury exposure;
- c) Build capacity of dental practitioners in the use of alternative restorative materials, including in any national institutions training dental staff;
- d) Develop and implement public awareness campaigns to promote dental health and the prevention of dental caries, in particular within community health programmes directed towards maternal and child health;
- e) Improve access to, and affordability of, mercury-free dental restoration materials, including through cooperation with healthcare insurance providers to remove perverse incentives.
- f) Require all dental clinics to fit and use equipment to capture amalgam waste;
- g) Establish systems for the separate collection of amalgam waste from dental clinics to secure storage (established in plan 5), providing OHS training to workers engaged in such systems,

Plan: 4

Priority: 2

Baseline and Findings from the Mercury Inventory:

Mercury-added products is a source-category present in every country. They are also one of the mercury sources, which are explicitly addressed in the Minamata Convention: According to the Article 4 (Annex A), several mercury-added products are to be phased-out by 2020, unless the party notifies the secretariat of time exemptions as per Article 6. At the time of this writing, Samoa has not registered any exemptions.

Convention articles addressed and requirements:

Article 4: Mercury-added products Annex A Part I; Import of products to be prohibited by end 2020.

Article 11: Wastes to be managed and disposed of in an environmentally sound manner.

Article 14: Capacity building, technical assistance and technology transfer; Parties to cooperate to deliver capacity building and technical assistance, and to promote diffusion of and access to environmentally sound alternative technologies.

Article 17: Information exchange to be facilitated between Parties regarding viable alternatives to mercury-added products.

Objective/s:

- To accelerate the phase out of mercury-added products from public institutions and services.
- To encourage the phase out of mercury-added products in domestic use.
- To avoid the emission and release to the environment of mercury contained in phased-out mercury-added products.

Rationale:

A range of mercury-added products are imported and used in Samoa. The Government and public services are significant purchasers of such products, particularly for lighting. Efforts to improve energy efficiency have seen some less efficient mercury vapour lamps removed from street lighting but a considerable number remain and could be phased out and replaced with benefits both to energy consumption and mercury avoidance. Samoa is making considerable efforts to boost the separation of recyclable materials from domestic and community waste streams and to arrange for their collection and shipment for treatment. The collection and waste management of mercury-added products currently in domestic use could benefit from management in the same or a very similar system but with the intended end point of final disposal (in plan 5).

Lead institution and other stakeholders:

MNRE, MfR, MoF, NHS, MoH

Existing Programmes Linkages:

- PEEP
- JPRISM II project – JICA/SPREP Solid Waste Initiative under the Pacific Regional Solid Waste Management Strategy (2016-2025)
- PacWaste Plus – SPREP

SDG Links:

7, 11, 12

Time Frame:

4 years

Budget:

US\$ 5 million

Proposed Actions/Activities:

- a) Revise procurement by public institutions to avoid purchase of mercury-added products
- b) Accelerate national efforts to improve energy efficiency through the phase-out of mercury-added products from public institutions and services such as street lighting.
- c) Enhance existing systems for the separation and recycling of domestic and community wastes to include separation, collection and environmentally-sound storage of mercury-added products such as batteries and lamps.
- d) Strengthen existing public awareness campaigns and encourage regulation at community level to improve the take up of waste separation and recycling schemes.
- e) Collect, separate and transport wastes to secure storage established in Plan 5.
- f) Provide OHS training for workers engaged in the replacement and waste management of mercury-added products.
- g) Prepare and distribute guidelines for business on use and disposal of mercury added-products in public consultations and workshops.

6.5

Environmentally Sound Management of Mercury Wastes

Plan: 5

Priority: 1

Baseline and Findings from the Mercury Inventory:

Current waste management plans for mercury-added products lack appropriate means for their environmentally sound disposal. Wastes might be added to other hazardous medical wastes and incinerated, stored until a final disposal option is determined, discarded with general waste to landfill. These approaches are not in compatible with environmentally sound disposal as established by the Minamata and Basel Conventions to which Samoa is Party.

Convention articles addressed and requirements:

Article 11: Wastes to be managed and disposed of in an environmentally sound manner.

Article 14: Capacity building, technical assistance and technology transfer; Parties to cooperate to deliver capacity building and technical assistance, and to promote diffusion of and access to environmentally sound alternative technologies.

Objective/s:

To establish environmentally-sound disposal for mercury wastes.

Rationale:

Hazardous Waste management in Samoa is hampered by the lack of environmentally sound means for final disposal. For mercury, local burdens are too small to consider establishing local facilities for environmentally sound disposal. It follows that options for packing, storage and shipment are required. International assistance with waste management at the regional scale has been forthcoming; this plan seeks to build on that cooperation.

Unlike Plan2 in which a single, short-term replacement Programmes will remove and dispose of mercury-added instruments in the health sector, plans 3 and 4 are likely to proceed over several phases and to generate volumes of waste over a much longer time period. It follows that a single disposal 'event' is not feasible for these plans. For this reason, plans 3 and 4 collect mercury wastes and place them into secure storage awaiting final disposal.

This plan provides for that secure storage and the final disposal, as a series of packing and shipping events undertaken as necessary, in accordance with the Basel and Waigani Conventions and in collaboration with Samoa's development partners that have facilities for the environmentally sound disposal of mercury wastes.

Lead institution and other stakeholders:

MNRE

Existing Programmes Linkages:

- Party to the Basel and Waigani Conventions
- JPRISM II project – JICA/SPREP Solid Waste Initiative under the Pacific Regional Solid Waste Management Strategy (2016-2025)
- PacWaste Plus - SPREP

SDG Links:

11, 12, 15

Time Frame:

5 years

Budget:

US\$ 5 million

Proposed Actions/Activities:

a) Establish a safe, environmentally sound central facility for the storage of mercury wastes collected in plans 3 and 4.

b) Avoid incineration of mercury wastes.

c) Pack and ship mercury wastes for environmentally sound disposal in accordance with the Basel and Waigani Conventions.

d) Provide OHS training for workers engaged in hazardous waste management including mercury.

e) Monitor sites where mercury wastes are handled and stored to avoid releases.

6.6

Identification and Protection of Populations at Risk

Plan: 6

Priority: 2

Baseline and Findings from the Mercury Inventory:

Regional surveys indicate that women of child-bearing age in neighbouring SIDS have mercury burdens commonly exceeding currently understood thresholds for developmental damage to fetuses and to medical problems in adults. These high burdens are thought to arise through chronic exposure to mercury present in the fish species that form an important and significant component of local diets. While survey results for Samoa are not yet available, the national situation is similar to that of other survey participants so that similar results are expected. Despite this, no cases of mercury intoxication have been recognized by local health services.

Convention articles addressed and requirements:

Article 16: Health aspects – promote and implement strategies to identify and protect populations at risk, promote appropriate health-care services for prevention, treatment and care, build health professional capacities for prevention, diagnosis, treatment and monitoring.

Article 17: Information exchange to be facilitated between Parties regarding epidemiological information concerning health impacts.

Article 18: Public information, awareness and education to be provided to the public to boost understanding of effects of exposure to mercury and to promote alternatives.

Article 19: Research, development and monitoring : Parties to cooperate to develop and improve inventories, modeling and geographically representative monitoring, impacts on human health and the environment, social, economic and cultural impacts, information on mercury cycling, transport, transformation and fate in the environment.

Objective/s:

- To identify and protect vulnerable populations.
- To understand locally-important pathways to high human mercury burdens.
- To establish appropriate health-care services for prevention, treatment and care for affected populations.

Rationale:

This plan seeks to improve local health services by assisting them in the identification and treatment of populations vulnerable to mercury. The predominance of fish-based diets would seem to be the principal route of likely high mercury burdens. Burdens arising from occupational exposure are as yet unknown.

Lead institution and other stakeholders:

MoH, MWCSO, MNRE

Existing Programmes Linkages:

Current Health sector plan (in particular element 1 Health promotion and primordial prevention; 2.1.3, Improved health care physical infrastructure and equipment; and 2.1.6 National Health Care Waste Policy (2006). JICA AID, 2018.

SDG Links:

3, 4, 5, 10, 14

Time Frame:

5 years

Budget:

US\$ 3 million

Proposed Actions/Activities:

- a) Design and conduct surveys of the mercury burden of women of child-bearing age and other vulnerable groups, including those subject to occupational exposure.
- b) Build local capacity in the research of all aspects of the mercury cycle and participate in international research networks conducting, for example, surveys of mercury burden in humans as well as in environmental media, in particular, target species for local diets.
- c) Build capacity of medical practitioners in diagnosis and testing for mercury intoxication.
- d) Establish and make available appropriate treatment and care for affected populations.
- e) Establish and disseminate dietary advice and public awareness materials, including for OHS.

Chapter 7:

MAINSTREAMING OF MERCURY PRIORITIES

7.1 National and Sector Plans

Everyone uses mercury added products. In order for the sound management of these products to be integrated into development planning and processes, they need to be part of the national agenda, in the national strategic development plan and in relevant sector plans. The Minamata Convention and Basel Convention to which Samoa is party are part of the caucus of international law and so provide a framework for actions towards the environmentally sound management of the substances and 'life-cycles' they regulate. This is necessary because decision makers are far more likely to opt for practical actions when the costs to human and environmental health and the quality of development are part of the national consciousness and are reflected in national policy and planning documents.

7.1.1 Strategy for the Development of Samoa, 2017-2021

The SDS is the national road map for the development of Samoa. A key expected outcome is Environmental Resilience that involves better management and regulation of chemical and hazardous waste. Disposed mercury is waste and is covered under this SDS Outcome. Another key priority is Energy Efficiency to reduce dependence on fossil fuel. Removing inefficient electrical appliances containing mercury improves energy efficiency so that mercury added products are also covered under this SDS priority. The SDS has a monitoring and evaluation framework to track the progress made by the sectors identified to carry out implementation. The responsible Ministries and agencies include MOF, MNRE and the EPC need to report against their stated targets.

7.1.2 National Environmental Sector Plan (NESP), 2013-2016

The NESP is the blueprint to guide and monitor the work of the MNRE responsible for the management of hazardous chemicals and waste. It describes what MNRE will do to give effect to the broad environmental objectives set out in the SDS above. The management of Hazardous Chemicals including implementation of the Minamata Convention on mercury and the SAICM initiative is the responsibility of the CHWMU. The SAICM PSC chaired by the MNRE CEO is the formal mechanism that provides strategic oversight and makes decisions in relation to the SAICM outputs. These functions have been extended to

cover mercury related issues²⁴. The SAICM PSC appears to meet on an ad-hoc basis and has no set agenda dedicated to mercury issues.

As mentioned in the Socio-Economic Impact of Mercury Report, it was observed that many of the proposed activities under the NESP 2013-2016 either had no corresponding targets, were not achieved or only partially achieved. The NESP 2017-2020 has not been publicly released but there are a number of interventions specific to mercury that need to be included in it. These are recommended in Table 18 below for the purposes of inclusion in the next iteration of the NESP.

TABLE 18

Hazardous Chemicals Management-Sound Management of Mercury and Added Products

Intervention	Timeframe Completed	Performance Indicators	Implementing Institution	Potential Partners
Provision of mercury filters to prevent mercury release from dental into environment and waste	2018	<ul style="list-style-type: none"> • Mercury filters in National Health Unit • Mercury filters in 3 dental practices • Mercury filter medical waste incinerator • Medical filter crematorium 	MoH, Dental practices, MNRE, PUMA, SWA	Development partners (e.g. governments of Japan, Australia, New Zealand, European Union, United States of America)

Hazardous Chemicals Management-Sound Management of Mercury and Added Products
(continued)

Intervention	Timeframe Completed	Performance Indicators	Implementing Institution	Potential Partners
Drafting regulations to ban use, manufacture, import and export of mercury and added products, make it an offence to break, crush, dump in general waste	2018	Regulation endorsed by Cabinet	MNRE and Legal Attorney General's Office, CHWMU	
Development of Sound Management Mercury Policy and Implementation Plan	2018	Mercury Policy Developed and Endorsed	MNRE-CHWM, SAICM-PSC	
Public Consultation on Policy – National Workshop	2018	Public Consultation	MNRE-CHWM, SAICM-PSC, General Public	
Formalising and Strengthening Governance arrangements for sound HCM	2018	Number of PSC priority action items met	Cabinet, MNRE-CEO, SAICM-PSC	
Financing local Research into deleterious effects of Mercury on Environment and Health	Ongoing	Evidence of SROS research into effects of mercury on environment and health (reports)	SROS, MNRE, NUS, USP, SAICM project committee	

Hazardous Chemicals Management-Sound Management of Mercury and Added Products
(continued)

Intervention	Timeframe Completed	Performance Indicators	Implementing Institution	Potential Partners
Financing Quantitative Mercury Inventory	2019	Updated and quantitative mercury inventory	SROS, MNRE, NUS, USP, SAICM project committee	Financial Mechanisms of Minamata Convention
Integrated Inter-Agency database providing data and Information on the use of Mercury Products throughout its life cycle	2019	Database Operational and used as a resource tool	SROS, MNRE, NUS, USP, SAICM project committee	Development partners (e.g. governments of Japan, Australia, New Zealand, European Union, United States of America)
Public Awareness campaign on use and disposal of Mercury-added Products (national workshops, media, posters)	Ongoing	Public campaign held Mercury-added Products, evidence disposal Mercury-added Products	MNRE-CHWM, MoH, EPC, SROS, SWA, MESC, Village community representatives	
Consultation and Guidelines for Business on use and disposal of Mercury-added Products	Ongoing	<ul style="list-style-type: none"> Guidelines prepared and distributed Consultation held 	Businesses, MNRE, MfR (Customs) and SAICM-PSC	

7.1.3 National Policies and Plans

Draft National Chemical Management Strategy 2008-2018 (NCMP) – 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. (NCMS) provides a de-facto framework for the sustainable management of all chemicals through the various stages during their life-cycle – procurement, transportation, storage, distribution, use and waste disposal. This strategy has not been endorsed by cabinet and remains on the shelf. It needs to be revised to include mercury specific considerations but its status is unclear as it was drafted in 2010 but has not been endorsed or operationalised.

7.1.4 National Planning Processes

While the incorporation of sound HCM into plans and policies are important so too are the supporting systems which underpin the policies and plans. In this respect it is critical to understand the important linkages between the key stakeholders and for these linkages to be institutionalised during the planning and implementation phase.

Critical to this process is a functional and proactive of Strategic Approach to International Chemicals Management Project Steering Committee (SAICM PSC) that draws on the input and expertise of the key stakeholders that collaborate together to ensure HCM is soundly managed. This study has attempted to describe of these linkage which include collaboration between *inter alia*:

- MNRE RED and CHWM, EPC, ADB on PEEP Phase 3;
- SROS, NUS, MNRE, MoH, SWA, EPC on research into mercury levels in the environment and testing on humans, products, air, water and land;
- MNRE, MoH, Waste Contractors and the business community on the use and disposal of mercury added products;
- MNRE and members of the PSC and the general public and representatives of village councils on the use and disposal of mercury products (and hazardous chemicals generally);
- MNRE, MfR (Customs Division), MoH, SWA, SROS, EPC, SBS to share an integrated and inter-operable data base that allows have access to and share information on use of mercury throughout its life cycle.

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Footnotes

¹ The Human Development Index (HDI) is generated by the United Nations as a summary measure of average achievement in key dimensions of human development: a long and healthy life, knowledge and education, and a decent standard of living. The HDI is a geometric mean of normalized indices for each of the three dimensions.

² The term Fono means councils or meetings great and small and applies to national assemblies and legislatures as well as local village councils.

³ <http://www.ee-pacific.net/index.php/database/country-information/samoa>

⁴ Extracted from SGP Country Programme Strategy for OP6 2015-2018 (Samoa Sub-Regional Programme (SSRP))

⁵ The toolkit is available at UNEP's website: <http://www.unep.org/hazardoussubstances/Mercury/MercuryPublications/GuidanceTrainingMateriallookits/MercuryToolkit/tabid/4566/language/en-US/Default.aspx>

⁶ This simple fact is the reason, why output pathways are not examined in detail: All input mercury is directly emitted to air.

⁷ Note: ULP (unleaded petrol), ADO (automotive diesel oil), DPK (kerosene)

⁸ Note: Samoa is no longer using LPG.

⁹ The density of diesel is approximately 0.832kg/l, which has been used for the conversion factor for the whole category.

¹⁰ FAO Yearbook for Forest Products 2014: <http://www.fao.org/3/a-i5542m.pdf>, accessed on 24 August 2017.

¹¹ Interviews, <http://www.ee-pacific.net/index.php/database/country-information/samoa#03>, accessed on 24 August 2017.

¹² Basel Convention Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds: <http://www.basel.int/TheConvention/ConferenceoftheParties/Meetings/COP12/tabid/4248/mctl/ViewDetails/EventModID/8051/EventID/542/xmid/13027/Default.aspx>, accessed 13 September 2017

¹³ World Bank doesn't have data on Samoa, but based on the data available the estimated average MSW generation rate for Pacific area is 0.95kg/day/capita: https://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf, accessed 12 September 2017

¹⁴ $0.48\text{kg} \times 365 \times 195125 = 34185.9\text{t}$. This has been distributed between Upolu and other islands according to the population distribution between the islands.

¹⁵ All the waste in Upolu which is not burned (95%) is considered to be deposited to the controlled landfill.

¹⁶ All the waste in the other islands which is not burned is considered to be informally dumped, as there is no engineered landfills on other islands.

¹⁷ http://www.pwwa.ws/pdfs/Wastewater_Tainau_Titimaea.pdf, accessed on 24 August 2017

¹⁸ MNRE Corporate Plan 2014-2018

¹⁹ Mahmoud Riad, 3R+Return J.I.C.A. Expert at the Secretariat of the Pacific Regional Environment Programme (SPREP)

²⁰ Previous spills include a diesel spill on the main road at Fugalei in 1998, a kerosene spill at the Apia Harbour in 2000, and frequent diesel spills from the EPC power station at Tanugamanono to the Vaisigano River.

²¹ Waste pickers are registered at the MNRE for permission to enter the landfill.

²² Interview with Lameko Tesimale, Manager Health Care Waste, Ministry of Health, GoS (2017).

²³ Interview with Pousui Dr Fiamé Leo, Manager Technical Services Division, SROS (2017).

²⁴ The SAICM PSC membership comprising the MNRE, MAF, MFAT, MoH, NHS, MfR, MESC, SBS, MoF, MCIL, SROS, MNRE Ozone Unit, MNRE-Meteorology Division, SPREP, SUNGO and CoC.

ANNEX 1

TABLE I

Mercury Inventory Results – Energy Consumption and Fuel Production

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
	Y/N/?	Annual consumption/production		Standard estimate	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Energy consumption										
Coal combustion in large power plants	N		Coal combusted, t/y	-	-	-	-	-	-	-
Other coal uses	N		Coal used, t/y	-	-	-	-	-	-	-
Combustion/use of petroleum coke and heavy oil	N		Oil product combusted, t/y	-	-	-	-	-	-	-
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	82,805	Oil product combusted, t/y	0	0.5	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	N		Gas used, Nm³/y	-	-	-	-	-	-	-
Use of pipeline gas (consumer quality)	N		Gas used, Nm³/y	-	-	-	-	-	-	-

Mercury Inventory Results – Energy Consumption and Fuel Production (continued)										
Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Biomass fired power and heat production	Y	Annual consumption/production 49,000	Biomass combusted, t/y	1	1.5	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	N		Charcoal combusted, t/y	-	-	-	-	-	-	-
Fuel production										
Oil extraction	N		Crude oil produced, t/y	-	-	-	-	-	-	-
Oil refining	N		Crude oil refined, t/y	-	-	-	-	-	-	-
Extraction and processing of natural gas	N		Gas produced, Nm³/y	-	-	-	-	-	-	-

TABLE II

Mercury Inventory Results – Domestic Production of Metals and Raw Materials

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Primary metal production										
Mercury (primary) extraction and initial processing	N		Mercury produced, t/y	-	-	-	-	-	-	-
Production of zinc from concentrates	N		Concentrate used, t/y	-	-	-	-	-	-	-
Production of copper from concentrates	N		Concentrate used, t/y	-	-	-	-	-	-	-
Production of lead from concentrates	N		Concentrate used, t/y	-	-	-	-	-	-	-
Gold extraction by methods other than mercury amalgamation	N		Gold ore used, t/y	-	-	-	-	-	-	-
Alumina production from bauxite (aluminium production)	N		Bauxite processed, t/y	-	-	-	-	-	-	-
Primary ferrous metal production (pig iron production)	N		Pig iron produced, t/y	-	-	-	-	-	-	-

Mercury Inventory Results – Domestic Production of Metals and Raw Materials (continued)										
Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Gold extraction with mercury amalgamation - without use of retort	N	Annual consumption/production	Gold produced, kg/y	-	-	-	-	-	-	
Gold extraction with mercury amalgamation - with use of retorts	N		Gold produced, kg/y	-	-	-	-	-	-	
Other materials production										
Cement production	N		Cement produced, t/y	-	-	-	-	-	-	
Pulp and paper production	N		Biomass used for production, t/y	-	-	-	-	-	-	

TABLE III

Mercury Inventory Results – Domestic Production and Processing with Intentional Mercury Use

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Production of chemicals										
Chlor-alkali production with mercury-cells	N		Cl2 produced, t/y	-	-	-	-	-	-	-
VCM production with mercury catalyst	N		VCM produced, t/y	-	-	-	-	-	-	-
Acetaldehyde production with mercury catalyst	N		Acetaldehyde produced, t/y	-	-	-	-	-	-	-
Production of products with mercury content										
Hg thermometers (medical, air, lab, industrial etc.)	N		Mercury used for production, kg/y	-	-	-	-	-	-	-
Electrical switches and relays with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	-	-
Light sources with mercury (fluorescent, compact, others: see guideline)	Y		Mercury used for production, kg/y	0	0.0	0.0	0.0	0.0	0.0	0.0

Mercury Inventory Results – Domestic Production and Processing with Intentional Mercury Use (continued)

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Batteries with mercury	N	Annual consumption/production	Mercury used for production, kg/y	-	-	-	-	-	-	-
Manometers and gauges with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	-	-
Biocides and pesticides with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	-	-
Paints with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	-	-
Skin lightening creams and soaps with mercury chemicals	Y	1	Mercury used for production, kg/y	1	0.0	0.0	0.1	0.0	0.1	0.0

TABLE IV

Mercury Inventory Results – General Waste Management

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
	Y/N/?	Annual production/waste disposal		Standard estimate						
Production of recycled of metals										
Production of recycled mercury ("secondary production")	N		Mercury produced, kg/y	-	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	Y	21	Number of vehicles recycled/y	0	0.0	0.0	0.0	0.0	0.0	0.0
Waste incineration										
Incineration of municipal/general waste	N		Waste incinerated, t/y	-	-	-	-	-	-	-
Incineration of hazardous waste	N		Waste incinerated, t/y	-	-	-	-	-	-	-
Incineration and open burning of medical waste	Y	22	Waste incinerated, t/y	1	0.5	0.0	0.0	0.0	0.0	0.1
Sewage sludge incineration	N		Waste incinerated, t/y	-	-	-	-	-	-	-
Open fire waste burning (on landfills and informally)	Y	1,709	Waste burned, t/y	2	1.7	0.0	0.0	0.0	0.0	0.0

Mercury Inventory Results – General Waste Management (continued)										
Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Waste deposition/landfilling and waste water treatment										
Controlled landfills/deposits	Y	23,871	Waste land-filled, t/y	24	0.2	0.0	0.0	-	-	-
Informal dumping of general waste *1	Y	8,606	Waste dumped, t/y	9	0.9	0.9	6.9	-	-	-
Waste water system/treatment	Y	456,250	Waste water, m ³ /y	2	0.0	2.2	0.0	0.0	0.2	0.0

TABLE V

Mercury Inventory Results – General Consumption of Mercury Products as Metal Mercury and as Mercury Containing Substances

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
	Y/N/?	Annual consumption/population		Standard estimate						
			NOTE: Selection regarding waste management:		Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement					
Use and disposal of products with mercury content										
<i>Dental amalgam fillings ("silver" fillings)</i>	Y			8	0.2	2.8	0.4	0.3	1.4	1.4
Preparations of fillings at dentist clinics		196,315	Number of inhabitants		0.2	1.2	0.0	0.0	1.0	1.0
Use - from fillings already in the mouth		196,315	Number of inhabitants		0.0	0.1	0.0	0.0	0.0	0.0
Disposal (lost and extracted teeth)		196,315	Number of inhabitants		0.0	1.5	0.4	0.3	0.4	0.4
		0.175	Number of dental personnel per 1000 inhab.							

Mercury Inventory Results – General Consumption of Mercury Products as Metal Mercury and as Mercury Containing Substances (continued)

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal	
	Y/N/?	Annual consumption/population	NOTE: Selection regarding waste management:	Standard estimate	Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement						
Thermometers	Y	19		0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Medical Hg thermometers	N		Items sold/y	-							
Other glass Hg thermometers (air, laboratory, dairy, etc.)	Y	19	Items sold/y	0							
Engine control Hg thermometers and other large industrial/speciality Hg thermometers	N		Items sold/y	-							
Electrical switches and relays with mercury	N	196,315	Number of inhabitants	-	-	-	-	-	-	-	-
		93	electricification rate, %								

Mercury Inventory Results – General Consumption of Mercury Products as Metal Mercury and as Mercury Containing Substances
(continued)

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						Sector specific waste treatment / disposal
					Air	Water	Land	By-products and impurities	General waste		
	Y/N/?	Annual consumption/population	NOTE: Selection regarding waste management:	Standard estimate	Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement						
Light sources with mercury	Y	54,500	Items sold/y	1	0.4	0.0	0.4	0.0	0.5	0.0	0.0
Fluorescent tubes (double end)	Y	42,664	Items sold/y	1							
Compact fluorescent lamp (CFL single end)	Y	11,836	Items sold/y	0							
Other Hg containing light sources (see guideline)	N		Items sold/y	-							
Batteries with mercury	Y	8	t batteries sold/y	8	2.0	0.0	2.0	0.0	3.9	0.0	0.0
Mercury oxide (button cells and other sizes); also called mercury-zinc cells	Y	0	Batteries sold, t/y	6							
Other button cells (zinc-air, alkaline button cells, silver-oxide)	Y	0	Batteries sold, t/y	0							

Mercury Inventory Results – General Consumption of Mercury Products as Metal Mercury and as Mercury Containing Substances (continued)

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
	Y/N/?	Annual consumption/population	NOTE: Selection regarding waste management:	Standard estimate	Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement					
Other batteries with mercury (plain cylindrical alkaline, permanganate, etc., see guideline)	Y	8	Batteries sold, t/y	2						
Polyurethane (PU, PUR) produced with mercury catalyst	N	196,315	Number of inhabitants	-	-	-	-	-	-	-
		93	Electricification rate, %							
Paints with mercury preservatives	N		Paint sold, t/y	-	-	-	-	-	-	-
Skin lightening creams and soaps with mercury chemicals	Y	1	Cream or soap sold, t/y	15	0.0	14.3	0.8	0.0	0.0	0.0
Medical blood pressure gauges (mercury sphygmomanometers)	N		Items sold/y	-	-	-	-	-	-	-

Mercury Inventory Results – General Consumption of Mercury Products as Metal Mercury and as Mercury Containing Substances
(continued)

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
		Annual consumption/population	NOTE: Selection regarding waste management:		Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement					
Other manometers and gauges with mercury	N	196,315	Number of inhabitants	-	-	-	-	-	-	-
		93	Electricification rate, %							
Laboratory chemicals	Y	196,315	Number of inhabitants	2	0.0	0.6	0.0	0.0	0.6	0.6
		93	Electricification rate, %							
Other laboratory and medical equipment with mercury	Y	196,315	Number of inhabitants	7	0.0	2.4	0.0	0.0	2.4	2.5
		93	Electricification rate, %							

TABLE VI

Mercury Inventory Results – Crematoria and Cemeteries

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal
Crematoria and cemeteries										
Crematoria	Y	208	Corpses cremated/y	1	0.5	0.0	0.0	-	0.0	0.0
Cemeteries	Y	1,041	Corpses buried/y	3	0.0	0.0	2.6	-	0.0	0.0

TABLE VII

Mercury Inventory Results – Miscellaneous Mercury Releases Sources

Source category	Source present?
	Y/N/?
Combustion of oil shale	N
Combustion of peat	N
Geothermal power production	N
Production of other recycled metals	Y
Production of lime	N
Production of light weight aggregates (burnt clay nuts for building purposes)	N
Production of other chemicals (than chlorine and sodium hydroxide) in Chlor-alkali facilities with mercury-cell technology	N
Polyurethane production with mercury catalysts	N
Seed dressing with mercury chemicals	N
Infra red detection semiconductors	N
Bougie tubes and Cantor tubes (medical)	N
Educational uses	Y
Gyroscopes with mercury	N
Vacuum pumps with mercury	N
Mercury used in religious rituals (amulets and other uses)	N
Mercury used in traditional medicines (ayurvedic and others) and homeopathic medicine	N
Use of mercury as a refrigerant in certain cooling systems	N
Light houses (levelling bearings in marine navigation lights)	N
Mercury in large bearings of rotating mechanic parts in for example older waste water treatment plants	N
Tanning	N
Pigments	N
Products for browning and etching steel	N
Certain colour photograph paper types	N
Recoil softeners in rifles	N
Explosives (mercury-fulminate a.o.)	N
Fireworks	N
Executive toys	N

ANNEX 2

TABLE VIII

Policy and Regulatory Measures in Place and Remaining Gaps

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 3: Mercury Supply Sources and Trade	Controls the supply and trade of mercury and certain mercury compounds defined in Paragraph 1.b	3.3, 3.4 Prohibits new mercury mining and limits existing mercury mining to 15 years after e.i.f for that Party. Limits use of any production to allowed uses under Art 4, Art 5 or for disposal in accordance with Article 11.	3.3, 3.4 NOT RELEVANT: Samoa has no mercury mining and no known re-sources.	Samoa is a Party to the Rotterdam Convention and applies PIC procedures. It has made a final decision (in 1996) that it does not consent to the import of Annex III chemicals including a range of mercury compounds.	Within the LSE Act (1989) and, as necessary, within the Food and Drug Act (1968): prohibit the import of mercury-added products listed in Annex A Part I after 2020 and not allow the import of materials for dental amalgam other than in encapsulated form.
		3.5 Identify stocks > 50 t and sources of mercury supply generating stocks > 10 t per year; ensure mercury from de-commissioning of Chlor-Alkali facilities is disposed in accordance with Article 11. 3.6 -3.10 Provides for Prior Informed Consent procedures for import and export between Parties and with non-Parties. 3.11 Requires Parties to report information showing requirements of Article have been met	3.5 NOT RELEVANT: Samoa has no stocks > 50 t; no supply likely to generate stocks >10 t per year; no Chlor-alkali facilities. 3.6-3.10 LIMITED RELEVANCE: Samoa imports limited amounts of mercury for the preparation of dental amalgam for local use. Export only likely to occur to remove excess stocks. 3.11 RELEVANT	Under LSE Act (1989) the Ministry principal functions include the management of the manufacture, use, storage, transport and disposal of such substances including Mercury. Food and Drug Act (1968) by Order prohibited the sale of any products or goods for health safety related purposes including Mercury.	

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 4: Mercury-added Products	Prohibits the manufacture and trade after specified phase-out dates of certain mercury-added products listed in Annex A Part I; and sets out measures to be taken to phase down the use of other mercury-added products listed in Part II of the Annex	<p>4.1 Prohibit the manufacture, import or export of mercury-added products listed in Part I of Annex A after the phase-out date specified. (Note: <i>Phase-out data for all products currently listed in Part I of Annex A is 2020</i>).</p> <p>4.3 Take measures for mercury-added products in Part II in accordance with provisions set out.</p> <p>4.5 Prevent incorporation of mercury-added products into assembled products.</p>	<p>4.1 RELEVANT: Samoa imports mercury-added products listed in Part I of Annex A.</p> <p>4.3 RELEVANT: Samoa uses dental amalgam.</p> <p>4.5 NOT RELEVANT: Samoa does not manufacture or assembly products that might incorporate mercury-added products <i>Note: Samoa did not register for one or more exemptions from the phase-out dates in Annex A. In accordance with Art 6.1(a) this could have been done on becoming a Party.</i></p>	<p>Dentists at the National Dental Health Unit have been trained in the proper preparation and use of dental amalgam so that mercury vapour during the preparation, filling and extraction process does not affect the dentist and the patient as well. The Ministry of Environment Japan has provided technical training and assistance in this area. Medical waste including disused mercury vials and used dental amalgam waste are collected by private waste collection services for final storage before incineration at the Health Waste incinerator facility at Tafaigata. Under the PEEP 2 project all mercury vapour lamps were replaced by non-mercury LED lights.</p>	<p>Samoa will need to regulate to prohibit the import of mercury-added products listed in Annex A Part 1 after 2020.</p> <p>WMA 2010, Section 12, subsection 1 Obligations to deal with certain wastes: sets out obligations to deal with certain wastes. Regulations made under is section may impose requirements in relation to certain wastes having adverse impacts on the environment or human health by:</p> <p>(a) imposing prohibitions in relation to the importation, exportation, manufacture, use, storage or transportation of certain objects, substances or things which may become wastes;</p> <p>(b) regulating the importation, exportation, manufacture, use, storage or transportation of certain objects, substances or things which may become wastes, and imposing conditions in relation to them;</p> <p>(c) requiring the lodging of a deposit in relation to certain objects, substances or things which may become wastes to ensure their appropriate disposal by recycling or otherwise; or</p> <p>(d) imposing obligations on persons importing, exporting, using or manufacturing certain objects, substances or things which may become wastes in relation to their eventual disposal.</p>

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 4: Mercury-added Products					<p>These provisions provide a potential means to prohibit the import of mercury-added products listed in Annex A Part I of the Convention and to restrict the import of dental amalgam to its encapsulated form as set out in Annex A Part II of the Convention.</p> <p>Alternatively, the Land Survey Environment Act (LSE) 1989 allows for regulations to control or prohibit substances of a dangerous, noxious or offensive nature and could be applied to mercury-added products. Such an approach may have advantages over controls via the WMA 2011 as the products to be controlled are not (yet) wastes.</p> <p>An example of this approach is the LSE (Plastic Bags) Regulations as amended 2013 whereby those importing, distributing, selling, supplying or using in trade any plastic bag are committing an offence.</p> <p>Within the Water Resource Management Act (2008): Not allow the discharge of dental amalgam wastes to waste water systems and require dental treatment facilities to be equipped with and to use managed waste traps to collect waste dental amalgam. Samoa will need to take measures to phase down the use of dental amalgam in accordance with the provisions set out in Annex A Part II.</p>

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 5: Manufacturing processes in which mercury or mercury compounds are used	Prohibits, after specified phase-out dates, certain manufacturing processes in which mercury or mercury compounds are used; and sets out measures to be taken to reduce the use of mercury and mercury compounds in certain other manufacturing processes. Discourages the development of manufacturing processes using mercury or mercury compounds.	5.2 Prohibit the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B after the phase-out dates specified.	NOT RELEVANT: Samoa has no facilities using such manufacturing processes	In the unlikely event of proposals to establish a manufacturing facility using a mercury process, provisions of the Planning and Urban Management Act 2004 could apply. The act provides for environmental impact assessment as a condition of providing development consent in projects where there may be: R5(f) adverse impacts arising from the discharge of any contaminant or environmental pollutant. Such an assessment would highlight the conflict with the Minamata Convention.	Within the PUMA Act and Regulations (2007): not allow development consent for industrial facilities using mercury processes listed in Annex B Part I (Minamata Convention) and require proposals to establish other facilities using mercury processes, such as, but not limited to, those listed in Annex B Part II (Minamata Convention) to be subject to Environmental Impact Assessment including an assessment of BAT/BEP and the suitability and viability of mercury-free alternative processes.
		5.3 Take measures to restrict the use of mercury or mercury compounds in processes listed in Part II of Annex B in accordance with the provisions there. 5.5 Identify facilities using such processes, take measures to reduce emissions and releases from any such facilities, report information.			

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 6:Exemptions available to a Party upon request	Provides for states to register for one or more exemptions from the phase out dates listed in Annexes A and B.	6.1 States may register for one or more exemptions from the phase out dates listed in Annexes A and B either (a) on becoming a Party; or (b) in the case of any mercury-added product added by amendment to Annex A or any manufacturing process added by amendment to Annex B.	LIMITED RELEVANCE: On becoming a Party, Samoa did not register for one or more exemptions from the phase-out dates in Annex A. Samoa could choose to register for an exemption or exemptions in relation to any mercury-added products added by amendment to the Convention.		

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 7: Artisanal and Small-Scale Gold Mining	Requires actions to reduce or eliminate mercury use, emission and release from artisanal and small-scale gold mining and processing in which mercury amalgamation is used to extract gold from ore.	<p>7.2 Parties to take steps to reduce and, where feasible, eliminate mercury use and emissions and releases to the environment from such mining and processing.</p> <p>7.3 To notify the Secretariat if the Party determines ASGM is more than insignificant in its territory and to develop and implement a national action plan in accordance with Annex C. Submit its plan and review progress made.</p>	NOT RELEVANT: Samoa has no artisanal or small-scale gold mining and no known resources on which such activities might be established.		

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 8: Emissions	Controls and reduces emissions of mercury and mercury compounds to the atmosphere from certain point sources	8.3, 8.5 Parties with relevant point sources within one of the categories listed in Annex D to take measures to control emissions. It may prepare targets, goals and outcomes within a national plan.	LIMITED RELEVANCE: Samoa has point sources within only one of the source categories listed in Annex D: Waste incineration.	The Waste Management Act 2010 can be used to regulate the importation, use, storage, distribution and disposal of mercury and mercury compounds, mercury products and mercury waste. The mechanisms that are available under the Act are regulation, environmental and public health standards and codes of practice. The Occupation, Health and Safety Act (OHS) 2004 make provision for the safety, health and welfare of people at work in Samoa and to establish procedures for the administration of these matters.	Samoa will need to take measures to reduce emissions and will need to set out proposals in the MIA. A first step would be to stop the practice of incinerating mercury-containing wastes. This might only be possible once an alternative ESM scheme has been established involving separation, secure storage and export for environmentally sound waste disposal in accordance with Waigani/Basel Conventions.
		8.4 Requires the use of BAT/BEP to control and reduce emissions for new sources no later than 5 years after e.i.f of the Convention for that Party. 8.7 Establish an inventory of emissions from relevant sources.		Pacific Regional Waste and Pollution Management Strategy 2016-2025 (Cleaner Pacific 2025) outlines the importance of proper chemical and waste management in the Pacific and is one of the many frameworks which have been put in place to deal with hazardous waste and chemicals	A report on the progress of these measures to be including in its National Reporting under Article 21.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 9: Releases	Controls and reduces releases of mercury and mercury compounds to land and water from relevant point sources not addressed in other provisions of the Convention	9.3-9.5 Identify relevant point source categories and take measures to control releases. It may prepare targets, goals and outcomes within a national plan. 9.6 Establish an inventory of releases from relevant sources	NOT RELEVANT: Releases identified to date arise from the use of mercury-added products and, in particular, their management and disposal at end of life. These issues will be dealt with under Articles 4 and 11 respectively.		

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 10: Environmentally sound interim storage of mercury, other than waste mercury	Ensures that the storage of mercury compounds intended for use is undertaken in an environmentally sound manner	10.2 Ensure that interim storage is established in accordance with guidelines to be adopted pursuant to 10.3, taking into account any relevant guidance developed under the Basel Convention	LIMITED RELEVANCE: Samoa stores small amounts of mercury for use in the preparation of dental amalgam in its dental services.	Dentists at the National Dental Health Unit have been trained in the proper preparation and use of dental amalgam so that mercury vapour during the preparation, filling and extraction process does not affect the dentist and the patient as well. The Ministry of Environment Japan has provided technical training and assistance in this area. Medical waste including disused mercury vials and used dental amalgam waste are collected by private waste collection services for final storage before incineration at the Health Waste incinerator facility at Tafaigata.	Samoa will need to develop a plan for Article 4 on Phasing down Dental Amalgam. One aspect of that plan could be to restrict the use of dental amalgam to its encapsulated form. This would obviate the need for action under the Article on Interim Storage.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 11.: Mercury Wastes	Ensures that mercury wastes are managed in an environmentally sound manner, only recovered for uses allowed, and only transported internationally for environmentally sound disposal in conformity with the Basel Convention	11.3 Take appropriate measures so that mercury waste is: a) managed in an environmentally sound manner b) only recovered, recycled, reclaimed or reused for a use allowed or for environmentally sound disposal	RELEVANT: Samoa manages mercury wastes arising from the disposal of mercury-added products and dental amalgam	Samoa is a Party to the Basel and Waigani Conventions. The provisions of these conventions are incorporated in national legislation through the Waste Management Act (WMA) 2010 (Section 15(1)(2)) (Implementing the Basel and Waigani Conventions). Under the Waigani Convention, imports of hazardous waste (defined as wastes listed in Basel Annex I and III definitions) are prohibited. Samoa may export mercury waste to an importing state providing its consent and having facilities for environmentally sound disposal. Under the Waigani Convention, wastes could not be exported to other Pacific Island states with the exception of Australia and New Zealand. Waste Management Act 2010 Section 11 sets out environmental standards and public health standards relating to waste management practices and facilities.	Within the WMA Act (2010) and, as necessary within the LSE and Village Fono Acts: Require the separation and separate collection and treatment of mercury wastes, including waste mercury-added products, from general municipal solid waste. Within the PUMA Act (2007) and its Codes of Environment Practice: provide for the establishment of environmentally sound facilities for the storage of mercury wastes. Within the OHS Act (2002): Include requirements for training in the safe handling of waste mercury and mercury-added products for those engaged in the maintenance and replacement of such products.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 11.: Mercury Wastes		c) not transported across international boundaries except for the purpose of environmentally sound disposal in conformity with the Basel Convention.		<p>The Lands Survey Environment Act (LSE) 1989 sets out the principal functions of MNRE to inter alia (Section 95(c)(iii)) control and manage hazardous and potentially hazardous substances, including their manufacture, use, storage, transport and disposal.</p> <p>The Planning and Urban Management Act 2004 and its Codes of Environmental Practice define methods and procedures to be followed to avoid or mitigate adverse environmental effects arising from infrastructure development projects.</p> <p>The Village Fono Act (2017) empowers the village Fono (council of chiefs) to exercise power and authority in accordance with the custom and usage of their villages. They make “faigafaavae” (fundamental rules) or “iugafono” (meeting decisions) in relating to such matters as hygiene and sanitation, protecting natural resources and the environment. As such, they provide a means of community engagement of potentially considerable value in, for example, restricting open burning of waste, separating and recycling certain wastes.</p> <p>MNRE has developed a tracking system for chemicals and hazardous waste that could be expanded to include mercury wastes.</p>	<p>The WMA 2010 may require amendment or minor addition:</p> <ul style="list-style-type: none"> • to incorporate thresholds of mercury content or quantity defined by the COP, in collaboration with bodies of the Basel Convention, for substances or objects considered as waste and consisting of, containing, or contaminated with mercury or mercury compounds. (Art 11.2) • to introduce or amend environmental or public health standards for mercury. • to introduce mercury waste to consideration under Section 34 allowing approved waste operators to make and impose rules, operating procedures, guidelines and codes of practice relevant to aspects of their waste management functions. <p>The development of a Code of Environmental Practice in relation to buildings that store or contain hazardous chemicals/pesticides or hazardous waste, and sites that contain such materials is recommended.</p>

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 12: Contaminated Sites	Develops strategies for the identification and assessment of sites contaminated by mercury or mercury compounds	12.1 Develop an appropriate strategy for identifying and assessing sites contaminated by mercury or mercury compounds.	LIMITED RELEVANCE: Samoa has few industrial and commercial sites and none is known to be subject to mercury contamination. Sites where waste is managed may be contaminated.	Strategy for the Development of Samoa 2017-2021. The Strategy for the Development of Samoa (SDS) is the national road map for the development of Samoa. Key SDS Outcome 13 Environmental Resilience addresses the better management and regulation of chemical and hazardous waste to prevent contamination. The strategy states that Samoa's built environment will be better planned, designed and monitored to prevent adverse impacts to the environment and its natural resources and the health of the human population.	Current arrangements for disposal of mercury wastes are not adequate and may give rise to contaminations. Actions proposed under Article 11 should help to prevent further contamination.
		12.2 Actions to reduce risks posed by such sites to be performed in an environmentally sound manner.		National Chemical Management Policy 2008-2018 (NCMP) -It is designed to guide MNRE's work on chemicals management. It provides a de-facto framework for the sustainable management of all chemicals through the various stages during their life-cycle - procurement, transportation, storage, distribution, use and waste disposal. Its objectives include: increasing awareness on chemicals, building capacity on the effective utilisation or application of chemicals, improving the safe disposal or treatment of chemical waste, enhancing the sustainable management of chemicals and developing regulatory framework to monitor or enforce the sustainable management of chemicals.	

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 12: Contaminated Sites				<p>National SAICM Implementation Plan- The focus of the NSIP is primarily to facilitate the implementation of the CMS to achieve achieving the agreed goal of the <i>Johannesburg Plan of Implementation from the World Summit on Sustainable Development</i> whereby significant adverse effects on human health and the environment from the use and production of chemicals were to be minimized by the year 2020. This would be done through the improved governance of chemicals, improved knowledge and information, reduced risks from exposure to hazardous substances, decreased illegal international traffic and strengthened capacity building and technical cooperation.</p>	

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 13: Financial resources and mechanisms	Establishes a financial mechanism to support implementation of the Convention	13.1 Provide resources in respect of national activities intended to implement the convention: such resources to include domestic funding, bilateral and multilateral funding, private sector involvement 13.5-13.7 Establishes a mechanism including the GEF and a specific international Programmes to support capacity-building and technical assistance	RELEVANT: Samoa, as a SIDS, has specific needs and special circumstances in relation to implementation of the Convention. It is unlikely that these can be fully met from domestic budgets.	JICA work with health and dental services PEEP 2 J-PRISM II project (SPREP & JICA) PacWaste (SPREP) Pacific Regional Waste and Pollution Management Strategy 2016-2025 (Cleaner Pacific 2025) outlines the importance of proper chemical and waste management in the Pacific and is one of the many frameworks which have been put in place to deal with hazardous waste and chemicals.	Chapter 6 of this report sets out outline proposals for action plans that are required to implement the Convention in Samoa. Samoa will seek, wherever possible to incorporate or link the actions proposed to relevant national policies and strategies, including Samoa's proposals with regard to meeting the SDG goals and targets, to enhance their impact and to attract both domestic and bilateral or multi-lateral budget support.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 14: Capacity-building, technical assistance and technology transfer	Requires Parties to cooperate to provide timely and appropriate capacity building and technical assistance to developing country Parties, in particular LDCs, SIDS and Parties with economies in transition.	<p>14.2 Proposes delivery of capacity building and technology transfer through regional, subregional and national arrangements, including existing regional and subregional centres, through multilateral and bilateral means, and through partnerships. Seeks cooperation and coordination with existing chemicals and waste MEAs to increase effectiveness.</p> <p>14.3 Requires developed country Parties and others as appropriate to promote and facilitate the development, transfer, diffusion and access to environmentally sound alternative technologies.</p>	<p>RELEVANT: Samoa has small teams dedicated to improving the management of chemicals and waste. These will benefit from capacity building to strengthen the implementation of the Minamata Convention within the broader context of the chemicals and waste MEAs and national development. Further improving waste management to incorporate the requirements for mercury waste management will require technical assistance and technology transfer.</p>		

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 16: Health Aspects	Promotes the development and implementation of strategies and Programmes to identify and protect populations at risk	16.1a Develop and implement strategies and Programmes to identify and protect populations at risk, including: adopting science-based health guidelines relating to mercury exposure; setting targets for exposure reduction; and public education	RELEVANT: Samoa has not identified a death or disease burden linked directly to mercury but the reliance of the population on a fish-based diet is likely to have resulted in chronic if low-level exposure to mercury resulting, potentially, in significant body burdens.	Actions taken in respect of occupational exposure re dental clinics and amalgam handling + waste management Actions taken to: avoid mercury exposure by replacing mercury medical instruments in health service; removing mercury lamps from street lighting. Limited survey of mercury levels in population undertaken but results not yet received: surrounding and similar Pacific Island states show high percentage of those sampled exceeding levels considered to give rise to foetal damage and to brain, heart and kidney damage in adults.	Actions necessary include strategies and Programmes to identify and protect populations at risk, including understanding of current potential for chronic dietary exposure and its effects; improved diagnostic capacity and access to treatment and care if necessary; determination of dietary or other schemes to limit chronic exposure and public awareness to implement change.
		16.1b Develop and implement science-based education and preventive Programmes on occupational exposure to mercury			
		16.1c Promote appropriate health-care services for prevention, treatment and care of affected populations			
		16.1d Strengthen institutional and health professional capacities for prevention, diagnosis, treatment and monitoring of health risks arising from exposure to mercury			

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 17: Information exchange	Facilitates the exchange of information pertinent to the objective of the Convention and its effective implementation	<p>17.1 Facilitate the exchange of:</p> <p>a) scientific, technical, economic and legal information on mercury, including toxicological, ecotoxicological and safety information;</p> <p>b) information on the reduction or elimination of production, use, trade, emissions, and releases of mercury;</p> <p>c) information on alternative to mercury-added products, manufacturing processes using mercury, activities and processes that emit or release mercury;</p> <p>d) epidemiological information concerning health impacts associated with exposure to mercury</p> <p>17.4. Designate a national focal point for information exchange under the Convention, including with regard to consent for importing Parties under Art 3.</p>	<p>RELEVANT: Samoa will benefit from information shared between Parties and relevant intergovernmental organizations and others in respect of mercury-added products and their replacement, mercury waste management and environmentally-sound disposal, emissions and release reduction, as well as ecotoxicological and epidemiological information relevant to the health impacts of mercury</p>	Samoa has designated a national focal point for information within the Ministry of Natural Resources and Environment.	

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 18: Public information, awareness and education	Promotes the provision of public information, education, training and public awareness related to mercury	18.1 Promote and facilitate: a) provision to the public of information on health and environmental effects of mercury; alternatives; topics identified in Art 17.1; the results of research, development and monitoring activities under Art 19; activities to meet its obligations under the Convention b) education, training and public awareness related to the effects of exposure to mercury on human health and the environment 18.2 Use existing mechanisms, or develop mechanisms, for the collection and dissemination of information on estimates of its annual quantities of mercury and mercury compounds that are emitted, released or disposed of through human activities.	18.1 RELEVANT: Samoa will need to provide information and to raise public awareness of the health and environmental effects of mercury in order to implement actions in relations to Articles 4, 8, 11, 12, 16. 18.2 RELEVANT Samoa will need to use an existing mechanism or develop a system to collect, maintain, interpret and report the information highlighted in 18.2 as appropriate under Art 21.	MNRE supports an annual Waste Awareness Day, publishes monthly environmental newsletters, promoted the Clean-up Samoa Campaign in awareness programmes targeting schools and improved coordination between stakeholders. The Ministry of Women, Community and Social Development, working with village communities, promotes environmental cleanliness The village Fono play an important role in establishing community rules, engaging with education, outreach and awareness programmes.	Policies, strategies and projects to implement Articles 4, 8, 11, 12 and 16 will all benefit from the engagement and active participation of communities and the public. It follows that public awareness, education and information will be important aspects of such policies, strategies and projects. Inventory processes, such as that undertaken in preparing the MIA, will need to be maintained and repeated to provide the means of collecting, maintaining, interpreting and reporting information highlighted in 18.2 for Art 21.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 19: Research, development and monitoring	Promotes cooperation to develop and improve research, development and monitoring of mercury	19.1 Cooperate to develop and improve: a) inventories of use, consumption, and anthropogenic emissions and releases of mercury and mercury compounds b) modelling and geographically representative monitoring of levels of mercury in vulnerable populations and in environmental media c) assessments of the impact of mercury on human health and the environment, in addition to social, economic and cultural impacts d) harmonized methodologies for activities undertaken under (a) to (c) e) information on the environmental cycle, transport, transformation and fate of mercury and mercury compounds in a range of ecosystems and distinguishing between natural, anthropogenic and remobilized mercury	RELEVANT: Samoa supports national and regional research and monitoring facilities active in aspects of mercury, its impacts and environmental cycling.	The Scientific Research Organization of Samoa (SROS) is engaged in monitoring mercury levels in commercial fish stocks to ensure regulatory compliance for trade purposes. Experts of the National University of Samoa (NUS) have conducted the initial mercury inventory used in this report as part of their Programmes of research into various aspects of chemicals and waste impacts on health and the environment. The University of the South Pacific (USP) Institute of Applied Sciences (IAS) Laboratory Services (IAS) staff were trained on Mercury Sampling by the Institute of Developing Economies (IDEA) Inc consultants from Japan. This was part of an initiative by Japan's Ministry of Environment on monitoring mercury levels in the Pacific Island region (ref http://www.usp.ac.fj/news/story.php?id=2667)	Samoa may wish to join the UNEP Global Partnership Mercury Fate and Transport Network to continue collaboration with BRI and others on mercury burdens in the environment and on transport and fate of mercury.

Policy and Regulatory Measures in Place and Remaining Gaps (continued)					
Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 19: Research, development and monitoring		<p>f) information on commerce and trade of mercury and mercury compounds and mercury-added products</p> <p>g) information and research on the technical and economic availability of mercury-free products and processes and on BAT/BEP to reduce and monitor emissions and releases of mercury and mercury compounds</p> <p>19.2 Build on existing monitoring and research programmes to undertake actions in paragraph 1</p>		<p>The Secretariat of the Pacific Regional Environment Programmes (SPREP) assists its members to manage pollution, solid wastes and hazardous chemicals and to establish appropriate infrastructure through the provision of training, technical assistance and support</p> <p>MNRE has participated in the study “Mercury monitoring in women of childbearing age in the Asia and the Pacific Region” jointly conducted by the Interim Secretariat of the Minamata Convention, Biodiversity Research International (BRI) and the global NGO network IPEN.</p>	

Policy and Regulatory Measures in Place and Remaining Gaps (continued)

Convention Article	Description	Summary of Provisions	Relevance to Samoa	Policy and regulatory measures in place (Title and reference to relevant policy and regulatory measures)	Outstanding regulatory or policy aspects that need to be addressed or developed to ensure compliance with the Convention
Article 21: Reporting	Requires Parties to report to the COP on the measures taken to implement the provisions of the Convention	21.1 -21.2 Report measures taken in relation to the implementation of provisions in Articles 3, 5, 7, 8, and 9. Report on the effectiveness of measures taken and the possible challenges in meeting the objective of the Convention.	RELEVANT: Samoa will need to report with respect to Articles 3, 8 and 9.	Inventory processes established for the preparation of the MIA National statistical systems for the collection of customs, waste and other relevant data are available from relevant national authorities and the Samoa Bureau of Statistics.	Inventory processes established for the preparation of the MIA will need to be maintained as the basis for reporting as set out in Article 21.

