BELIZE

MINAMATA INITIAL ASSESSMENT REPORT

Development of Minamata Initial Assessment in the Caribbean- Belize

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ABOUT THIS DOCUMENT

The Belize Minamata Initial Assessment Report was developed under the project, "Development of Minamata Initial Assessment in the Caribbean: Belize".

The project is an enabling activity for the ratification and/or implementation of the Minamata Convention on Mercury. Funding was received from the Global Environment Facility (GEF) with the United Nations Environment Programme (UNEP) acting as the Implementing Agency and the Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean (BCRC-Caribbean) acting as the Executing Agency. Nationally, the project was executed by the Department of the Environment (DOE) under the Ministry of Sustainable Development, Climate Change, and Disaster Risk Management.

The development of the Report was guided by the BCRC-Caribbean with technical assistance from the Biodiversity Research Institute (BRI) who was contracted for their consultancy services on the project. The report consists of an inventory of mercury releases primarily based on 2018 data. Data collection was conducted by a National Project Coordinator hired by the BCRC-Caribbean, and assessments and recommendations for the effective implementation of the Minamata Convention were provided.

This inventory was performed in accordance with UN Environment's "Toolkit for identification and quantification of mercury releases", Inventory Level 2 (version November 2019).

The report also includes an assessment of the Policy, Legislative and Institutional Framework in relation to the implementation of the Minamata Convention on Mercury, which was developed by the legal consultant, Environmental Advisors' Inc (EAI). Additional assessments and recommendations are outlined in chapters relating to populations at risk, education and awareness-raising strategies, and priorities for action to ensure the effective implementation of the Minamata Convention on Mercury.

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List of Abbreviations

ALBA	Bolivarian Alliance for the Americas
BAHA	Belize Agricultural Health Authority
BAT	Best Available Techniques
BBS	Belize Bureau of Standards
BCRC-Caribbean	Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean
BEL	Belize Electricity Limited
BEP	Best Environmental Practices
BFREE	Belize Foundation for Research and Environmental Education
BNE	Belize Natural Energy Limited
BRI	Biodiversity Research Institute
BSI	Belize Sugar Industries Ltd
BSWaMA	Belize Solid Waste Management Authority
BTU	British Thermal Units
BWS	Belize Water Services Limited
BZ$	Belize Dollar
CARICOM	Caribbean Community
CARPHA	Caribbean Public Health Agency
CBD	United Nations Convention on Biological Diversity
CCFLs	Cold Cathode Fluorescent Lamps
CDB	Caribbean Development Bank
CDEMA	Caribbean Disaster Emergency Management Agency
CDM	Comprehensive Disaster Management
CFLs	Compact Fluorescent Lamps
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
COP	Conference of the Parties
CROSQ	CARICOM Regional Organization for Standards and Quality
CSOs	Civil Society Organisations
DOE	Department of the Environment
DVRP	Disaster Vulnerability Reduction Project
EAI	Environmental Advisors Inc.
EC	European Commission
EC $	East Caribbean Dollar
ECU	Environmental Coordinating Unit
EEFLs	External Electrode Fluorescent Lamps
EIA	Environmental Impact Assessment
ESM	Environmentally Sound Management
ESP	Electrostatic Precipitator
FAO	Food and Agriculture Organization
FDA	U.S. Food and Drug Administration
g	Gram
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information Systems
GLC	Great Lakes Commission
GSA	Geological Society of America
HDI	Human Development Index
Hg	Mercury
$HgCl_2$	Mercury Chloride
HgO	Mercury Oxide
HgS	Mercury Sulphide
$HgSO_4$	Mercury Sulfate
HPMV	High-Pressure Mercury Vapour

HS Code	Harmonised System Codes
ICM	Integrated Chemicals Management
ILO	International Labour Organisation
IQ	Intelligence Quotient
ISLANDS	Implementing Sustainable Low and Non-Chemical Development in SIDS
ISM	Interim Storage of Mercury
Kg	Kilogram
Kg Hg/y	kilograms per year
LCD	Liquid Crystal Display
LEDs	Light-Emitting Diodes
LFLs	Linear Fluorescent Lamps
LPG	Liquid Petroleum Gas
M&E	Monitoring and Evaluation
MAPs	Mercury-Added Products
MCMM	Minamata Convention on Mercury Management
MEAs	Multilateral Environmental Agreements
mg	milligrams
MIA	Minamata Initial Assessment
mm	Millimetres
MoH	Ministry of Health
MW	Megawatts
NEMO	National Emergency Management Organisation
NGOs	Non-Governmental Organisation
NIP	National Implementation Plan
Nm	Nanometre
NPTEL	National Programme on Technology Enhanced Learning
NREL	National Renewable Energy Laboratory
NSC	National Standards Council
NWG	National Working Group
ODM	Office of Disaster Management
OECS	Organisation of Eastern Caribbean States
OSPESCA	Central America Fisheries and Aquaculture Organization
PCB	Pesticides Control Board
POPs	Persistent Organic Pollutants
ppm	Parts Per Million
RCNP	Runaway Creek Nature Preserve
RoHS	Restriction of Hazardous Substances
SAICM	Strategic Approach to International Chemicals Management
SCUBA	Self-Contained Underwater Breathing Apparatus
SDG	Sustainable Development Goals
SICA	Central American Integration System
SIDS	Small Island Developing States
sq. km	Square Kilometres
t	Tonne
THg	Total Mercury
UN	United Nations
UN ECOSCO	The United Nations Economic and Social Council
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UPOPs	Unintentional Persistent Organic Pollutants
US	United States
US EPA	United States Environmental Protection Agency

WEEE	Waste Electrical and Electronic Equipment
WHO	World Health Organisation
WTO	World Trade Organization
ww	Wet Weight

Acknowledgements

The Department of the Environment, within the Ministry of Sustainable Development, Climate Change and Disaster Risk Management, Government of Belize, has a broad mandate to protect the environment, marine and terrestrial, to guarantee a better quality of life for all Belizeans. A core function of the Department is pollution control (prevention and abatement) from all possible sources. Considering Belize's development status, which is not highly industrialized, it is critical that a strong foundation is laid now, to prevent serious environmental impacts as the country grows. With the assistance and support of our partners, the Global Environment Facility (GEF), the Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean (BCRC-Caribbean) as Executing Agency and, United Nations Environment Programme (UNEP) as Implementing Agency, the project entitled, "Development of the Minamata Initial Assessment in the Caribbean (Belize)" was executed which has planted another strategic footing in our national approach to pollution control.

The report highlights that approximately 95.72 kg of mercury were released in Belize in 2018 and the most significant source was determined to be the consumption of products with intentional use of mercury through their use and disposal. The information generated through the Minamata Initial Assessment will be used to springboard Belize to sign and later ratify the Minamata Convention on Mercury; thus, allowing for regional and international support for our battle against this chemical and its harmful human and environmental effects.

At this stage, it is important to recognize our partners, collaborators, and supporters in this process because every good accomplishment, such as this one, has an equally good, competent, and hardworking team. To this end, the Department of the Environment is grateful for the financial contribution from the Global Environment Facility. We further extend our gratitude to the United Nations Environment Programme and our partners and friends at the Basel Convention Regional Centre-Caribbean for the time, dedication and continued support offered for the successful execution of this project. The Belize team has similarly been very dynamic and hardworking; the backbone to this project. The realization of this critical footing that will move Belize forward to better regulate pollution from mercury sources was only made possible with all your collective time, effort, dedication, and drive to make Belize and the world a better place. As we move forward, we will build upon what we currently have established therefore our relationship will continue to grow. This is especially important considering our vision to grow Belize using principles of sustainable development, inclusiveness, equity, transparency, and accountability.

Martin Alegria
Chief Environmental Officer
Department of the Environment

Executive Summary

The Minamata Convention on Mercury, a multilateral environmental agreement that aims to protect human health and the environment from the anthropogenic emissions and releases of mercury and mercury compounds, came into effect in 2017.

In order to assess the priorities for the ratification and implementation of the Minamata Convention's obligations, the Government of Belize participated in the Global Environment Facility funded project, "Development of Minamata Initial Assessment in the Caribbean (Belize)" (MIA Project). The MIA Project aims to facilitate the ratification and early implementation of the Minamata Convention on Mercury through the use of scientific and technical knowledge in participating countries. The MIA Project outputs within the project country was overseen by a National Working Group comprising of representatives from relevant ministries and institutional bodies.

Under the MIA Project, a national inventory of the major sources of mercury releases and emissions was conducted using the "Toolkit for Identification and Quantification of Mercury Releases" (Toolkit), made available by the Chemicals Branch of the United Nations Environment Programme. This project utilized the Level 2 Toolkit as it provided a more comprehensive assessment of mercury releases. It should be noted that in the Toolkit, the term "releases" is used to cover mercury emissions to air as well as releases to water, land and other output pathways. The methodology is based on a life cycle approach where mercury releases from a particular human activity are viewed as the consecutive distribution of an original mercury input to various media (air, water, land etc.) during various stages of the life cycle of the product or process in question. Using previous research and databases available globally, the Toolkit provides set calculation templates to estimate national mercury releases for a country. The estimations provided by the Toolkit have various uncertainties and complexities involved.

For Belize, the inventory primarily used 2018 data obtained through research, interviews and stakeholder questionnaires. However, for some sub-categories, data from the year 2018 was not available and so previous years or default calculations were used to develop estimates. Default calculations were based on the Toolkit assumptions and may have resulted in over- or under- estimations of the actual mercury input. Data gaps were also noted for some sub-categories where no estimations could be made such as informal dumping of waste. The completed inventory Toolkit spreadsheet and a listing of national project stakeholders are included as Annexes to this document. It is noted that due to the limited available data for certain categories and the assumptions made, the estimations of mercury releases for Belize using this inventory should not be considered as definitive but rather as a guide for the identification of priorities and further assessments.

Results of The Inventory of Mercury Releases

Based on the data available, approximately 95.72 kilograms (kg) of mercury (Hg) were determined to be released in Belize in 2018. The estimated mercury releases by source and by output through various release pathways identified are illustrated in Figures 1 and 2. The most significant source of mercury releases was found to be the consumption of products with intentional use of mercury throughout their use and disposal. This category accounted

for 42.15% of estimated national mercury releases due to the use and disposal of mercury containing electrical switches and relays, polyurethane with mercury catalysts; batteries, lighting devices and, thermometers which accounted for inputs of approximately 25.14 kg, 11.30 kg, 1.20 kg, 1.08 kg and 0.88 kg of mercury per year (kg Hg/y) respectively, resulting in a total of 39.6 kg Hg/y.

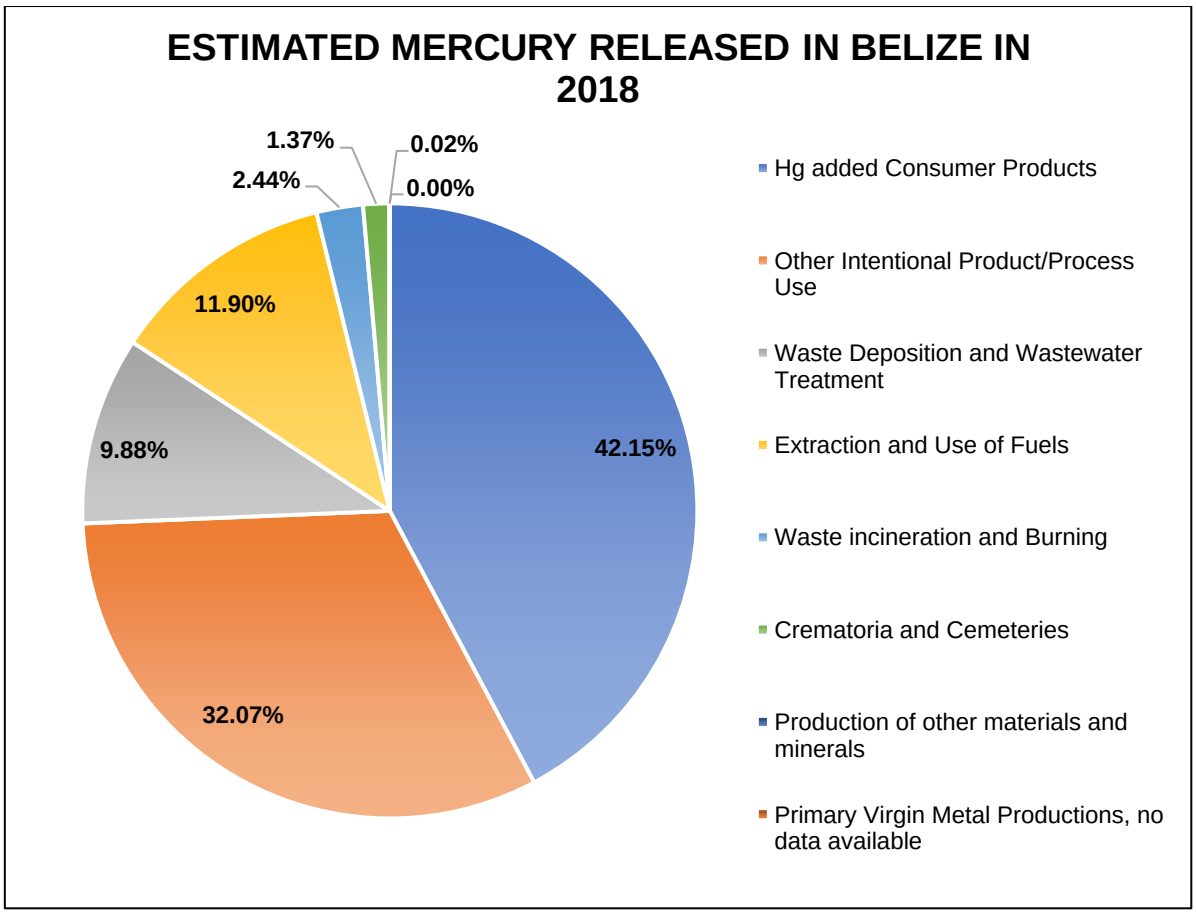

Figure 1: Estimations of total releases from the major sources of mercury identified in the mercury inventory conducted using primarily 2018 data for Belize

Of this total, the majority (32.47 kg Hg/y) was estimated to be released to the general waste output pathway with minor releases to land, water and air. These products are not produced within Belize but rather imported from countries such as the United States of America and China.

The second largest estimated source of mercury releases was found to be from the category: Other Intentional Product/Process which referred to sources such as Laboratory Chemicals and Equipment (18.83 kg Hg/y), Dental Amalgam Fillings (9.42 kg Hg/y) and Manometers and Gauges (1.88 Kg Hg/y). This category accounted for the largest releases to water, by-products and impurities and sector-specific treatment and disposal.

The third highest source of mercury releases was from the category, Waste Deposition and Wastewater Treatment of which the largest releases were from the source category: Wastewater Treatment (13.00 kg Hg/y) with minor releases from Landfilling (2.78 kg Hg/y).

Other releases were estimated from the categories Extraction and Use of Fuels/Energy Sources (referring to the combustion and use for transport and other

uses of mineral oils) with the largest releases attributed to the use and combustion of biomass (bagasse). Minor releases were also estimated from sources such as Waste Incineration and Burning; Crematoria and Cemeteries and; Production of other minerals and materials (referring mainly to lime production). It was noted that primary metal production (referring to gold production) may be a source of mercury releases in the future as current prospecting for the industry is ongoing in Belize.

Regarding mercury stockpiles, supplies or trade, there is no notable activity in Belize.

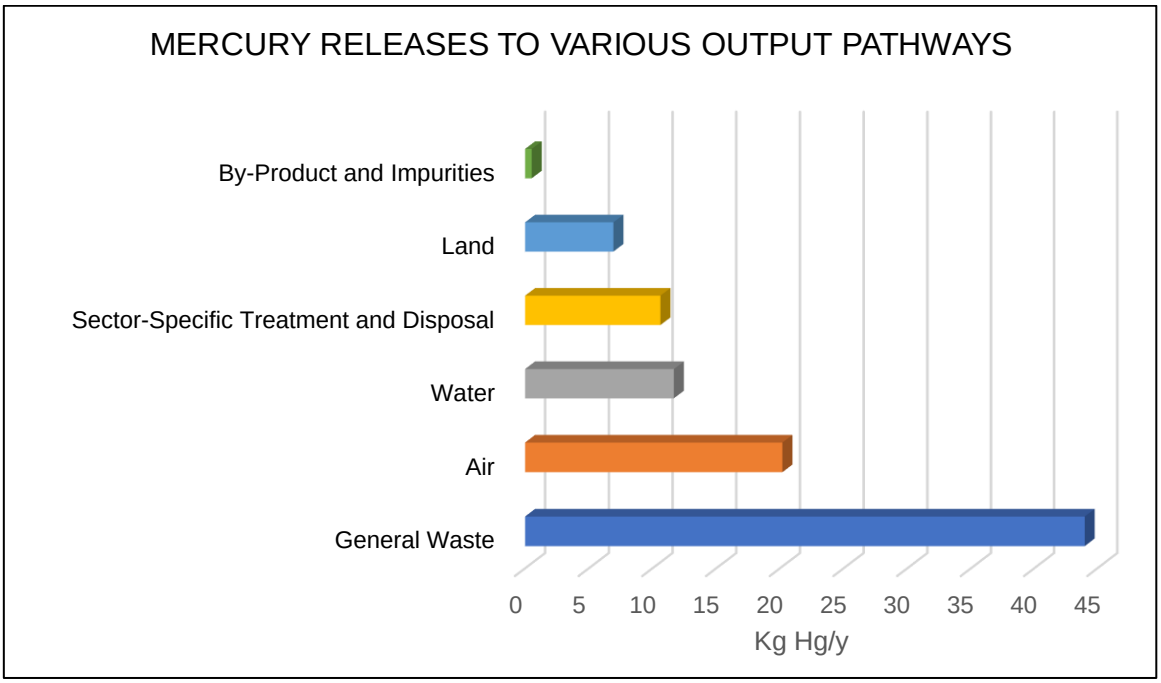

Figure 2: Estimations of releases to each output pathway from the major sources of mercury identified in the mercury inventory conducted using 2018 data for Belize

Major Findings of the Policy, Regulatory and Institutional Framework Assessment

An assessment of the policy, regulatory and institutional framework related to mercury management was conducted under the MIA Project by legal consultant, Ms. Judy Daniel, Environmental Advisors Inc.

Belize has shown some policy, legislative and institutional capacity to manage chemicals nationally however a general observation of this study is that these frameworks and practice do not adequately fulfil what is required to attain compliance with the Convention.

Belize has established policies for environment, health, solid waste, agriculture, water and physical planning that provide some background for chemicals management activities and offer some control over the life cycle of chemicals in particular mercury. However, a chemicals management policy is needed that establishes comprehensive strategies on mercury risks by outlining what Belize hopes to achieve under its chemicals management structure and clarifying the methods and principles that it will use to achieve them.

The Environment Protection Act, Chapter 248, in Belize serves as an umbrella Act for a variety of environmental issues and empowers the central government to establish authorities charged with the

mandate of preventing environmental pollution in all its forms and tackle specific environmental problems nationwide. The other main instruments that come before the others in importance are the Pesticides Control Act, Chapter 216, Environmental Protection Act, Chapter 328, Solid Waste Management Authority Act, Customs Regulation Act, the Public Health Act, Chapter 49, Belize Agricultural Health Authority Act and Standards Act. The DOE prepared a Draft National Integrated Chemicals Management Bill and a Draft Industrial Chemicals Management Regulations in 2017 to institute a response to the existing fragmented legislative framework for the management of mercury and other chemicals.

The implementation of the Minamata Convention also intersects with other multilateral environmental agreements (MEAs). Greater attention to the environmentally safe handling and disposal of mercury wastes creates policy-making and management linkages with parallel efforts under the Basel Convention, Stockholm Convention, the Rotterdam Convention and the Cartagena Protocol. The Draft Law also seeks to implement these treaties and other MEAs to which Belize is a party.

The Minamata Convention, in addition to the legal framework, also obliges Parties to establish appropriate institutional arrangements for fulfilling its obligations. Presently these entities operate in silos in Belize. They are fragmented and dispersed among related sectors with the result that chemical management is being implemented on a sectoral basis, reducing impact. The establishment of a comprehensive entity was proposed in a Draft National Integrated Chemicals Management Bill to address these weaknesses. In the Bill all key agencies vested with the task of regulating chemicals function under one Board.

A Chemicals Unit is also created and staffed by specialist officers who deal with chemicals management only. All officers will be enforcement officers. A much earlier enactment, the Pesticides Control Act, 1988 mirrors these provisions. However, it is only applicable to the management of pesticides. The Draft National Integrated Chemicals Management Bill, 2017 prepared by the DOE and the GEF 5558 Model Draft Law which was later drafted and of similar scope should be considered for implementation in Belize. Both the Draft Bill and Model Law incorporate these institutional mechanisms for fulfilling obligations under the Minamata Convention.

The following recommendations are proposed for the Government of Belize:

- Establish a harmonised policy on the management of chemicals in Belize.
- Enact a comprehensive legislative and regulatory framework for the management of chemicals including mercury to control the manufacture, registration, application, labelling, packaging, marketing, transportation, storage, use and disposal of chemicals including mercury-added products (MAPs). The DOE 2017 Draft Integrated Chemicals Management Law and Model Draft Integrated Waste Management Act developed under the GEF 5558 Project executed by the BCRC-Caribbean advance such a framework and should form the basis of the enactment. Both instruments should be harmonised to produce a single the National Law;
- Improve collaboration among the relevant institutions and agencies involved in chemical management;
- Increase infrastructural capacity;
- Establish a National Inventory on the importation and disposal of chemicals;

- Undertake training for Customs and Port Authority officials on procedures for the identification, inspection and confiscation of the management of chemicals;
- Undertake public awareness and education programmes on the impacts of mercury on human health and the environment;
- Assess the costs associated with the accession to the Minamata Convention among the implications of ratifying the Convention;
- The Belizean Assembly has a critical role in ensuring that the legislative measures required by the Minamata Convention are adopted. It should promote political will to enact the legal framework for the management of chemicals.

Strategies for Identification of Contaminated Sites and Assessment of Risks to Human Health

The development of a strategy to identify sites contaminated by mercury was initiated under this project by technical consultancy, The Biodiversity Research Institute (BRI). National-scale data on potential point sources of mercury and ecosystems that might be sensitive to mercury inputs were incorporated into a model to help identify areas of the country that are sensitive to mercury inputs from a standpoint of methylmercury generation and availability.

Following an assessment conducted by BRI to identify potential mercury hotspots using watershed sensitivity spatial analysis, a map was developed that indicated that there was considerable variation of mercury sensitivity among watersheds. Spatial analysis indicates that mercury sensitivity patterns are strongly driven by the combination of wetlands and contaminated sites.

The Belize River was the only watershed in the highest sensitivity classification. This watershed forms a corridor of developed areas, including Belize City, Belmopan, and San Ignacio. Due to these populated areas, the watershed contains multiple potentially contaminated sites and wastewater treatment plants, which increase mercury in puts to an already sensitive watershed.

The impact of the Chalillo Reservoir on downstream mercury inputs is being monitored through mammal and fish monitoring.

The results from the rapid assessment can be used to provide information on the potential of relating land coverage to mercury exposure risk. To further optimize the analysis, the presence and location of additional potential sources of mercury should be verified by relevant authorities in Belize.

Exposure to elemental mercury and mercury compounds can pose a higher risk to certain populations that are more sensitive to their effects or have an increased frequency of exposure. These groups include pregnant women and women of childbearing age, fetuses, new-borns and young children, individuals with health-related preconditions, and individuals who consistently use MAPs. Also at risk are people living in areas that are more susceptible to environmental contamination by mercury and workers exposed to mercury on a regular basis including dental and medical professionals and assistants, waste handlers, environmental officers, firemen and first responders, laboratory workers and other industrial workers.

Populations with a regular diet of contaminated high trophic level aquatic organisms are also at risk of mercury contamination. A rapid assessment of mercury concentrations in opportunistic samples of fish was conducted in Belize by

the BRI. Overall, it was found that some samples exceeded the recommended thresholds for mercury concentrations (over 0.22 parts per million, wet weight, [ppm, ww]). As such, further sampling and analysis is recommended to accurately assess the potential concentrations of mercury in fish.

The monitoring of mercury in fish and seafood in Belize needs to be improved to ensure accurate exposure estimates over time, and to inform advisories on healthy dietary practices throughout the country.

Awareness-raising Strategies for Mercury Management

Under the MIA Project, stakeholders from the relevant government sectors such as waste and health as well as non-governmental organisation (NGO) stakeholders have been made aware of the areas of focus for sound mercury management throughout the project through working group meetings. In addition to the National Minamata Initial Assessment Report and discussions, a communications package was developed that includes technical briefing documents which will provide information to all key stakeholders and government officials. These documents provide the results of the different components of the project, including the results of the add-on sampling initiatives. These materials will assist in high-level stakeholder engagements or in drafting relevant cabinet briefing notes to promote the enforcement of the Minamata Convention.

Based on the materials produced, a communication strategy for mercury awareness was developed for Belize that included the use of social media campaigns; Public Service Announcements via television and radio; involvement in environmental campaigns and events; partnering with NGOs, Youth Groups or other project initiatives; engaging local health institutions and store owners; engaging students at primary and secondary level; engaging policy makers.

The communication strategy can be tailored to meet the priorities of Belize, given the available resources, collaborations and network in the country.

Priority Areas for Consideration in the Implementation of the Minamata Convention

Recommendations for consideration in the implementation of the Minamata Convention may include:

- Ratification of the Minamata Convention on Mercury
- Promotion of mercury-free consumer products which are already widespread on the market.
- Development of proper separation methods for the disposal of MAPs both at the household consumer level and in landfill management procedures. The Government should ensure that the public has access to environmentally sound facilities/locations that could aid in the disposal process, as well as information and guidelines on disposing MAPs.
- Strengthening of the national or regional capacity to test and monitor mercury in human health and the environment.
- Integration of gender into mercury abatement projects.

Under the GEF Programme, Implementing Sustainable Low and Non-Chemical Development in SIDS (ISLANDS) of which Belize is a participant, sound management of chemicals and waste will be addressed through strengthening the capacity of sub-national, national and regional institutions and strengthening the enabling policy and regulatory framework in project countries. Mercury management will be largely

addressed under this Programme planned for 2021- 2026. In order for Belize to benefit from the mercury initiatives proposed under this programme which include the legislative and institutional capacity strengthening for managing MAPs as well as the development of BAT/BEP for the management of mercury wastes, the Government must accede to the Minamata Convention on Mercury prior to execution of the project.

INTRODUCTION

Mercury in the Environment

Mercury (Hg) is a highly toxic heavy metal which occurs naturally in the Earth's crust. It is commonly found as a reddish-brown compound called cinnabar: mercury sulphide (HgS) and can be released into the environment via natural processes or anthropogenic releases. Once released and mobilized into the environment, mercury cannot be destroyed and will cycle between air, water and land.

Some of the natural processes that release mercury into the environment include volcanic eruptions, weathering of mercury-containing rock materials, forest fires, and ocean vents (Figure 3). Human activities have significantly contributed to major increases in mercury levels in the environment. These activities include mining, combustion, production of metal from ores, the intentional use of mercury in products and processes and the remobilization of previous mercury releases. Anthropogenic sources can account for 30% of the mercury emissions in the atmosphere, while 60% comes from re-emissions of mercury already in the environment, mostly as a result of previous human activity and the remaining 10% of the emissions is from natural sources. (UNEP, 2019d).

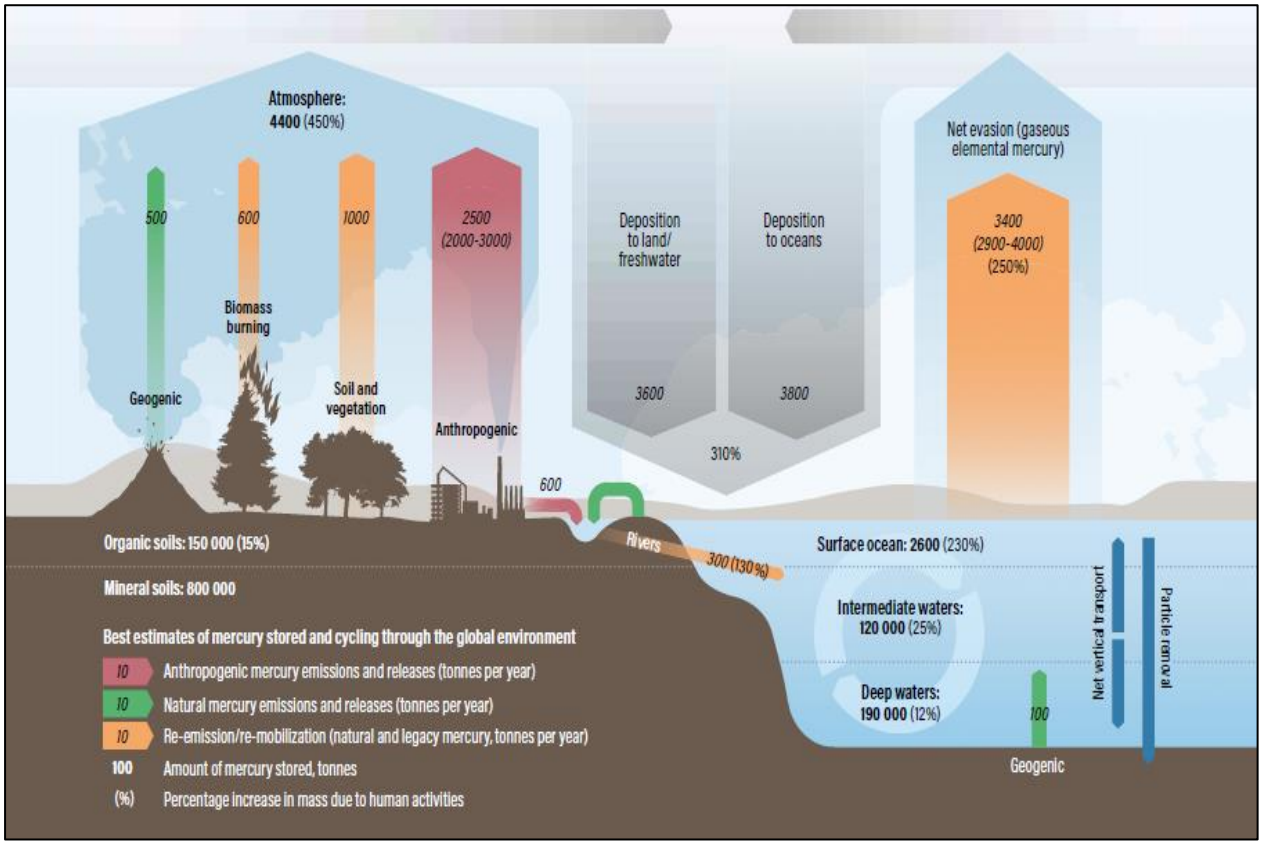

Figure 3: The Global Mercury Budget as it relates to the Mercury Cycle (Values in tonnes of mercury) (Source: UNEP, 2019d)

Mercury possesses unique properties; for example: it has a high density, is liquid at room temperature and can combine with most metals to form alloys called amalgams. With a change in temperature, liquid elemental mercury expands and contracts very precisely yet with a change in atmospheric pressure, maintains its

volume. These unique properties have made mercury very useful in devices designed to measure temperature or pressure, and it is included as a component of many products and processes.

The World Health Organization (WHO) has listed mercury as one of the top ten chemicals of major health concern (WHO, 2017). In its liquid, inorganic form, mercury poses less of a risk but when deposited into water bodies, it can be converted into its more toxic methylated form through the action of bacteria. This highly toxic organic form of mercury can bioaccumulate and biomagnify up the food chain and can result in different concentrations of mercury in food resources that can affect humans and wildlife.

Inorganic mercury can enter the human body through inhalation or direct contact with the skin, while organic methylmercury can enter through ingestion of contaminated aquatic species. Exposure to mercury is detrimental to human health as it can damage the central nervous system and affect numerous organs, resulting in neurological and behavioural disorders. Symptoms include tremors, insomnia, memory loss, neuromuscular effects, headaches, and cognitive and motor dysfunction (UNEP, 2019a). More severe effects are typically seen in foetuses and young children due to their vulnerable developing systems.

According to the updated Global Mercury Assessment which assessed 2015 global mercury inventory emissions, it was noted that artisanal and small-scale gold mining contributed the most to mercury emissions (approximately 38% of total) as large amounts of elemental mercury are often used in the process. Other key sources included coal combustion, non-ferrous metal production and cement production. Emissions from the disposal of mercury-added products (MAPs), such as thermometers and compact fluorescent lightbulbs accounted for 7% of global emissions. For Central America and the Caribbean region, an estimated 45.8 tonnes of mercury per year were estimated to be emitted accounting for 2.1% of global emissions (UNEP, 2019d). Although the releases of mercury through anthropogenic activity in the Caribbean region is expected to be relatively small, mercury released by other countries around the globe has the ability for long-range transport in the atmosphere and a global approach to mercury management is needed to adequately address its impacts.

Minamata Convention on Mercury

In order to address the negative impacts posed by the release of mercury, a global treaty called the Minamata Convention on Mercury was developed. The objective of this Convention is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

The text of the Minamata Convention was adopted on October 10, 2013 and the Convention entered into force on August 16, 2017. The Convention regulates, *inter alia*, mercury supply, sources and trade; MAPs and processes; interim storage and disposal of mercury, its compounds and mercury waste; and the emissions and releases of mercury.

In the Caribbean region, the countries that are Party to the Minamata Convention as of September 2020 are:

- Antigua and Barbuda;
- The Bahamas;
- Cuba;
- Dominican Republic;
- Guyana;
- Jamaica;
- Saint Kitts and Nevis;
- Saint Lucia; and
- Suriname.

Project Background

Through Article 13 of the Minamata Convention, a financial mechanism was identified to support countries with implementation of the Convention. This included support from the Global Environment Facility Trust Fund for the development of a Minamata Initial Assessment (MIA) which is an enabling activity to determine the national mercury inventory in a country and what is needed to ratify and/or implement the Convention.

Belize's Minamata Initial Assessment is facilitated through the project entitled the "Development of Minamata Initial Assessment in the Caribbean (Belize)" (MIA Project) which is funded by the Global Environment Facility (GEF), implemented by United Nations Environment Programme (UNEP) and executed by the Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean (BCRC-Caribbean). The national focal point for implementation of the Convention is the Department of the Environment (DOE).

The MIA Project aims to facilitate the ratification and early implementation of the Minamata Convention on Mercury using scientific and technical knowledge in conducting an inventory of mercury releases (and emissions[1]). The development of an inventory of mercury releases will inform countries of their national mercury sources and subsequently assist in identifying actions to increase their capacity in mercury management.

The inventory was conducted with the use of the "Toolkit for Identification and Quantification of Mercury Releases" (Toolkit), made available by the Chemicals Branch of UNEP. The Toolkit is designed to produce a simple and standardised methodology and database to inform the national mercury inventory. It outlines a UNEP-recommended procedure to facilitate the development of consistent and comparable source inventories. The steps involved include:

1. The identification of the main mercury source categories present in the country;
2. The refining of the identified mercury source categories into further sub-categories in order to determine the individual activities that potentially release mercury, and gathering of qualitative information on the activities;
3. The development of a quantitative inventory; the Inventory Level 2 version of the Toolkit was utilised in this MIA Project as it provided a more comprehensive look at the releases of mercury. Estimations are calculated via equations and procedures specific to the source types identified; and
4. The compilation of the standardised mercury inventory and identification of data gaps which will build on the country's knowledge base on mercury.

It is important to note that in calculating estimations of mercury releases using the Toolkit, there may be various uncertainties and complexities involved. As such, for each mercury source sub-category present, there will be an estimate of releases to all media where data is sufficient and an indication of the likely magnitude if full data is unavailable. Major data gaps will also be identified. These

[1] Under the Minamata Convention, the term "releases" is typically related to mercury released to land and water while the term "emissions" refers to mercury released to air. Under the UN Environment Toolkit, "releases" is used to describe mercury released to all media, including air. For this report, the term "mercury releases" will be used predominantly as described under the UN Environment Toolkit.

considerations will assist in the interpretation of results and prioritisation of future actions.

Other aspects of the MIA Project included an assessment of the legislation, policies and institutional capacity available to implement the Convention; identification of possible mercury contaminated sites and hotspots; and capacity building, technical assistance and awareness-raising activities in relation to mercury management. Further details on the project outputs are detailed in Table 1.

For the development of project activities, consultants were hired. These included a National Project Coordinator responsible for the in-country data collection and stakeholder engagement; technical experts on the mercury inventory development, The Biodiversity Research Institute (BRI); legal experts, Environmental Advisors Inc. (EAI); and awareness raising consultancy, Efoundry Digital Agency Ltd.

In order to acquire information and develop a comprehensive national mercury management strategy for mercury releases, a national working group of key stakeholders, which included professionals from the waste management, energy, health and environmental sectors, was formed (Annex 1).

Table 1: Outline of project components and expected outputs as stated in the MIA Project document

Project Component	Project Output
Global technical support and capacity building for MIAs development	1.1 Technical assistance provided to participating countries to develop the MIAs while building sustainable foundations for their future implementation of the Minamata Convention
Development and validation of the Minamata Initial Assessments	2.1 Identified and strengthened Project Steering Committee and National Coordination Mechanisms dealing with mercury management that will guide the project implementation
	2.2 National institutional and regulatory frameworks and national capacities on mercury management assessed
	2.3 National inventories of mercury sources and releases developed using the UN Environment Mercury Toolkit Level II and strategies for the identification of mercury contaminated sites developed
	2.4 Challenges, needs and opportunities to implement the Minamata Convention assessed and recommendations to ratify and implement the Minamata Convention developed
	2.5 MIA validated by national stakeholders
Monitoring and Evaluation	3.1 Status of project implementation and probity of use of funds accessed on a regular basis and communicated to the GEF
	3.2 Independent terminal evaluation developed and made publicly available

Chapter 1: National Background Information

1.1 Geography and Population

Belize is located on the south-eastern edge of the Yucatan Peninsula (Northern Central America), bordered to the North by Mexico; to the South and West by Guatemala to the East by the Caribbean Sea. Belize is located 17º15 North of the Equator and 88º45 West of Prime Meridian (Figure 4).

Figure 4: Location of Belize within the Caribbean (Source: Google Maps, 2020)

Using an offshore territorial limit of 20 kilometres, the national territory covers about 46,620 square kilometres (sq. km), of which, 49% is land. Belize's landmass includes more than 1,000 islands known as Cayes, totalling approximately 690 sq. km

Belize has a relatively low topographic relief in the northern half and south-eastern fringes. The Maya Mountains, 300 - 1000 metres in altitude, occupy the south centre and dominate much of the remainder of the country, draining into the lower coastal plains. Freshwater river systems and many perennial streams supply most of its water needs. The country is well endowed with both surface water, and water stored in aquifers. Near the submerging coast, numerous lagoons, mangrove swamps, deep estuaries, and river-mouth bars are well developed. Off the coast of the main landmass, the Belize Barrier Reef, the second longest in the world and the longest in the Northern hemisphere, extends 200 km from the Mexican border to the Sapodilla Cayes.

The climate is sub-tropical, with temperatures ranging from 21ºC from October to February and increasing to 32.2ºC during May to September. The annual mean relative humidity is 81.8%, while total annual rainfall varies from 1,588 millimetres (mm) in the north to 4,290 mm in the south. There are two (2) distinct seasons: the rainy season (typically from June to November), and the dry season (typically December to early June).

Belize is the most sparsely populated nation in Central America. In 2019, the

population was 406,262 with the Belize and Cayo Districts accounting for roughly half the population of the country (Statistical Institute of Belize, 2019). Belize is included in the World Bank's grouping of upper middle-income countries for the 2021 fiscal year (World Bank, 2020) and was ranked 103 among 189 countries in terms of the United Nations Development Programme's (UNDP) Human Development Index (HDI), in 2019 (United Nations Development Programme, 2019).

Belize is an ethnically diverse nation with most Belizeans being of multiracial descent. There are at least ten (10) different ethnic groups in the country. The ethnicity with the highest representation is the Mestizo group, followed by the Creoles and the Maya. Belize consists of six (6) districts, which are comprised of cities, towns and villages. The northern districts of Corozal and Orange Walk consist of predominantly Mestizo and Spanish-speaking ethnic groups. The Belize District is comprised primarily of English-speaking Creole. The Cayo district, located in the geographic centre of the country is more mixed, with Creole, Mestizo, Mayan, and Mennonite communities. Further south, the Garifuna dominates the Stann Creek district, while more than 60% of the Toledo district is Mayan. Three (3) Mayan languages are spoken throughout Belize: Ket'chi, Mopan, and Yucatec.

1.2 Political, Economic and Legal Profile

Belize is a sovereign state having gained independence from the United Kingdom on 21 September 1981. It is governed by a representative democracy with bicameral legislature based on the Westminster model. The Prime Minister and Cabinet form the executive branch, while the National Assembly forms a bicameral legislature comprising of a 31-member elected House of Representatives and a 13-member appointed Senate.

Belize is a constitutional monarchy and parliamentary democracy on the Westminster model and is a member of the Commonwealth of Nations. Queen Elizabeth II is head of state and is represented in the country by the Governor General. The primary executive organ of government is the Cabinet led by a Prime Minister (head of government). Cabinet Ministers are members of the majority political party in Parliament and usually hold elected seats in the National Assembly concurrently with their Cabinet positions (National Assembly of Belize, 2021). Legislative power is vested in both the government and the Parliament of Belize.

Belize is a member of some regional and sub-regional organizations including the following:

The Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean (BCRC-Caribbean), which provides support for the region on various chemical issues related to the Basel, Stockholm, Rotterdam and Minamata Conventions.

The Caribbean Community (CARICOM), which rests on four main pillars: economic integration; foreign policy coordination; human and social development; and security.

The Caribbean Public Health Agency (CARPHA), a regional inter-governmental agency with the purpose of drawing together and building on public health knowledge and expertise across the Caribbean, preventing duplication of effort and resources. This will facilitate a coordinated approach to public health issues including managing the risk of disease outbreaks in the Caribbean region.

The United Nations (UN), an intergovernmental organization tasked to promote international cooperation and to create and maintain international order.

The CARICOM Regional Organization for Standards and Quality (CROSQ), a regional inter-governmental organisation established to facilitate the development of regional standards, promote the harmonization of metrology systems and support the sustainable production and trade of goods and services.

The Caribbean Disaster Emergency Management Agency (CDEMA), a regional inter-governmental agency for disaster management in the Caribbean Community. CDEMA is the regional disaster management body playing the role of facilitator, driver, coordinator and motivating force for the promotion and engineering of Comprehensive Disaster Management (CDM) in the region.

The Bolivarian Alliance for the Americas (ALBA), an intergovernmental organization based on the idea of the social, political and economic integration of the countries of Latin America and the Caribbean.

The Commonwealth of Nations, an intergovernmental organisation of fifty-three (53) member states that are mostly former territories of the British Empire. The Commonwealth operates by intergovernmental consensus of the member states, organised through the Commonwealth Secretariat and non-governmental organisations, organised through the Commonwealth Foundation.

The World Trade Organization (WTO), an intergovernmental organisation that regulates international trade.

The Food and Agriculture Organization (FAO) of the United Nations, a specialised agency that leads international efforts to defeat hunger.

The Central American Integration System (SICA), a regional organisation aimed at a comprehensive development approach to Central American integration.

The Central America Fisheries and Aquaculture Organization (OSPESCA), an organisation, which is part of SICA, aimed at coordinating aspects of regulatory framework for the region that works towards the sustainable development of fishing and aquaculture activities.

Belize possesses a small open economy, which relies heavily on the services sector. Agriculture contributes to the country's main exports with marine products (including seafood such as shrimp) and small manufacturing making notable contributions. Petroleum exports accounts for less than 1.0 % of Gross Domestic Product (GDP) and exhibited a steady decline over the five years beginning in 2012, when it measured 3.0 % of GDP (Pompey & Mendoza, 2018).

Agriculture plays a significant role in the economic structure of Belize, with the value of crops and agricultural products in 2018 amounted to 8.7 % of GDP (Statistical Institute of Belize, 2019). The sector continues to form the foundation of the productive sector and the rural economy of the country. Agriculture and horticulture contributed over BZ$190 million in 2014 (Statistical Institute of Belize, 2016). Sugar, citrus and bananas are the country's main exports accounting for at least 60 % of the earnings accrued from merchandise exports. Moreover, small-scale and large-scale agriculture production continues to grow in importance as large farms expand to satisfy external markets, while small farmers depend on cash crops as a means of earning a living.

Tourism is one of the largest sources of foreign currency with estimated earnings measured 26.3% of GDP in 2018 (Statistical Institute of Belize, 2019). Belize tourism product is highly dependent on the health of its natural resources, with feature attractions such as the extensive rainforests, the largest cave system in Central America, major Maya ruins,

wildlife, the largest barrier reef in the Western Hemisphere, and three of the four true atolls in the Americas including the Great Blue Hole. More than 100 islands and beaches nestled inside the reef make for traditional sun, sand, and sea attractions as well as world class Self-Contained Underwater Breathing Apparatus (SCUBA) diving. Cruise-ship arrivals have also increased in recent years.

1.3 Environmental Overview

Belize is located within the "hurricane belt" and as such has experienced many hurricanes and other systems over the years. The most notable hurricane to affect Belize was Hurricane Hattie, which made landfall on October 31, 1961. There have been several more hurricanes affecting Belize over the years, the most recent being Hurricane Earl in 2016. Other hazards such as droughts, floods, forest fires and to a lesser extent, oil spills, have also affected Belize.

The dominant sector in Belize, agriculture, is highly vulnerable because the country's main exports are located in the narrow coastal belt, which are faced with environmental and geographical issues.

Major impacts of climate change such as increased sea surface temperatures; sea level rise and increased frequency and intensity of storms are projected to exacerbate the challenges already faced by the country's coastal zone. Aside from the agriculture sector, coastal zone management is of utmost importance to Belize as the fisheries and tourism sectors, which contribute significantly to the country's GDP, and are also likely to be negatively impacted.

The water sector is another major area of concern. Historically, Belize has been considered a water secure country, due to its 18 water catchment areas, high levels of forest cover and abundance of rainfall. However, pressures from population growth and the development of sectors such as agriculture and tourism have caused the water resources sector to be under stress and the intended growth of these sectors to aid in economic development will continue to do so.

The nation is a Party to various Multilateral Environmental Agreements (MEAs) that are listed in Table 2.

Table 2: Multilateral environmental agreements to which Belize is a Party

Treaty		Signature	Ratification
	Basel Convention		23 May 1997
	Cartagena Convention		22 Sep 1999
	Cartagena Protocol		12 Feb 2004
	Convention on Biological Diversity	13 Jun 1992	30 Dec 1993
	Convention on International Trade in Endangered Species of Wild Fauna and Flora	19 Aug 1986	21 Sep 1981
	Kyoto Protocol		26 Sep 2003
	Montreal Protocol		9 Jan 1998
	Paris Agreement	22 Apr 2016	22 Apr 2016
	Ramsar Convention	22 Aug 1998	22 Apr 1998
	Rotterdam Convention		20 Apr 2005
	Stockholm Convention	14 May 2002	25 Jan 2010
	United Nations Convention to Combat Desertification		23 Jul 1998
	United Nations Framework Convention on Climate Change	13 Jun 1992	31 Oct 1994
	United Nations Convention on the Law of the Sea	10 Dec 1982	13 Aug 1983
	Vienna Convention		6 Jun 1997

Chapter 2: Mercury Inventory and Identification of Emissions and Releases

2.1 Summary of Mercury Releases, Stockpiles, and Supply and Trade

2.1.1 Mercury Release Source Types Present

Mercury released into the environment can come from a variety of sources. For the Toolkit, focus was placed on anthropogenic sources of mercury. In Belize, the presence of these sources was identified through consultations with national stakeholders from public and private sectors (Table 3). Stakeholders were engaged through questionnaires, email correspondence, interviews and project workshops. The categories identified as not being present will not be discussed further in the report.

Table 3: Identification of mercury release sources in Belize; sources present (Y), absent (N), and possible but not positively identified (?)

Toolkit Category #	Source category	Source presence (Y/N/?)
5.1	**Extraction and use of fuels/energy sources**	
5.1.1	Coal combustion in large power plants	**N**
5.1.2	Other coal combustion	**N**
5.1.3	Extraction, refining and use of mineral oil	**Y**
5.1.4	Extraction, refining and use of natural gas	**Y**
5.1.5	Extraction and use of other fossil fuels	**N**
5.1.6	Biomass fired power and heat production	**Y**
5.1.7	Geothermal power production	**N**
5.2	**Primary (virgin) metal production**	
5.2.1	Primary extraction and processing of mercury	**N**
5.2.2	Gold and silver extraction with the mercury-amalgamation process	**N**
5.2.3	Zinc extraction and initial processing	**N**
5.2.4	Copper extraction and initial processing	**N**
5.2.5	Lead extraction and initial processing	**N**
5.2.6	Gold extraction and initial processing by other processes than mercury amalgamation	**?**
5.2.7	Aluminium extraction and initial processing	**N**
5.2.8	Extraction and processing of other non-ferrous metals	**N**
5.2.9	Primary ferrous metal production	**N**
5.3	**Production of other minerals and materials with mercury impurities**	
5.3.1	Cement production	**N**
5.3.2	Pulp and paper production	**N**
5.3.3	Lime production and light weight aggregate kilns	**Y**
5.3.4	Other minerals and materials	**Y**
5.4	**Intentional use of mercury as an auxiliary material in industrial processes**	

Toolkit Category #	Source category	Source presence (Y/N/?)
5.4.1	Chlor-alkali production with mercury-technology	**N**
5.4.2	VCM (vinyl-chloride-monomer) production with mercury-dichloride ($HgCl_2$) as catalyst	**N**
5.4.3	Acetaldehyde production with mercury-sulphate ($HgSO_4$) as catalyst	**N**
5.4.4	Other production of chemicals and polymers with mercury compounds as catalysts	**N**
5.5	**Consumer products with intentional use of mercury**	
5.5.1	Thermometers with mercury	**Y**
5.5.2	Electrical and electronic switches, contacts and relays with mercury	**Y**
5.5.3	Light sources with mercury	**Y**
5.5.4	Batteries containing mercury	**Y**
5.5.5	Polyurethane with mercury catalysts	**Y**
5.5.6	Biocides and pesticides	**N**
5.5.7	Paints	**N**
5.5.8	Pharmaceuticals for human and veterinary uses	**N**
5.5.8	Cosmetics and related products	**N**
5.6	**Other intentional products/process uses**	
5.6.1	Dental mercury-amalgam fillings	**Y**
5.6.2	Manometers and gauges	**Y**
5.6.3	Laboratory chemicals and equipment	**Y**
5.6.4	Mercury metal use in religious rituals and folklore medicine	**N**
5.6.5	Miscellaneous product uses, mercury metal uses and other sources	**N**
5.7	**Production of recycled metals**	
5.7.1	Production of recycled mercury ("secondary production)	**N**
5.7.2	Production of recycled ferrous metals (iron and steel)	**N**
5.7.3	Production of other recycled metals	**N**
5.8	**Waste incineration**	
5.8.1	Incineration of municipal/ general waste	**Y**
5.8.2	Incineration of hazardous waste	**N**
5.8.3	Incineration of medical waste	**Y**
5.8.4	Sewage sludge incineration	**N**
5.8.5	Informal waste burning	**Y**
5.9	**Waste deposition/landfilling and wastewater treatment**	
5.9.1	Controlled landfills/deposits	**Y**
5.9.2	Diffuse deposition under some control	**N**
5.9.3	Informal local deposition of industrial production waste	**N**
5.9.4	Informal dumping of general waste	**Y**

Toolkit Category #	Source category	Source presence (Y/N/?)
5.9.5	Wastewater system/treatment	**Y**
5.10	**Cremation and cemeteries**	
5.10.1	Crematoria	**Y**
5.10.2	Cemeteries	**Y**

2.1.2 Summary of Estimated Mercury Inputs to Society

Mercury inputs to society should be understood here as the mercury made available for potential releases through economic activity in Belize. This includes mercury intentionally used in products such as thermometers, blood pressure gauges and fluorescent light bulbs as well as mercury that can become available through the disposal of these products. It also includes mercury mobilized via extraction and use of raw materials which contains mercury in trace concentrations.

Mercury inputs to Belize for the source categories identified as being present in Table 3 are shown below in Table 4.

Table 4: Summary of mercury inputs to Belize

Source category	Estimated Hg Input (Kg Hg/y)
Extraction and use of fuels/energy sources	
Mineral Oil- Extraction, refining and use	**0.81**
Natural Gas- Extraction, refining and use	**0.14**
Biomass fired power and heat production	**10.23**
Primary (virgin) metal production	
Gold extraction and initial processing by methods other than mercury amalgamation	*No data available*
Production of other minerals and materials with mercury impurities	
Production of lime and light weight aggregates	**0.02**
Other minerals and materials	*No data available*
Consumer products with intentional use of mercury	
Thermometers with mercury	**0.88**
Electrical and electronic switches, contacts and relays with mercury	**25.14**
Light sources with mercury	**1.08**
Batteries containing mercury	**1.20**
Polyurethane with mercury catalysts	**11.30**
Other intentional products/process uses	
Dental mercury-amalgam fillings	**9.42**
Manometers and gauges	**1.88**
Laboratory chemicals and equipment	**18.83**
Waste incineration	

Source category	Estimated Hg Input (Kg Hg/y)
Incineration of municipal/general waste	**0.01**
Incineration of medical waste	**1.87**
Informal waste burning	**0.41**
Waste deposition/landfilling and wastewater treatment	
Controlled landfills/deposits	**2.78**
Informal dumping of general waste	**0.00**
Wastewater system/treatment	**13.00**
Cremation and cemeteries	
Crematoria/Cremation	**0.07**
Cemeteries	**1.22**

The sum of mercury inputs to Belize for 2018 was determined to be approximately 95.72 Kg Hg. This input was calculated using national data collected through stakeholder engagement and default input factors present in the Toolkit. The total input includes only 10% of the calculated mercury input from waste incineration sources, waste deposition and informal dumping to avoid double counting of mercury inputs from waste and products. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Toolkit.

Mercury in waste and wastewater produced in Belize originates in products and materials in which mercury was intentionally used. Imported wastes may represent original mercury inputs to a country, however, this is not relevant as Belize does not import wastes from other countries. Waste deposition to controlled landfills and wastewater may, however, represent substantial flows of mercury through society.

The following source sub-categories (waste sub-categories not included) made the largest contributions to mercury inputs to Belize:

- Electrical switches and relays (25.14 Kg Hg/y);
- Laboratory chemicals and equipment (18.83 Kg Hg/y); and
- Wastewater system/treatment (13.00 Kg Hg/y).

Overall, the largest source of mercury input to Belize is from consumer products with intentional use of mercury with 39.60 Kg Hg released per year.

2.1.3 Summary of Mercury Releases

Key mercury releases are to air (the atmosphere), water (marine and freshwater bodies, including via wastewater systems), land, general waste, and sector specific waste treatment/disposal. An additional output pathway is "by-products and impurities" which designates mercury flows back into the market in by-products and products where mercury does not play an intentional role. Table 5 describes these output pathways.

Table 5: Descriptions of the types of output pathways for mercury releases

Calculation Result Type	Description *(NOTE: Not all examples provided are relevant to Belize but are included for general reference)*
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: • 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 wastewater 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: • 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 groundwater. For example, releases from: • 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.
By-products and impurities	By-products that contain mercury, which are sent back into the market and cannot be directly allocated to environmental releases, for example: • 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).

Calculation Result Type	Description *(NOTE: Not all examples provided are relevant to Belize but are included for general reference)*
General waste	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, etc.) as well as high volume waste like printed paper, plastic, etc., with small trace concentrations of mercury.
Sector specific waste treatment /disposal	Waste from industry and consumers which is collected and treated in separate systems, and in some cases recycled; for example: • 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 batteries, thermometers, mercury switches, lost teeth with amalgam fillings, etc.; • Confined deposition of tailings and high-volume rock/waste from extraction of non-ferrous metals.

Table 6 summarises mercury releases to the various output pathways in Belize based on Toolkit calculations using mainly 2018 data and default values where data was not available. Details on how the release values were obtained are included in the respective subsections of this report. Source categories that were not identified as being present in Belize are not included in the table.

Table 6: Summary of mercury releases in Belize for 2018

Source category	Calculated mercury output, kilograms per year (Kg Hg/y)					
	Air	Water	Land	By-pro-ducts and impurities	General waste	Sector specific treatment/ disposal
Extraction and use of fuels/energy sources						
Mineral oils - extraction, refining and use	0.79	0.02	0.00	0.00	0.00	0.00
Natural gas - extraction, refining and use	0.03	0.03	0.00	0.07	0.00	0.01
Biomass fired power and heat production	10.23	0.00	0.00	0.00	0.00	0.00
Production of other minerals and materials with mercury impurities						
Production of lime and light weight aggregates	0.02	0.00	0.00	0.00	0.00	0.00
Other minerals and materials	0.00	0.00	0.00	0.00	0.00	0.00
Consumer products with intentional use of mercury						
Thermometers with mercury	0.09	0.26	0.00	-	0.53	0.00

Source category	Calculated mercury output, kilograms per year (Kg Hg/y)					
Electrical switches and relays with mercury	2.51	0.00	2.51	-	20.11	0.00
Light sources with mercury	0.05	0.00	0.00	-	1.03	0.00
Batteries with mercury	0.00	0.00	0.00	-	1.20	0.00
Polyurethane with mercury catalysts	1.13	0.57	0.00	-	9.61	0.00
Other intentional product/process use						
Dental mercury-amalgam fillings	0.25	3.99	0.59	0.44	2.07	2.07
Manometers and gauges with mercury	0.19	0.56	0.00	0.00	1.13	0.00
Laboratory chemicals and equipment with mercury	0.00	6.21	0.00	0.00	6.21	6.40
Waste incineration*3						
Incineration of municipal/general waste	0.01	0.00	0.00	0.00	0.00	0.00
Incineration of medical waste	1.68	0.00	0.00	0.00	0.00	0.19
Informal waste burning	0.41	0.00	0.00	0.00	0.00	0.00
Waste deposition/landfilling and wastewater treatment						
Controlled landfills/deposits*3	2.75	0.03	0.00	0.00	0.00	0.00
Informal dumping of general waste*1*3	0.00	0.00	0.00	-	-	-
Wastewater system/treatment*2	0.00	6.50	2.60	0.00	1.95	1.95
Crematoria and cemeteries						
Crematoria/cremation	0.07	0.00	0.00	-	0.00	0.00
Cemeteries	0.00	0.00	1.22	-	0.00	0.00
SUM OF QUANTIFIED INPUTS AND RELEASES *1*2*3*4	20.20	11.68	6.93	0.52	44.00	10.62

Notes: *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 include mercury amounts which have also been accounted for under each source category. To avoid double counting release to water from wastewater system/treatment have been subtracted automatically in the TOTALS.

*3: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration sources, 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 this Toolkit.

*4 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.

The output pathway with the highest quantity of mercury releases to Belize in 2018 was general waste. A total of 44.00 Kg Hg/y was released primarily due to the following sub-categories:

- Electrical switches and relays with mercury (20.11 Kg Hg/y)
- Polyurethane with mercury catalysts (9.61 Kg Hg/y); and
- Laboratory Chemicals and Equipment (6.21 Kg Hg/y).

2.1.4 Summary of Mercury Stockpiles, Supply and Trade

The Minamata Convention on Mercury outlines the obligations of Parties in terms of managing mercury supply sources and trade in Article 3. The provisions of the article refer to restrictions for the Party's territory regarding:

- Primary mercury mining;
- Individual stocks of mercury or mercury compounds exceeding 50 metric tons;
- Sources of mercury supply generating stocks exceeding 10 metric tons per year; and
- The import and export of mercury under circumstances described within the article.

If any such stockpiles are identified, Article 10 of the Convention regarding environmentally sound interim storage of mercury, other than waste mercury, would also apply.

There are no industries in Belize, which generate or use mercury as described by the Convention. Therefore, there are no such stockpiles in the country and no supply and trade in this regard. Mercury entering the country largely comes from imported products.

2.2 Data and Inventory on Extraction and Use of Fuels/Energy Sources

2.2.1 Extraction and Use of Mineral Oils and Natural Gas

Mineral oils or petroleum oils are combusted to provide heat and power and for transportation. Mineral oils also have other uses such as the synthesis of chemicals, lubricants, polymers and black pigments. Small amounts of mercury are contained within petroleum oils as impurities. These can be emitted into the atmosphere through extraction, refining and use (UNEP, 2019a). In refineries, crude oil can be separated via distillation into various fractions such as gasoline/petrol, kerosene, jet fuel, liquefied petroleum gas and other distillates.

Natural Gas which is combusted to produce electricity and heat also contains small amounts of natural mercury impurities which are released during extraction, refining and combustion.

In Belize, mineral oils and natural gas are imported as well as produced locally. Belize Natural Energy Limited (BNE) is the main company involved in oil and gas extraction with crude oil, liquified petroleum gas (LPG) and natural gas produced (BNE, 2020). Crude oil is used locally and exported for international processing. The LPG produced by BNE is blended with imported LPG from Mexico for domestic use while the natural gas processed from BNE operations is used for the company's internal power production (BNE, 2020).

The majority of mineral oils used for transportation and other processes in Belize is imported. Belize Electricity Limited (BEL) is the main power generation company in Belize. Based on their 2018 Annual Report, 54 % of the energy used for electricity production came from renewable sources such as hydroelectric and solar.

The remaining sources are derived from petroleum and biomass; and is secured and stabilized by interconnection with Mexico (Belize Electricity Limited, 2018).

Data Collection and Assessment

Data for extraction of mineral oils and natural gas was obtained from 2018 BNE data provided through questionnaires developed. Data for the use of mineral oils was obtained from The Statistical Institute of Belize import data for 2018 and were provided in gallons per year.

For input into the Toolkit, these values were converted to tonnes per year using the following conversions[2].

- 1 gallon [UK] of kerosene type jet fuel to tonne of oil equivalent = 0.00408 tonne of oil equivalent
- 1 gallon [U.S.] of residual fuel oil (bunker c) to tonne of oil equivalent = 0.00377 tonne of oil equivalent
- 1 gallon [U.S.] of automotive gasoline to tonne of oil equivalent = 0.00315 tonne of oil equivalent
- 1 gallon [UK] of diesel oil to tonne of oil equivalent = 0.0042 tonne of oil equivalent.

Table 7 shows the import data for various types of minerals oils converted from gallons per year to tonnes per year.

Table 7: 2018 Imports of Mineral Oils provided by the Statistical Institute of Belize

Fuel Type	2018 Imports	
	Gallons	Tonnes
Motor spirit (regular gasoline	18,701,088	58,853
Gasoline (Premium)	7,501,155	23,606
Diesel oil	22,279,167	77,968
Kerosene type jet fuel	4,442,014	15,087
Bunker C (residual) fuel oil	2,520,010	9,512
Lubricating oils	712,408	2,242
TOTAL	**56,155,842**	**187,268**

Table 8 summarises the mercury inputs and releases to Belize from the extraction and use of mineral oils and natural gas. The input factors and output distribution factors used to estimate mercury releases were obtained from the Toolkit.

Table 8: Analysis of mercury inputs and outputs from the extraction and use of natural gas and mineral oils

[2] Conversion factors found at: https://www.convertunits.com/from/gallon/to/tonne+of+oil+equivalent

Extraction and Use of Natural Gas and Mineral Oils	Unit	Extraction of Mineral oil	Use of Mineral Oils	Production of Natural Gas	Use of Pipeline Gas (Consumer Quality)
Activity rate	Oil, t/y	29,525	187,268	-	-
	Gas, Nm^3/y	-	-	1,353,986	676,933
Input factor for phase	mg Hg/t oil	3.4	4.2	-	-
	µg Hg/Nm^3 gas	-	-	100	0.22
Calculated input to phase	**Kg Hg/y**	**0.10**	**0.79**	**0.14**	**0.0001**
Output distribution factors for phase:				(Gas processing without Hg removal)	
- Air	N/A	-	1	0.2	1
- Water	N/A	0.2	-	0.2	-
- Land	N/A	-	-	-	-
- Products	N/A	-	-	0.5	-
- General waste treatment	N/A	-	-	-	-
- Sector-specific waste treatment	N/A	-	-	0.1	-
Calculated outputs/releases to:					
- Air	Kg Hg/y	-	0.79	-	0.00
- Water	Kg Hg/y	0.10	-	0.20	-
- Land	Kg Hg/y	-	-	-	-
- Products	Kg Hg/y	-	-	-	-
- General waste treatment	Kg Hg/y	-	-	-	-
- Sector specific waste treatment	Kg Hg/y	-	-	-	-

Due to lack of available data, it was assumed that the imported mineral oil data accounted for the total amount of gasoline, diesel, light fuel oil, kerosene, LPG and other light to medium distillates used in Belize.

It was also assumed that the total natural gas produced by BNE was equivalent to the amount used to generate electricity internally.

Specific mercury content data was not available for any of the fuel sources obtained for the inventory. The recommended input factor provided in the Toolkit was used for calculations.

2.2.2 Biomass Fired Power and Heat Production

Biofuel may contain natural mercury or deposits from anthropogenic emissions (COWI 2002). Vegetation absorbs atmospheric mercury overtime which is readily re-released to the air upon combustion (Friedli, et al., 2001).

In Belize, the combustion of biomass for power generation occurs. Bagasse, a by-product of sugar production, is mainly supplied by Belize Sugar Industries Ltd/ASR (BSI). BSI owns and operates a 31.5 megawatt (MW) cogeneration energy power plant (Belcogen) for auto-consumption and sale of energy to the national public grid, BNE. In 2018, BSI produced 115,395,976 megawatts (MW)

annually. At its peak, 13.5 MW per hour were produced.

The Santander Sugar Group comprised of the Santander Farms located west of Belmopan in the Cayo District with the Santander Sugar Mill has been functional since 2016 and produces sugar as well as energy via cogeneration for local consumption.

Data Collection and Assessment

The amount of bagasse used annually for electricity was provided through questionnaire response from BSI. It was noted that no mercury monitoring activities take place in operations and as such the default mercury content input factor provided in the Toolkit was used to calculate mercury releases as shown in Table 9. It was assumed that the volume of biomass used represented dry weight.

It was noted that Santander Sugar Factory also produces energy via cogeneration for their processes, however data was not able to be collected within the project timeframe.

Table 9: Analysis of mercury inputs and outputs from the burning of biomass for power generation

Biomass Burning	Unit	Biomass Burning
Activity rate	Biomass, t (dry weight)/y	340,949
Input factor for phase	g Hg/t (dry weight)	0.03
Calculated input to phase	**Kg Hg/y**	**10.23**
Output distribution factors for phase:		
- Air	N/A	1
- Water	N/A	-
- Land	N/A	-
- Products	N/A	-
-General waste treatment	N/A	-
-Sector-specific waste treatment	N/A	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	10.23
- Water	Kg Hg/y	-
- Land	Kg Hg/y	-
- Products	Kg Hg/y	-
- General waste treatment	Kg Hg/y	-
- Sector specific waste treatment	Kg Hg/y	-

2.3 Data and Inventory on Primary (virgin) metal production

2.3.1 Gold extraction and initial processing by methods other than mercury amalgamation

For centuries, mercury has been used in the gold mining process as it tends to form an amalgam with gold particles, allowing for extraction of the gold from composite ore (UNEP, 2019a). The use of mercury in the artisanal and small-scale gold mining sector is the largest contributor to mercury pollution globally (UNEP, 2018). Even in gold extraction processes that do not include the deliberate use of mercury for amalgamation, significant releases of mercury may still occur as mercury tends to be naturally present in trace amounts of gold ore (UNEP, 2019a). Therefore, if gold mining activities are taking place within a country, operations should be monitored and regulated to ensure mercury releases are managed.

Data Collection and Assessment

In Belize, the potential for gold mining is being explored. Currently, a mining company has been granted Environmental Clearance to conduct non-intrusive prospecting in certain areas and to conduct gold mining operations in the areas of Ceibo Grande, South Chiquibul and Smokey Branch in Belize. The use of chemicals such as mercury and sodium cyanide for placer gold extraction from alluvial soils is strictly prohibited and all mining activities must be approved by the Mining Unit of the Ministry of Natural Resources.

No data on the quantities of gold extracted have been made available, however if further gold mining activities are planned for Belize, the obligations of the Minamata Convention on Mercury should be considered to ensure sound management of potential mercury releases.

2.4 Data and Inventory on Other Materials and Minerals

2.4.1 Lime Production

Lime is produced from the calcination of limestone, which is a process that involves the combustion of calcium carbonate at high temperatures. Mercury, typically naturally present in limestone deposits, may be released to the environment (mainly air) during this combustion process. The type of fuel used for combustion can also contribute to mercury releases, depending on the fuel's mercury content. Trace amounts of mercury may also be released in the by-products or impurities produced during the process.

In Belize, limestone is extracted from quarries located within the mountainous regions of the country and lime production occurs mainly along the Hummingbird Highway, St. Margaret Village in the Cayo District (Department of the Environment, 2019).

Data Collection and Assessment

The 2018 lime production value was 333.21 tonnes based on data obtained from the Industrial Processes and Produce Use, Greenhouse Gas Inventory 2018 (Department of the Environment, 2019). There has been no data on the potential levels of mercury that may be present in the lime production process in Belize. Using a default input factor of 0.06 g Hg per tonne of lime produced, an estimated mercury release of kg Hg was calculated from the process for 2018. Based on the amount of lime produced, mercury releases are not estimated to be significant, however, further assessments on mercury content in local limestone should be conducted if lime production increases in Belize. Table 10 provides the total mercury releases from the sector.

Table 10: Analysis of mercury inputs and outputs from lime production

Lime Production	Unit	Lime Production
Activity rate	Lime produced (t/y)	333.21
Input factor for phase	g Hg/t	0.06
Calculated input to phase	**Kg Hg/y**	**0.02**
Output distribution factors for phase:		
- Air	N/A	0.8
- Water	N/A	-
- Land	N/A	-
- Products	N/A	0.2
- General waste treatment	N/A	-
- Sector-specific waste treatment	N/A	-
Calculated outputs/releases to:		

Lime Production	Unit	Lime Production
- Air	Kg Hg/y	0.02
- Water	Kg Hg/y	-
- Land	Kg Hg/y	-
- Products	Kg Hg/y	0.00
- General waste treatment	Kg Hg/y	-
- Sector specific waste treatment	Kg Hg/y	-

2.4.2 Other minerals and materials- Dolomite Production

In the Toledo District of Belize, Belize Minerals Ltd produces dolomite, an anhydrous carbonate mineral which may naturally be associated with cinnabar (mercury [II] sulfide). Dolomite is used in Belize mainly in the agricultural sector to regulate pH conditions as it raises pH and is a quality source of calcium and magnesium (Department of the Environment, 2019).

Data Collection and Assessment

For the year 2018, dolomite production was estimated as 2,540.5 tonnes, though it should be noted that over the period 2010-2018, dolomite production fluctuated with lower production values being recorded in 2011 (243 tonnes) and in 2017 (484 tonnes).

There has been no data on the potential levels of mercury that may be present in the dolomite production process in Belize and globally, little data exists. Within the Toolkit, estimations were not available for the input factor of mercury per tonne of dolomite produced or the calculated output factors for the various release pathways. As such, the estimated amount of mercury was not calculated. Further assessments should be conducted to determine potential mercury concentrations released from this activity.

2.5 Data and Inventory on Consumer Products with Intentional Use of Mercury

Several products make use of mercury's properties to support their functions. The major product groups in which mercury is added intentionally are thermometers, fluorescent light bulbs, some batteries, older types of electrical switches and relays, and some manometers and pressure gauges.

Releases take place during production, depending on how closed the manufacturing systems are, and on the handling and workplace procedures in the individual production units; during use, when products are broken or damaged; during disposal of the products after use (directly to soil through landfills and informal dumping sites, to the air via waste incineration and informal burning, and to water through wastewater treatment, landfill leachate and runoff) according to the types and efficiency of waste collection and handling procedures implemented (UNEP, 2019a).

Under Article 4 of the Minamata Convention on Mercury, Parties must phase out the manufacture, import and export of certain mercury- added products listed under Annex A by the year 2020.

In Belize, no production of products containing mercury occurs. However, items are imported, used and disposed of locally. Annex 3 of this report provides the raw data obtained for data entry of this category.

2.5.1 Use and Disposal of Thermometers

Thermometers (medical, ambient air, industrial and special, other glass thermometers) are instruments used to measure the temperature of a system. Mercury is used in thermometers due to its various properties such as a high boiling point and high coefficient of expansion (UNEP, 2019). As the temperature changes, the mercury expands or contracts within the tube, and the temperature can be recorded manually or automatically using a standardized scale on a thermometer. Mercury thermometers are used in various fields such as the medical, education and industrial sectors. Various alternatives are available such as mercury-free liquid-in glass thermometers, dial thermometers, electronic thermometers and infrared thermometers (COWI and Concord East/West, 2008).

Since the mercury in thermometers is contained within a sealed containment, it does not pose any risk during use. However, once broken or cracked, the mercury contained within can be emitted to the air as vapours or released to the land and to water (UNEP, 2019a).

Data Collection and Assessment

For the inventory, Custom data for the year 2018 was used to estimate mercury releases. It was assumed that the total number of thermometers under the Harmonised System (HS) Code 9025 1100 (liquid-filled thermometers) were mercury containing for the purpose of the inventory. Imports were recorded from China, Japan and the United States of America. For 2018, 879 thermometers were imported according to Customs data, however Figure 5 illustrates the fluctuating trend in liquid-filled thermometer imports from 2015 -2019.

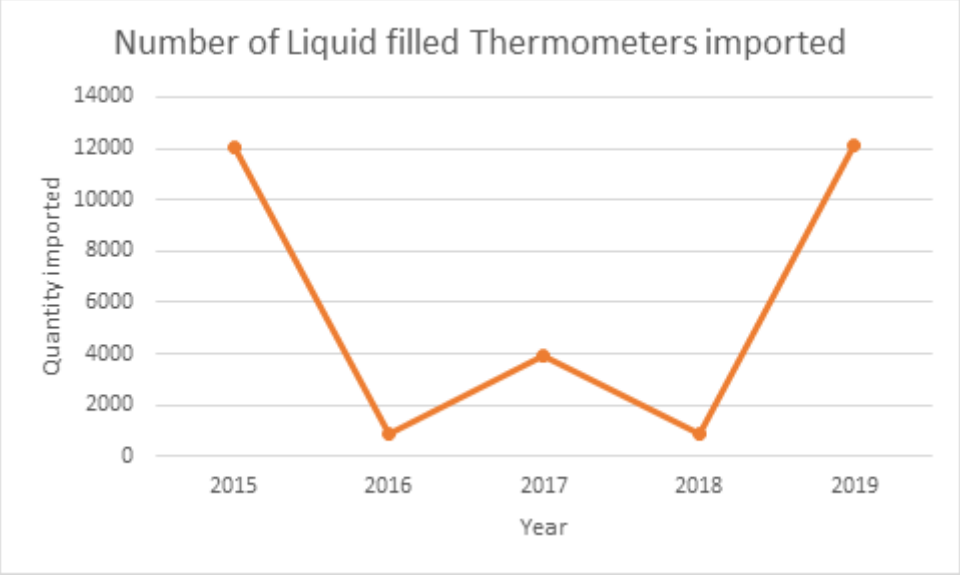

Figure 5: Graph showing number of liquid filled thermometers (HS Code 9025 1100) imported between 2015-2019 in Belize

In Belize, mercury-free clinical thermometers are recorded under the HS Code 9025 1900 (Figure 6). The number of imported liquid filled thermometers compared against the number of mercury-free clinical thermometers indicated that mercury-free thermometer imports were highest in 2018 before dropping in 2019 while the number of liquid-filled thermometers (assumed to be mercury-containing) increased in 2019. The continued trends and potential influencing factors should be considered in future assessments.

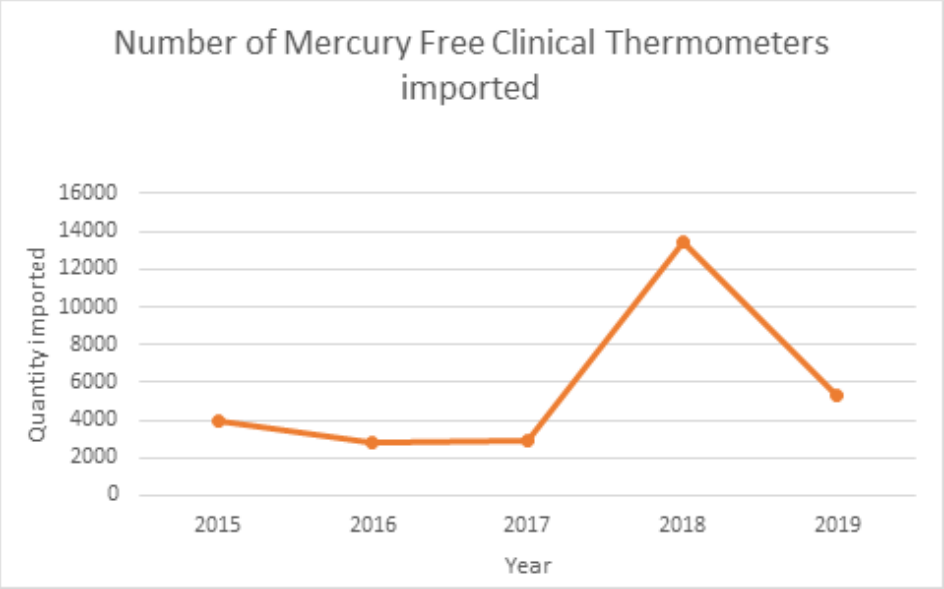

Figure 6: Graph showing number of mercury free clinical thermometers (HS Code 9025 190000) imported between 2015-2019 in Belize

There is no local data for the quantities of mercury contained in these medical thermometers, and therefore, the default mercury input factor from the Toolkit was used to calculate the estimated mercury input to society, 0.88 Kg Hg/y. There is no separate collection of thermometers with mercury, but waste handling is controlled. Some thermometers used in medical facilities may be incinerated with other biomedical wastes, however, as the quantity of thermometers was not confirmed, it was assumed that all were disposed of in general disposal.

The summary of input and output factors used to estimate the inputs and releases of mercury from the use and disposal of medical thermometers is shown in Table 11.

Table 11: Analysis of mercury inputs and outputs from the use and disposal of thermometers with mercury

Thermometers with Mercury	Unit	Use and Disposal of Medical Thermometers
Activity rate	Items/y	879
Input factor for phase	g Hg/item	1
Calculated input to phase	**Kg Hg/y**	**0.88**
Output distribution factors for phase:		
- Air	N/A	0.1
- Water	N/A	0.3
- Land	-	-
- Products	-	-
- General waste treatment	N/A	0.6
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	0.09
- Water	Kg Hg/y	0.26
- Land	-	-
- Products	-	-
- General waste treatment	Kg Hg/y	0.53
- Sector specific waste treatment	-	-

2.5.2 Use and Disposal of Electrical Switches and Relays

Mercury is used in some electrical switches and relays found in various electronic equipment due to its high density, conductivity and sensitivity to temperature. The elemental mercury within electrical switches and relays expands or contracts in order to open or close a valve. It can also be used to make electrical connections within switches during their operation (UNEP, 2019a).

The most common use of elemental mercury is in tilt switches or "silent" switches which are used in numerous products including silent electric wall switches, electric switches for thermostats used in residential and commercial heating, antilock braking systems and active ride-control systems in vehicles and convenience lights (such as those used in car trunks when opened). Another type of switch is the "float" switch which is used in pumps to activate or deactivate equipment (UNEP, 2019a).

Relays, electrically controlled switches, are used in high current lighting and heating (displacement relays), small circuit controls for low voltage electronic devices primarily used in test, calibration and measurement equipment (wetted read relays). Although mercury relays may be widely used, their total mercury consumption has been relatively small compared to the mercury switches (UNEP, 2019a).

Globally, mercury-free switches and relays have become more popular over the past twenty (20) years, but the status and extent of substitution varies between countries (UNEP, 2019a). Further, due to the long service life of mercury switches and relays (ranging from 10-50 years, primarily based on the life span of the equipment in which the switch or relay is contained), mercury from these items is expected to be present in wastes for many years despite the use of alternative products.

Mercury contained in electrical switches and relays does not pose a risk to human health and the environment when the items are intact as a tight seal prevents the release of mercury. However, mercury becomes a hazard when the products are damaged and the seal is broken thus allowing elemental mercury to be emitted into the atmosphere as vapours, or into waterways or the land.

In Belize, electrical switches and relays may be present as components of the range of electronic equipment mentioned above. Although imported switches and relays may not contain mercury due to the increased global popularity of mercury free options, mercury containing items may be included in older equipment and homes. With regard to disposal, the products containing switches and relays are disposed of in general waste.

Data Collection and Assessment

Specific data on the number of electrical switches and relays in use and disposed of in Belize and their mercury content was not available as these items are included as components of a large range of equipment and are typically not quantified. Therefore, default Toolkit calculations were used to estimate mercury input to society and output from this category. The calculations developed under the Toolkit utilized the number of inhabitants and the percent electrification rate from 1998 to give a more accurate estimation of the historical consumption and infer the 2018 disposal rates based on the estimated 20-year lifespan of these products. These values were 230,244 residents and 78% electrification rate (World Bank, 2019).

According to the Toolkit estimations, approximately 25.14 Kg Hg/y is input to Belize from the use and disposal of electrical switches and relays. There is no separate collection of these items and waste handling is controlled. As such, it was estimated that 2.51 Kg Hg/y is

released each to air and to the land each, while the majority of the estimated mercury (20.11 Kg Hg/y) is released to general waste. The summary of estimated releases of mercury in electrical switches and relays is shown in Table 12.

Table 12: Analysis of mercury inputs and outputs from the use and disposal of electrical switches and relays with mercury

Electrical Switches and Relays with Mercury	Unit	Use and Disposal
Activity rate	inhabitants	230,244
	% of population with access to electricity	78
Input factor for phase	g Hg/(y*inhabitant)	0.14
Calculated input to phase	**Kg Hg/y**	**25.14**
Output distribution factors for phase:		
- Air	N/A	0.1
- Water	-	-
- Land	N/A	0.1
- Products	-	-
- General waste treatment	N/A	0.8
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	2.51
- Water	-	-
- Land	Kg Hg/y	2.51
- Products	-	-
- General waste treatment	Kg Hg/y	20.11
- Sector specific waste treatment	-	-

2.5.3 Use and Disposal of Light Sources

Small amounts of mercury are used in various discharge lamps including linear fluorescent tubes (LFLs), compact fluorescent lamps (CFLs), mercury vapour lamps, high-pressure sodium lamps and metal halide lamps. CFLs and LFLs are typically used for general lighting in residences and buildings, while high-pressure sodium lamps and metal halide lamps can be used in streetlights and lights utilized in stadiums. The amount of mercury contained in these light sources vary and depend on the type of bulb.

Mercury is not considered a threat to the environment when it is contained within the glass tube of the bulbs. When the bulbs and lamps are broken, however, vapour-phase elemental mercury, liquid mercury and mercury absorbed onto phosphor powder which coats the inside surface of the tube can be released into the environment. Small amounts of mercury could also be released from pieces of the glass and other components of the lamps that are contaminated with the mercury (UNEP, 2019a).

Lighting products containing mercury are not produced in Belize, however, they are imported from countries including China.

Data Collection and Assessment

Customs data from 2015-2019 was obtained for analysis. For the purpose of the inventory Toolkit, data from 2018 was used to estimate mercury releases. Due to assumptions made for Customs Data as illustrated in Table 13 imports of lighting sources over the period 2015 - 2019 were not compared as confirmation on the number of imports that were mercury-containing over the years could not be obtained.

Table 13: Assumptions made in Data used for Input in Toolkit to Estimate Mercury Releases for Lighting Products

Toolkit Source Category for Lighting Products	2018 Customs Data Used	Assumptions made
Fluorescent Tubes (double ended)	73,826 items imported under HS Code 8539 3110 (Discharge Lamps, fluorescent, hot cathode with double ended cap)	All items imported under HS Code were mercury containing fluorescent tubes (double ended).
Compact Fluorescent Lamp (CFL single end)	79,117 items imported under HS Code 8539 3910 (Low energy consumption lamps)	All items imported under HS Code were mercury containing CFLs (single ended)
High pressure mercury vapour lamps High pressure sodium lamps Metal Halide Lamps	4,987 items imported under HS Code 8539 3200 (mercury or sodium vapour lamps; metal halide lamps)	As the HS Code covered three (3) types of bulbs, a questionnaire was sent to a hardware retail store to assist in extrapolating values from Customs data for each type. According to the retail store questionnaire response, a total of 270 mercury vapour, sodium and metal halide lamps were sold in a year. Of the number sold, 55.6% sold were high pressure mercury vapour; 22.2% sold were high pressure sodium and; 22.2% were metal halide lamps. These percentages were applied to the Customs Data value to extrapolate the following estimates for entry into the Toolkit: • High pressure mercury vapour lamps (2,771 items) • High pressure sodium lamps (1,108 items) • Metal Halide Lamps (1,108 items)
UV Light for Tanning	7,987 items imported under HS Code 8539 4900 (UV or IR lamps excluding arc lamps)	All items imported under HS Code were mercury containing UV lights used for tanning

Default Toolkit calculations were used to estimate mercury input to society and output from this category and estimated releases are outline in Table 14 below. Estimated releases from all light sources was 1.08 kg Hg/y for the year 2018 with the majority of releases being to general waste treatment (1.03 kg Hg/y) as in Belize there is not typically any separate waste collection for spent light bulbs.

It should be noted that in Belize, mercury vapour lamps were used in street lighting. According to the Belize Electricity Limited, technicians in all six districts of Belize are responsible for replacing mercury vapour street lamps with mercury-free and energy efficient Light Emitting Diodes (LEDs). Dismantled mercury vapour lamps are sold to private recyclers specified in mercury vapour lamp management for sound disposal.

Table 14: Analysis of mercury inputs and outputs from the use and disposal of light sources with mercury

Light Sources with Mercury	Unit	Use and Disposal					
		Fluorescent Tubes	Compact Fluorescent Lamps	High-Pressure Mercury Vapour	High-Pressure Sodium Lamps	Metal Halide Lamps	UV Light for Tanning
Activity rate	Items/y	73,826	79,117	2,771	1,108	1,108	7,987
Input factor for phase	mg Hg/item	8	2.7	40	20	25	15
Calculated input to phase	**Kg Hg/y**	**0.59**	**0.21**	**0.11**	**0.02**	**0.03**	**0.12**
Total Calculated Input to phase (No separate collection; waste handling controlled)	Kg Hg/y	**1.08**					
Output distribution factors for phase:							
- Air	N/A	0.05					
- Water	-	-					
- Land	-	-					
- Products	-	-					
- General waste treatment	N/A	0.95					
- Sector specific waste treatment	-	-					
Calculated outputs/releases to:							
- Air	Kg Hg/y	0.05					
- Water	-	-					
- Land	-	-					
- Products	-	-					
- General waste treatment	Kg Hg/y	1.03					
- Sector specific waste treatment	-	-					

2.5.4 Use and Disposal of Batteries

Batteries are among the largest product uses of mercury (UNEP, 2019a). Primary, non-rechargeable batteries which contain mercury include mercury oxide batteries, some cylindrical alkaline batteries, and some button cell batteries (alkaline, zinc/air, silver oxide) which are used to provide power in small portable electronics such as calculators and wrist watches. High concentrations of mercury (30-32% w/w) have been used in the positive electrode in button cells, larger cylindrical and other shaped mercury oxide batteries used in hospitals, military facilities and commercial appliances (Zero Mercury Working Group, n.d.). About 0.25 mg of mercury are added to the zinc-air, alkaline and silver-oxide batteries to prevent the formation of internal gases (Zero Mercury Working Group, n.d.).

The use of mercury in batteries does not pose a threat to human health or the environment once the batteries are intact. Mercury only becomes a hazard when the batteries are broken allowing elemental mercury to be released into the atmosphere as vapours, and into land and general waste. Due to the risks associated with the exposure of mercury from batteries, some countries have prohibited the marketing of mercury oxide batteries

and other batteries with mercury for purposes other than specified exemptions such as military uses (UNEP, 2019a).

In Belize, batteries are imported for use in various equipment and applications. There is no separate collection of batteries for disposal.

Data Collection and Assessment

Customs data from 2015-2019 was obtained and for the purpose of the inventory Toolkit, data from 2018 was used to estimate mercury releases from the sector.

Customs data provided information on the number of batteries imported per year, however for the inventory, data for batteries were input in tonnes (t) per year using the unit conversion factors available in the Toolkit as shown in Table 15.

Table 15: Calculated Activity Rates Used in the Toolkit for Batteries

Toolkit Source Categories for Batteries	Items Imported in 2018 according to Customs Data (items/y)	Conversion Factor (Kg/item)	Calculated Activity Rate Used in Toolkit (t/y)
Mercury Oxide/Mercury-Zinc Batteries	102	0.0012	0.00
Zinc-air Button Cells	21	0.0012	0.00
Alkaline Button Cells	2,950	0.0012	0.004
Silver Oxide Button Cells	55	0.0012	0.00
Alkaline, other than button*1	78,852 (for the purpose of the inventory calculations it was assumed that of the total items imported, 25% were AA battery cells; 25% were AAA battery cells; 25% were C battery cells and; 25% were D battery cells)	0.023 (AA battery cell)	0.453
		0.011 (AAA battery cell)	0.217
		0.066 (C battery cell)	1.301
		0.139 (D battery cell)	2.740

*1 Total Calculated Activity Rate for the category, “Alkaline, other than button” was estimated to be 4.711 t/y.

It was assumed that all batteries were mercury-containing and as this was not able to be confirmed, trends in imports of batteries over the period 2015 – 2019, was only assessed for Mercury Oxide batteries which are confirmed to contain mercury. As seen in Figure 7, the import of mercury oxide primary cells/batteries were the highest in 2018 and while in 2019 imports decreased, they were still high compared to previous years. The reason for this trend is unclear and should be considered in future assessments to inform recommendations for mercury management.

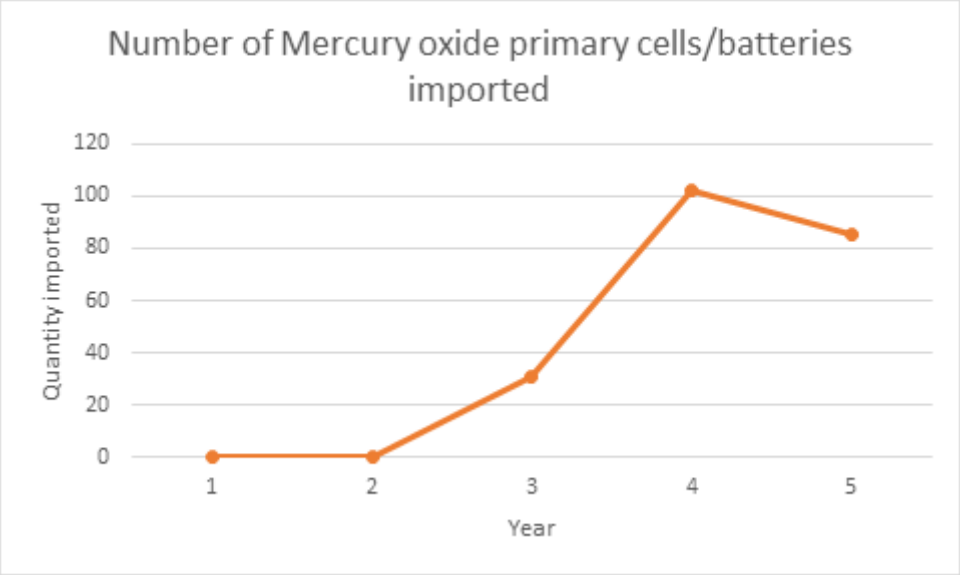

Figure 7: Graph showing number of mercury oxide primary cells/batteries (HS Code 8506 3000) imported between 2015-2019 in Belize

According to Toolkit estimations as shown in Table 16, as there is no separate collection of batteries for disposal, but waste handling is controlled in Belize's sanitary landfill, 1.20 kg Hg/y were released to general waste treatment.

Table 16: Analysis of mercury inputs and outputs from the use and disposal of batteries with mercury

Batteries with Mercury	Unit	Use and Disposal				
		Mercury oxide	Zinc-air button cells	Alkaline button cells	Silver oxide button cells	Alkaline, other than button cell shapes
Activity rate	t/y	0.00	0.00	0.004	0.00	4.711
Input factor for phase	kg Hg/t	320	12	5	4	0.25
Calculated input to phase	**Kg Hg/y**	**0.00**	**0.00**	**0.02**	**0.00**	**1.18**
Total Calculated Input to phase (no separate collection; waste handling controlled)	Kg Hg/y	**1.20**				
Output distribution factors for phase:						
- Air	N/A	-				
- Water	-	-				
- Land	-	-				
- Products	-	-				
- General waste treatment	N/A	1				
- Sector specific waste treatment	-	-				
Calculated outputs/releases to:						
- Air	Kg Hg/y	-				
- Water	-	-				
- Land	-	-				
- Products	-	-				
- General waste treatment	Kg Hg/y	1.20				
- Sector specific waste treatment	-	-				

2.5.5 Use and Disposal Polyurethane with mercury catalysts

Polyurethane is used in the manufacture of products including high resilience foam seating, high performance adhesives, surface coating and sealants, synthetic fibres, and durable wheels for products, such as shopping carts, escalators and elevators. The production of polyurethane materials may involve the use of organic mercury compounds as catalysts to harden or cure the polyurethane materials. The catalyst may become embedded in the structure of the compound and remain in the final product where it may be released to the environment during use or disposal (UNEP, 2019a).

Data Collection and Assessment

Specific data on the use and disposal of polyurethane in Belize could not be obtained due to the many possible uses of polyurethane in other products and equipment that cover a wide range including rollers, flooring, gaskets, encapsulation of electronic components, shoe soles, shock absorption and repair of industrial installations. For the purpose of the inventory, default Toolkit calculations were used to estimate mercury input to society and output from this category. The calculations utilized the number of inhabitants and the percent electrification rate from 2018. These values were 383,071 residents and 98.3% electrification rate (World Bank, 2019).

According to the Toolkit estimations, approximately 11.30 Kg Hg/y is input to Belize from the use and disposal of polyurethane with mercury catalysts. There is no separate collection of these items and waste handling is controlled. As such, it was estimated that the majority of releases (9.61 kg Hg/y) are released to general waste while minor releases to air and water occur. The summary of estimated releases of mercury in polyurethane with mercury catalysts is shown in Table 17.

Table 17: Analysis of mercury inputs and outputs from the use and disposal of polyurethane with mercury catalysts

Polyurethane with mercury catalysts	Unit	Use and Disposal
Activity rate	inhabitants	383,071
	% of population with access to electricity	98.3
Input factor for phase	g Hg/(y*inhabitant)	0.03
Calculated input to phase	**Kg Hg/y**	**11.30**
Output distribution factors for phase:		
- Air	N/A	0.10
- Water	N/A	0.05
- Land	-	-
- Products	-	-
- General waste treatment	N/A	0.85
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	1.13
- Water	Kg Hg/y	0.57
- Land		-
- Products	-	-
- General waste treatment	Kg Hg/y	9.61
- Sector specific waste treatment	-	-

2.6 Data and Inventory on Other Intentional Product/Process Use

2.6.1 Dental mercury-amalgam Fillings

Dental amalgam is used to fill cavities caused by tooth decay. It consists of a mixture of metals including liquid elemental mercury (which makes up approximately 50% of the amalgam by weight), silver, copper and tin (U.S. FDA, 2017). Due to its chemical properties, mercury can bind readily to the other metals in order to form the amalgam.

Amalgam can be delivered to dentists as pure mercury and a powder mix of the other metals which must be separately weighed out in the right proportions and mixed in an agitator at the clinic; or as a small capsule containing the required proportions of mercury and other metals that need only be mixed before application to the cavity. In general, mercury amalgam fillings can last between 10-20 years.

Mercury releases from dental amalgam fillings occur to the air, water and waste during the production of amalgam at factories; when amalgam is being prepared, placed, shaped or repaired at clinics; through natural wearing away in a person's mouth; during disposal of the amalgam after it is removed; and when a person with amalgam is buried or cremated after death (UNEP, 2019).

Data Collection and Assessment

In Belize, it has been noted that the use of mercury-amalgam fillings is very minimal country-wide as composite fillings have become more common and widely available. According to the Ministry of Health, approximately half of government dental chairs have been equipped with re-usable chair side trap filters to trap residues generated during placement of fillings. Waste generated is disposed of general disposal.

As dentists do not typically record the number of dental amalgam fillings conducted in their practices, for the inventory, default calculations derived from the Toolkit were used to obtain an estimate of mercury input to society. These calculations utilized the number of dentists per 1,000 inhabitants (estimated to be 0.1333 for Belize according to the Toolkit) as well as the number of inhabitants.

Population data from 2018 was used to calculate the mercury input from the preparation of dental amalgam fillings at dental clinics in Belize. Mercury input and releases occurring from the use of amalgam fillings in 2018 were expected to have been from amalgam placed 10 years prior in 2008 since mercury amalgam can last between 10-20 years before needing to be replaced. Mercury input from the disposal of dental amalgam in 2018 was calculated using the country's population from 20 years prior, 1998, due to the life expectancy of the fillings. Population data was sourced from available World Bank Database (2019).

According to the Toolkit, about 12.32 Kg Hg/y, 9.86 Kg Hg/y and 7.40 Kg Hg/y were input to society from dental amalgam prepared and placed in 2018, 2008 and 1998, respectively. Releases of mercury from dental amalgam fillings occur gradually over time and would not all be accounted for in the preparation year. Therefore, the overall input of mercury to society from the preparation, placement, use and disposal of dental amalgam in 2018 was calculated to be approximately 9.42 Kg Hg/y once double-counting assumptions were accounted for. The summary of estimated inputs and releases of mercury from dental amalgam is provided in Table 18.

Due to the phasing out of mercury amalgam, estimated releases from this sector are expected to be reduced in further years.

Table 18: Analysis of mercury inputs and outputs from the preparation, use and disposal of dental amalgam in 2018

Dental Mercury-Amalgam Fillings	Unit	Preparation	Use	Disposal
Activity rate	inhabitants	383,071 (2018)	306,823 (2008)	230,244 (1998)
Input factor for phase	g Hg/(y*inh)	0.2	0.2	0.2
Calculated input to phase	**Kg Hg/y**	**12.32**	**9.86**	**7.40**
Output distribution factors for phase:				
- Air	N/A	0.02	-	-
- Water	N/A	0.14	0.02	0.28
- Land	N/A	-	-	0.08
- Products	N/A	-	-	0.06
- General waste treatment	N/A	0.12	-	0.08
- Sector specific waste treatment	N/A	0.12	-	0.08
Calculated outputs/releases to:				
- Air	Kg Hg/y	0.25	-	-
- Water	Kg Hg/y	1.72	0.20	2.07
- Land	Kg Hg/y	-	-	0.59
- Products	Kg Hg/y	-	-	0.44
- General waste treatment	Kg Hg/y	1.48	-	0.59
- Sector specific waste treatment	Kg Hg/y	1.48	-	0.59

2.6.2 Use and Disposal of Manometer and Gauges

Mercury is used in some manometers, gauges, pressure valves and other measuring devices (UNEP, 2019a). Its historical use in these products is due to its non-evaporating quality under normal conditions and its high and stable density (National Programme on Technology Enhanced Learning (NPTEL), n.d.). Globally, mercury containing equipment are being substituted by mercury-free alternatives.

Data Collection and Assessment

Specific data on the number of medical blood pressure gauges imported and used in Belize in 2018 was not obtained for this inventory due to difficulties in differentiating mercury-containing from mercury-free blood pressure gauges under the HS Codes provided. However, it has been noted that mercury-free medical blood pressure gauges have become more common throughout Belize and as such the estimated releases from this product are expected to be low. In order to determine mercury releases from other manometers used in industry and equipment, default calculations for mercury input from the use and disposal of other manometers were used. 2018 population data (383,071) and electricity rates (98.3%) were used (World Bank, 2019).

The total input from the use and disposal of other manometers (not including medical devices) in 2018 was estimated to be 1.88 Kg Hg/y. According to the default output distribution factors derived from the Toolkit, 1.13 Kg of mercury per year is released into the general waste, while 0.19 and 0.56 Kg of mercury per year are released to the air and water, respectively, from the use and disposal of manometers and gauges since no separate collection occurs with controlled waste handling.

A summary of estimated mercury releases from manometers and gauges is shown in Table 19.

Table 19: Analysis of mercury inputs and outputs from the use and disposal of manometers and gauges with mercury

Manometers and Gauges with Mercury	Unit	Use and Disposal of Other Manometers
Activity rate	inhabitants	383,071
Input factor for phase	Percent of population with access to electricity	98.3
	g Hg/y*inhabitant	0.005
Calculated input to phase	**Kg Hg/y**	**1.88**
Output distribution factors for phase:		
- Air	N/A	0.1
- Water	N/A	0.3
- Land	-	-
- Products	-	-
- General waste treatment	N/A	0.6
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	0.19
- Water	Kg Hg/y	0.56
- Land	-	-
- Products	-	-
- General waste treatment	Kg Hg/y	1.13
- Sector specific waste treatment	-	-

2.6.3 Use and Disposal of Laboratory Chemicals and Equipment

Mercury is used in laboratories as components of instruments and equipment, reagents, preservatives and catalysts (UNEP, 2019a). Some laboratory chemicals which contain mercury include mercury oxide (HgO), mercury chloride (HgCl2), mercury sulfate (HgSO4), and others which may be used in different experiments or for the preparation of other chemicals.

Globally, the total mercury content in many of the chemicals used in laboratories is low. Further, some mercury- added instruments and some methods using mercury have been substituted by mercury-free alternatives due to increasing availabilities of alternatives and awareness of the related risks (COWI and Concord East/West, 2008).

Mercury and mercury containing products used in various laboratories and schools in Belize may be imported. The mercury within the chemicals and equipment in laboratories can be released to various pathways during their life-cycle. Mercury vapours can be released from chemicals during use and when stockpiled or disposed improperly at the landfills and into waterways.

Data Collection and Assessment

Data on the volumes and numbers of laboratory chemicals and equipment imported for Belize could not be verified at the time of the inventory due to the difficulties in differentiating mercury-containing from mercury-free products based on the HS Codes provided. Default calculations made available in the Toolkit were used to estimate releases based on global references available.

The 2018 population data and electrification rate were used as the activity rate in these default calculations. The default input factors of 0.01 and 0.04 grams

of mercury per year per inhabitant were used to estimate the mercury input to society from laboratory chemicals and other lab equipment, respectively. Default output factors from the Toolkit were used to estimate mercury releases.

The mercury input to Belize from the use and disposal of laboratory chemicals and equipment containing mercury was determined to be approximately 18.83 Kg Hg/y in total. A summary of mercury inputs and releases to each category is provided in Table 20.

Further assessments to assist in the accurate quantification of the mercury-containing chemicals and equipment used in Belize is necessary to accurately approximate the amount of mercury being released into the environment from this source.

The implementation of a proper management system for the use and disposal of chemicals and equipment containing mercury within schools and laboratories in the nation is needed to aid in data collection.

Table 20: Analysis of mercury inputs and outputs from the use and disposal of laboratory chemicals and equipment with mercury

Laboratory Chemicals and Equipment with Mercury	Unit	Use and Disposal	
		Laboratory Chemicals	Other Laboratory Equipment
Activity rate	inhabitants	383,071	383,071
Electrification Rate	% of population with access to electricity (2018)	98.3	98.3
Input factor for phase	g Hg/y*inhabitant	0.01	0.04
Calculated input to phase	**Kg Hg/y**	**3.77**	**15.06**
Output distribution factors for phase:			
- Air	-	-	-
- Water	N/A	0.33	0.33
- Land	-	-	-
- Products	-	-	-
- General waste treatment	N/A	0.33	0.33
- Sector specific waste treatment	N/A	0.34	0.34
Calculated outputs/releases to:			
- Air	-	-	-
- Water	Kg Hg/y	1.24	4.97
- Land	-	-	-
- Products	-	-	-
- General waste treatment	Kg Hg/y	1.24	4.97
- Sector specific waste treatment	Kg Hg/y	1.28	5.12

2.7 Data and Inventory on Waste Incineration

2.7.1 Incineration of Municipal/General Waste

The mercury content for municipal/general waste may be from discarded MAPs and process waste; natural mercury impurities in high volume materials such as paper and minerals; and mercury as a human-generated trace pollutant in high volume materials (UNEP, 2019a). Municipal solid waste may be incinerated under controlled conditions (using an incinerator with emission controls) in some cases and mercury content can range widely based on the type of waste present in a country. Some incinerators may generate

incinerator ash that needs to be disposed of in landfills. Due to the incineration process, typically all mercury that may have been present in the waste is expected to be converted to vapour due to high combustion temperatures (UNEP, 2019a).

Data Collection and Assessment

Incineration of municipal/general waste has been noted to occur on a minimal scale in Belize. Currently, there exists a private waste incineration company located in Belize City which specialises in mainly medical waste incineration, though general waste such as paper has also been noted to be incinerated on occasion. At the time of the inventory, updated data on the volumes of the different types of waste incinerated was not available. Data was obtained from the "Inventory report of unintentionally produced persistent organic pollutants (UPOPs) in Belize" (CARPHA, 2016) which noted the total volume of waste incinerated from the private waste incineration company being attributed to medical waste. Further assessments into the types of waste incinerated at that company should be done to inform future assessments on potential releases of mercury and other chemicals from municipal waste.

For the input of data for the inventory, volumes of waste incinerated in 2016 was obtained from the 2016 CARPHA Report. According to the report, it was estimated that approximately 13 tonnes of waste was incinerated as part of operations by the Belize Agricultural Health Authority (BAHA) to incinerate on an as-needed basis, confiscated high-risk products. As part of BAHA's quarantine inspection services at all points of entry for Belize, illegally imported and high risks products are confiscated and disposed of through burial in pits or incineration. Six (6) incinerators (Shenandoah Model A6-10 Incinerators) are owned by BAHA at the following locations: Benque Viejo Western Border, Santa Elena Northern Border, Phillip Goldson International Airport, Elridgeville Toledo, Placencia Stann Creek and the Central Investigation Laboratory. It was noted that the incinerators at the first three (3) locations mentioned were typically used on a more frequent basis, though due to the high volumes of fuel required for operations (approximately 5 gallons/hour), burial of waste in pits according to regulations was typically preferred. Waste incinerated may include illegally imported vegetables or meat products.

Based on 2016 data obtained, it was noted that there was a limited capacity to monitor emissions from the incinerators used but operations were guided in accordance to Best Practical Treatment methods to control or reduce emissions such as maintaining optimal operation temperatures and ensuring that electrostatic precipitator air pollution control systems were in place. Bottom ash generated was safely disposed of in the sanitary landfill. According to Table 21, it was estimated that mercury inputs were relatively low at 0.01 Kg Hg/y mainly being released to air.

Table 21: Analysis of mercury inputs and outputs from the incineration of municipal/general waste

Incineration of Municipal/General Waste	Unit	Incineration
Activity rate	Waste incinerated, t/y	13
Input factor for phase	g Hg/t waste incinerated	1
Calculated input to phase (Particulate Matter reduced, simple ESP, or similar)	**Kg Hg/y**	**0.01**
Output distribution factors for phase:		
- Air	N/A	0.9
- Water	-	-

Incineration of Municipal/General Waste	Unit	Incineration
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	N/A	0.1
Calculated outputs/releases to:		
- Air	Kg Hg/y	0.01
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	Kg Hg/y	0.00

2.7.2 Incineration of Medical Waste

Medical waste is any waste generated from medical activities taking place at hospitals, healthcare facilities, dental clinics, etc. Waste generated from these activities usually include human secretions, pharmaceuticals, packaging materials and various tools used in medical treatment. Incineration is usually used to destroy different toxins, pathogens and viruses contained within the waste (UNEP, 2019a). The concentration of mercury within incinerated waste is dependent on the amount of mercury contained in products and equipment included in the incinerated waste. These may include medical thermometers, blood pressure gauges, dental amalgam fillings and chemicals containing mercury.

Data Collection and Assessment

Updated data on medical waste incineration was not available at the time of the inventory. As such, 2016 estimations were obtained from the report, “"Inventory report of unintentionally produced persistent organic pollutants (UPOPs) in Belize" (CARPHA, 2016) and it was assumed that for the purpose of the inventory, 2016 and 2018 data would be comparable. Within all public health facilities in Belize, biomedical waste is separated at the source with red bags for any waste that has come into contact with blood, body fluids or other infectious materials; yellow bags for pathological/infectious waste and; green bags for municipal waste disposed of according to local municipal waste collection systems. Medical waste incinerators have been installed at several health facilities across Belize, however, the status of their operations is varying and should be confirmed for future assessments on mercury releases.

For the inventory, medical waste (red bag waste) collected from the Karl Heuser Memorial Hospital and incinerated at a private waste incineration company located in Belize City was estimated for the year 2016 as 78 tonnes. The incinerator owned by the private company listed operates with a thermal oxidizer with a capacity to burn 800 pounds of waste per hour. Mercury input from this activity was estimated to be 1.87 Kg Hg/y with the majority (1.68 Kg Hg/y) being released to air (Table 22).
It is recommended that future assessments take into consideration the waste incineration facilities throughout Belize to provide more accurate results in order to assess the issues posed by mercury due to these activities.

Table 22: Analysis of mercury inputs and outputs from the incineration of medical waste

Incineration of Medical Waste	Unit	Incineration
Activity rate	Waste incinerated, t/y	78
Input factor for phase	g Hg/t waste incinerated	24
Calculated input to phase (Particulate Matter reduced, simple ESP, or similar)	**Kg Hg/y**	**1.87**
Output distribution factors for phase:		
- Air	N/A	0.9
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	N/A	0.1
Calculated outputs/releases to:		
- Air	Kg Hg/y	1.68
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	Kg Hg/y	0.19

2.7.3 Open Waste Burning on Landfills and Informally

Informal waste burning is defined as waste incineration undertaken in informal conditions such as in barrels, containers, or on bare land without flue gas controls and the diffuse spreading of incineration residues on land (UNEP, 2019a). If mercury is present in the waste, part of it will be released to air, while the remainder in the incineration residues (including unburned and semi-degraded waste) have potential for additional releases to air, land, groundwater and surface waters. This waste disposal method may pose an immediate risk for the local community in which it takes place, because air emissions that may contain mercury and several other potent pollutants which are not controlled and the residues may cause contamination of the local groundwater (UNEP, 2019).

Data Collection and Assessment

In Belize, open burning of waste has been noted to occur however the frequency of this activity and the amount of garbage burnt is difficult to quantify. As a result, data from the open burning of general waste was not included in this assessment and further research should be conducted to quantify releases more accurately from this sector. For the purpose of the inventory, 2016 estimations were obtained from CARPHA 2016 Report, "Inventory report of unintentionally produced persistent organic pollutants (UPOPs) in Belize". According to the report, destruction of animal carcasses by open burning does occur by one of the two largest processors of meat in Belize. Based on calculations done in the report to determine the total weight of animal carcasses burned in a year using fuel, it was estimated that 412 tonnes of waste were burnt per year. The input of mercury due to this process was found to be 0.41 Kg Hg/y all released to air (Table 23). It is noted that due to the limited data available for this category, the assessment only represents a percentage of the probable mercury releases due to open burning. Future assessments should be conducted to more accurately quantify this sector.

Table 23: Analysis of mercury inputs and outputs from the open burning of waste (animal carcasses)

Incineration of Open Burning of Waste	Unit	Incineration
Activity rate	Waste burned, t/y	412
Input factor for phase	g Hg/t waste burned	1
Calculated input to phase	**Kg Hg/y**	**0.41**
Output distribution factors for phase:		
- Air	N/A	1.0
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	0.41
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-

2.8 Data and Inventory on Waste Deposition/Landfilling and Wastewater Treatment

2.8.1 Controlled Landfills

A sanitary landfill is an area for waste deposition which is specially designed to prevent releases and emissions of waste components to the environment. Some design attributes may include linings made up of impermeable materials such as clay or leachate ponds to isolate liquid components from the environment. Wastes deposited in landfills that do not have efficient built-in measures to prevent releases can lead to the contamination of surrounding areas with hazardous waste components including mercury (UNEP, 2019a).

The mercury content in the municipal waste may be due to discarded MAPs such as batteries and fluorescent lighting products (UNEP, 2019a). When the MAPs are damaged or broken, mercury contained within the item can be released into the air by evaporation. Small amounts of mercury can also be released into waterways.

Data Collection and Assessment

The Belize Regional Landfill located at Mile 24 on the George Price Highway is a sanitary engineered landfill which was inaugurated in 2013. According to a site visit conducted under the MIA Project in 2019, it was noted that approximately thirty (30) hectares of land has been allocated for the landfill, of which an estimated ten (10) hectares has been utilised. There are temporary stations around the country which collects waste and 18 – 24 trucks (per delivery) transport this waste to the engineered landfill, three days per week. The landfill has been lined and settling ponds have been established for collecting of liquid waste. Methane vents are also constructed to minimise unexpected fires. Recent data for the volumes of waste disposed of at the landfill were unavailable at the time of the inventory. Data obtained from "Inventory report of unintentionally produced persistent organic pollutants (UPOPs) in Belize" (CARPHA, 2016) provided estimates for volumes of waste generated in 2015 (130,000 tonnes) according to the population size. Using World Bank data, the population of Belize in 2015 versus 2018 was 360,933 inhabitants and 383,071 respectively, indicating a population increase of 5.78% over the years listed. This percentage was

applied to the amount of waste generated in 2015 to estimate the volumes assumed for 2018 (137,514 tonnes calculated). This value was input in the inventory (as seen in Table 24) to calculate an estimated 275 Kg Hg/y being input due to this sector. When calculations were adjusted to account for double-counting of mercury inputs due to other categories, it was determined that total releases to the environment were 2.75 Kg Hg/y (to air) and 0.03 Kg Hg/y (to water).

Table 24: Analysis of mercury inputs and outputs from controlled landfills/ deposits

Controlled Landfills/ Deposits	Unit	Controlled Landfills
Activity rate	Waste landfilled, t/y	137,514
Input factor for phase	g Hg/t waste	2
Calculated input to phase	**Kg Hg/y**	**275**
Output distribution factors for phase:		
- Air	N/A	0.01
- Water	N/A	0.0001
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	2.75
-Water	Kg Hg/y	0.03
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-

2.8.2 Informal Dumping of General Waste

This relates to disposal of general waste in the absence of safeguards preventing the release of pollutants into the environment (UNEP, 2019a). Residential, green and construction waste represent the major waste types dumped. Though illegal, informal dumping has been noted to occur in Belize. The amount of general waste informally dumped was unable to be quantified at the time of the inventory and it is unknown whether this practice presents a potential mercury danger to groundwater or the local community. Further assessments on the locations and quantification of informal dumping of waste should be conducted.

2.8.3 Wastewater System/Treatment

Mercury in wastewater originates from the two main source groups:

- Intentionally used mercury in products and processes such as dental amalgams, broken thermometers and other devices, and industrial discharges; and
- Atmospheric mercury, originating from both natural and anthropogenic sources that is washed out by precipitation which makes its way into soil, surface and groundwater.

Wastewater systems are an intermediate mercury release pathway, where the mercury will either be released into the waterways after the treatment of wastewater or distributed through sludge as fertiliser on land or as waste deposited at a landfill (UNEP, 2019a).

Wastewater treatment processes can include different stages - primary (involves mechanical filtration of debris, sand and sludge); secondary (involves clarification

and disinfection through processes involving chlorine or ultraviolet light) and; tertiary (involving nutrient removal).

Data Collection and Assessment

In Belize, wastewater treatment occurs by the national water and sewerage utility, Belize Water Services Limited which currently operates sewerage systems in Belmopan, Belize City and San Pedro Town. In Belmopan, the primary treatment plant consists of a settling tank and four (4) sludge drying beds. Sludge is deposited onto drying beds for agricultural land application. In Belize City, wastewater treatment utilises a two-cell facultative lagoon system with treated effluent being released through canals cut through a mangrove wetland to the Caribbean Sea. In San Pedro Town, the wastewater treatment system includes two facultative ponds and one maturation pond with permeable layers located at the bottom to treat sewage. The treated effluent is released to the mangrove wetland through a dispersion pipe prior to final disposal into the Caribbean Sea (Belize Water Services Ltd, 2020).

For the inventory, data was obtained from the Belize Water Services Limited official website for municipal wastewater. Calculations were made to estimate the total wastewater generated in a year as shown in the table below.

Table 25: Calculated Total Wastewater Generated per Year

Location	Wastewater Generated Per Day (Gallons/day)	
Belize City	1,500,000	
San Pedro Town	160,000	
Belmopan	200,000	
TOTAL	1,860,000	
Conversion Estimate of Wastewater Generated per day (m^3/day)		7,041
Estimated Wastewater Generated per year (m^3/year)		**2,569,965**

The calculated input of mercury was estimated based on the assumption that the total volume of waste had mechanical and biological (activated sludge) treatment with 40% of sludge being used for land application as seen in Table 26. Estimated input was calculated to be 13 Kg Hg/y with releases being to water (6.50 Kg Hg/y); land (2.60 Kg Hg/y); general waste (1.95 Kg Hg/y) and; sector-specific waste treatment (1.95 Kg Hg/y).

Table 26: Analysis of mercury inputs and outputs from Wastewater system/treatment

Wastewater System/Treatment	Unit	Wastewater System/Treatment
Activity rate	Wastewater, m^3/y	2,569,965
Input factor for phase	mg Hg/ m^3 wastewater	5.25
Calculated input to phase (mechanical and biological [activated sludge] treatment; 40% sludge used for land application)	**Kg Hg/y**	**13**
Output distribution factors for phase:		
- Air	-	-
- Water	N/A	0.5
- Land	N/A	0.2
- Products	-	-
- General waste treatment	N/A	0.15

Wastewater System/Treatment	Unit	Wastewater System/Treatment
- Sector specific waste treatment	N/A	0.15
Calculated outputs/releases to:		
- Air	-	-
-Water	Kg Hg/y	6.50
- Land	Kg Hg/y	2.60
- Products	-	-
- General waste treatment	Kg Hg/y	1.95
- Sector specific waste treatment	Kg Hg/y	1.95

2.9 Data and Inventory on Crematoria and Cemeteries

Mercury can accumulate in humans through the use of dental amalgam, exposure to mercury contained in products and intentionally used in processes, and consumption of mercury contaminated aquatic species. This mercury may be released after death when a corpse is cremated or buried.

2.9.1 Crematoria/Cremation

Data Collection and Assessment

Cremation is a method used for a smaller percent of the population in Belize. During a site visit conducted under the MIA Project in January 2019, operations at a private funeral home located in Belize City were observed. It was noted that the cremation furnace system, manufactured in the United States, had been in operation for approximately three years. The system has the capacity to heat up to a maximum of 2,204.4 ° C (4,000 ° F) but is typically operated between the range 760 – 926.7 ° C (1,400 – 1,700 ° F). Butane and propane gas are utilised for operations. In 2018, 67 cremations were recorded for the funeral home. Data for the inventory was obtained from the Ministry of Health who recorded a total of 102 cremations in 2018. While cremation typically occurred using cremation furnaces in funeral homes, a small number of cremations were noted to occur as open pyre burning. As shown in Table 27, the estimated mercury releases were solely to the air at 0.07 Kg Hg/y.

Table 27: Analysis of mercury inputs and outputs from crematoria/cremation

Crematoria/Cremation	Unit	Crematoria/Cremation
Activity rate	Corpses cremated/y	102
Input factor for phase	g Hg/corpse	4
Adjustment for dental personnel density as dental amalgam is the major contributor to mercury in the human body	Dentist per 1000 inhabitants, country	0.1333
Calculated input to phase	**Kg Hg/y**	**0.07**
Output distribution factors for phase:		
- Air	N/A	1
- Water	-	-
- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	Kg Hg/y	0.07
-Water	-	-

- Land	-	-
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-

2.9.2 Cemeteries

During decomposition, mercury in human corpses can be released into the soil in cemeteries. Mercury in corpses were typically estimated to be due to dental amalgam releases.

Data Collection and Assessment

Data for the inventory was obtained from the Ministry of Health as 1,900 for the year 2018. Estimated releases are shown in Table 28 with a total of 1.22 Kg Hg/y being released to land.

Table 28: Analysis of mercury inputs and outputs from cemeteries

Cemeteries	Unit	Cemeteries
Activity rate	Corpses buried/y	1900
Input factor for phase	g Hg/corpse	4
Adjustment for dental personnel density as dental amalgam is the major contributor to mercury in the human body	Dentist per 1000 inhabitants, country	0.1333
Calculated input to phase	**Kg Hg/y**	**1.22**
Output distribution factors for phase:		
- Air	-	-
- Water	-	-
- Land	N/A	1
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-
Calculated outputs/releases to:		
- Air	-	-
-Water	-	-
- Land	Kg Hg/y	1.22
- Products	-	-
- General waste treatment	-	-
- Sector specific waste treatment	-	-

2.10 Stocks of Mercury and/or Mercury Compounds and Storage Conditions

As per Article 3, Part 1 of the Minamata Convention on Mercury, “mercury” and “mercury containing compounds” refer to mixtures of mercury with other substances, mercury (I) chloride, mercury (II) oxide, mercury (II) sulphate, mercury (II) nitrate, cinnabar and mercury sulphide.

Article 3, Part 5a states that each Party shall endeavour to identify individual stocks of mercury or mercury compounds (not including MAPs) over 50 metric tonnes. If any such stocks are identified, Article 10 of the Convention regarding environmentally sound interim storage of mercury, other than waste mercury, would also apply.

Belize does not currently have any notable stocks of mercury and/or mercury compounds as no significant activities

occur that would require such stocks. It should be noted that if gold mining activities are further developed in Belize, a monitor on the potential stocking and storage of mercury and/or mercury compounds for this activity should be monitored.

2.11 Supply and Trade of Mercury and Mercury Containing Compounds Including Sources, Recycling Activities and Quantities

Article 3 of the Minamata Convention also lists provisions for Parties to regulate the supply, export and disposal of mercury and mercury containing compounds. Part 5a states that each Party shall endeavour to identify sources of mercury supply generating stocks exceeding 10 metric tonnes per year, that are located within its territory.

Based on the inventory, it was determined that no significant sources, trade, or recycling of mercury and/or mercury compounds are present in Belize, and therefore, the interim storage provisions outlined in Article 10 of the Minamata Convention are not currently applicable to Belize. As stated in Section 2.10 of this report, monitoring of the supply and trade of mercury may be required if its use is found in gold mining activities being developed in Belize.

2.12 Identified Hot Spots of Mercury Contamination (Contaminated Sites)

Article 12 of the Minamata Convention on Mercury states that Parties should "develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds". Risk reduction activities should be conducted using environmentally sound measures and should incorporate an assessment of the risks to human and environmental health from present mercury or mercury compounds.

Hot spots of mercury contamination exist as the direct result of the use and release of mercury in processes leading to on-site deposition, as well as the inadequate disposal of mercury-contaminated materials. Previous deposits of mercury may still have the potential to release significant amounts of mercury and pose a risk to human health and the environment. Potential hot spots may include reservoirs where mercury containing materials have been stored, dumped or accumulated over many years.

Following an assessment conducted by BRI to identify potential mercury hotspots using watershed sensitivity spatial analysis, a map was developed (Figure 8).

The map was generated through two scientifically validated approaches to evaluate the variables with percent watershed coverage data available. For land cover classes with extensive coverage, watersheds were split into three categories based on the percent of watershed covered. Variables with positive coefficients were assigned a rank of 1 for 0 – 33.3%, 2 for 33.3-66.6%, and 3 for 66.6-100% coverage. Negative coefficients were ranked -1 for 0 – 33.3%, -2 for 33.3 – 66.6%, and -3 for 66.6 – 100% coverage. Alternatively, for datasets with positive coefficients but more sparse coverage, watersheds were ranked 1 for 0%, 2 for 0 – 1.0%, and 3 for 1.0 – 100% coverage. Mangroves are an especially important pathway for mercury availability and as a result were given rankings of 1 for 0%, 3 for 0 – 1.0%, and 5 for 1.0 – 100% coverage.

In addition, the occurrence datasets were awarded rankings based on the number of occurrences in a given watershed, where for each occurrence of a given predictor variable an additional point was awarded. The rankings were then summed across each watershed or catchment. An

increasing number of assigned total points indicate the presence of a set of variables that combine to expose the watershed to increased sensitivity to mercury contamination. In order to compare watersheds across countries with varying numbers of predictor variables, the results were normalized by dividing the total cumulative points of each watershed by the maximum number of points that could be awarded for each individual watershed to create a final proportional ranking.

The mercury sensitivity map of Belize showed considerable variation among watersheds. Spatial analysis indicates that mercury sensitivity patterns are strongly driven by the combination of wetlands and contaminated sites.

The Belize River was the only watershed in the highest sensitivity classification. This watershed forms a corridor of developed areas, including Belize City, Belmopan, and San Ignacio. Due to these populated areas, the watershed contains multiple potentially contaminated sites and wastewater treatment plants, which increase mercury in puts to an already sensitive watershed.

How the Chalillo Reservoir contributes to downstream mercury inputs is being closely monitored through mammal and fish monitoring. Findings are currently inconclusive.

Results from this rapid assessment of mercury watershed sensitivity provide important information on the potential for relating land cover characteristics with potential mercury exposure risk. In particular, hotspot mapping is a useful exercise for helping understand the drivers of mercury sensitivity in a particular country. Of particular note in Belize is the strong pattern between mercury sensitivity rankings and the presence of potentially contaminated sites as well as wetland and water body coverage.

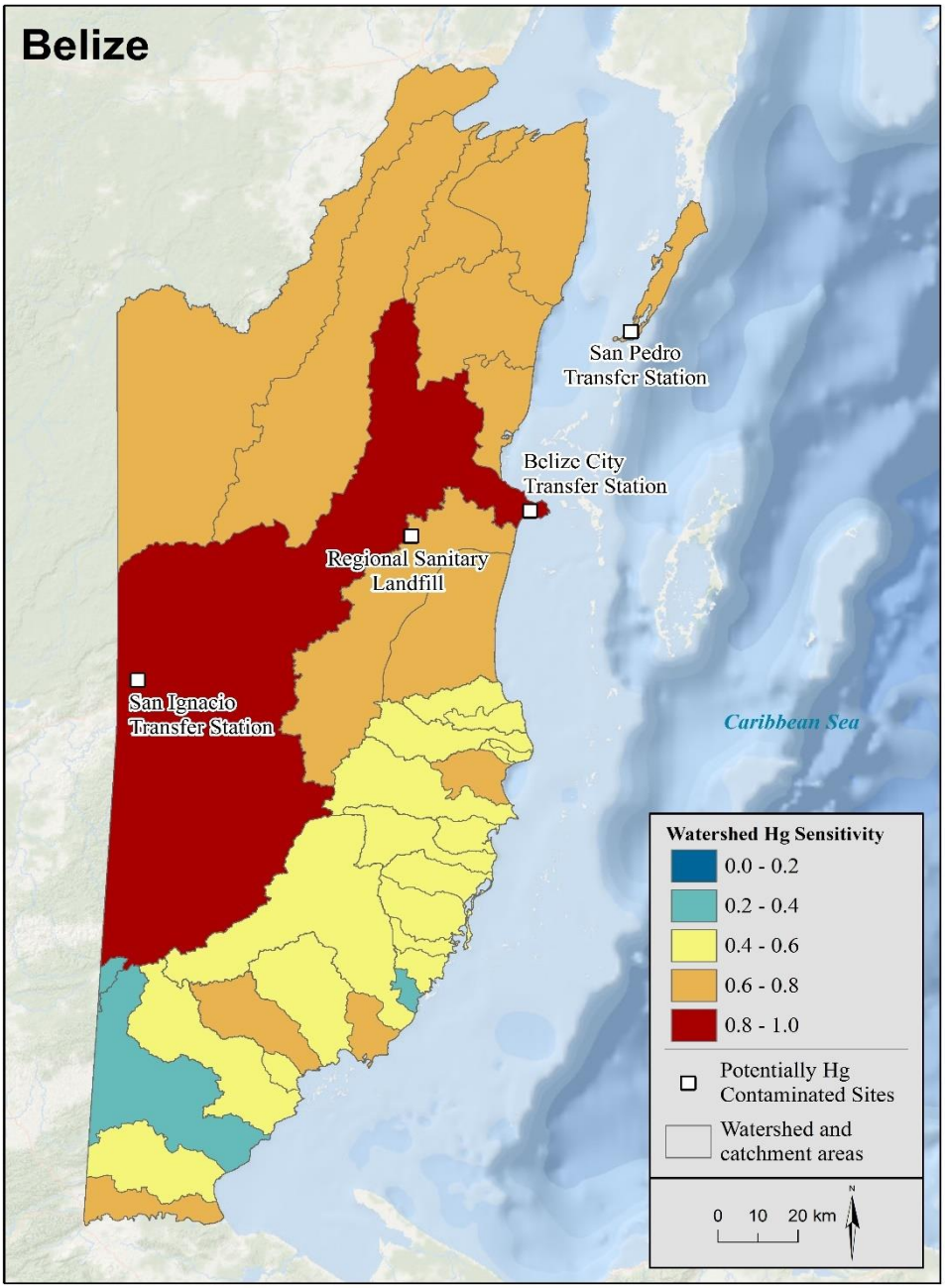

Figure 8: Watershed Mercury Sensitivity Map in Belize. (BRI, 2020)

Hotspot mapping is an important step in helping to understand and visualize the spatial patterns of mercury sensitivity in Belize. It provides an important tool useful for guiding future monitoring and mitigation efforts. The watershed sensitivity maps are dependent on accurate information (both the presence and location) about potential sources of mercury and the drivers of watershed sensitivity in each watershed. It will be important for the Government of Belize to conduct further studies to better understand and refine these preliminary findings.

2.13 Impact of Mercury on Human Health and the Environment

Mercury is a highly toxic element which persists in the environment in various forms.

The organic form of mercury, methylmercury, is its most dangerous form as it binds to human and animal tissue and

can cause physiological, neurological and behavioral harm to humans. The process of methylation, whereby mercury is converted to methylmercury, varies widely across various landscapes and within waterscapes. Areas that are particularly sensitive to mercury deposition generally represent aquatic ecosystems or have an aquatic connection within the food web. Methylmercury tends to bio-magnify in food webs and bioaccumulate over time in organisms which are then consumed by humans. Fish from the sea or freshwater systems can be a major source of methylmercury, and it has been determined that generally, predatory species that are long-lived and grow larger can contain higher levels of methylmercury, though it may vary from species to species (BRI, 2018).

Elemental mercury can also enter the body through direct contact with mercury and its compounds, and the inhalation of vapours released from damaged MAPs or processes in which mercury is intentionally used. Exposure can affect the central and peripheral nervous systems and cause tremors, emotional lability and insomnia (WHO, 2003). The inhalation of mercury can also affect the lungs and the digestive and immune systems which may be fatal.

The effects of mercury on health and the environment are causes for concern, and plans should be put in place to alleviate these effects. Further investigation is needed to assess the quantities of mercury being released into the environment in order to fully understand what should be done to eliminate this toxic metal and reduce its impacts.

Under the MIA Project, BRI conducted an assessment of ecosystem sensitivity provided in a technical report. A summary of findings of the report (BRI, 2020) is provided as follows.

Mapping ecosystem sensitivity spots helps identify critical areas where mercury affects important human food sources or threatened and endangered fish and wildlife species.

Mercury emissions and deposition from contaminated sites are important but explain only part of the spatial story of mercury pollution. Ecosystem sensitivity and food web relationships help further describe the actual risks to human and eco-health.

Elemental mercury is converted to a more toxic organic form through the process of methylation, which occurs with the help of bacteria found primarily in wet areas. Variations in methylmercury (MeHg) concentrations may occur in different parts of the food web depending on the sensitivity of the ecosystem to mercury input.

Where methylmercury availability is elevated, fish and wildlife may exhibit harmful mercury concentrations and represent the places that will require the most attention by countries and global monitoring programs.

BRI conducted a study designed to identify spatial patterns of mercury on three levels:

1. Identify spatial patterns of mercury sensitivity—landscape-scale environmental indicators were used to identify areas that may be disproportionately sensitive to mercury contamination. This was aimed to improve understanding of and to identify spatial patterns in potential mercury sensitivity at a watershed level using widely available geospatial data.
2. Quantify mercury exposure levels in wildlife and humans—In order to address mercury exposure, 1) available fish samples intended for human consumption were tested; 2) locations from where contaminated fish were distributed were identified; and 3) opportunistic sampling of

birds and bats as indicators for assessing mercury exposure to wildlife were taken.

3. Compare the two sets of patterns—To improve targeting for future monitoring and mitigation efforts, comparisons of the two sets of patterns were done to begin developing a plan for a future biomonitoring program measuring human and wildlife exposure to mercury.

Of particular note in Belize is the pattern between watershed mercury sensitivity rankings and the presence of potentially contaminated sites as well as wetland and water body coverage. Mercury concentrations in bird blood and feathers were, in general, below the estimated known effect concentrations with the important exceptions of seven individuals sampled at two locations: the Belize Foundation for Research and Environmental Education (BFREE) and Runaway Creek Nature Preserve (RCNP). Comparatively, 40 percent of the bats sampled had fur total mercury (THg) levels that exceeded 10 parts per million (ppm), fresh weight (fw), which is a documented effect level.

Opportunistic samples of fish intended for human consumption (purchased at fish markets or obtained directly from rivers) indicated some levels that generally exceeded both the safe consumption guideline of 0.22 ppm established by the Great Lakes Commission (GLC) in 2007, and the less-conservative guideline of 0.5 ppm ww, jointly proposed by the World Health Organization (WHO) and the UN FAO, for fish and fish products (Codex Alimentarius 2009). This indicated that further strategic sampling efforts should be conducted in the future to validate findings.

The mercury sensitivity mapping and the biotic sampling results together indicate that there is likely high variation in mercury exposure to humans and wildlife across Belize. Although the patterns and mechanisms of mercury's path through the environment are complex, these results highlight the importance of continued sampling efforts to further elucidate the patterns of mercury exposure across the Belize landscape.

Chapter 3 Policy, Regulatory and Institutional Framework Assessment

To determine the legislative and institutional framework that would benefit Belize's accession of the Minamata Convention on Mercury, an assessment was undertaken. The information provided in the assessment report was the result of intense scrutiny of multiple pieces of legislation and policies that touch on and concern the management of wastes and chemicals in the country and discusses the strengths, weaknesses and gaps of these legislations and policies within the context of mercury management. The following section summarises the results obtained for Belize.

The domestic legislative procedure for incorporating the obligations of a multilateral instrument into national legislation in Belize is established in section 4(1) of its United Nations Resolutions and Conventions (Enforcement) Act, Chapter 24:01. According to the Act Belize may ratify the Minamata Convention through the National Assembly, may enact it by legislation or the Minister may by Order make such provisions for giving effect to the Minamata Convention in Belize. An appropriate legal, policy and institutional framework must be established in Belize to achieve compliance and implement the obligations of the Convention. Article 21 requires Belize "to report to the Conference of the Parties, through the Secretariat, on these measures, their effectiveness and challenges in meeting the objectives of the Convention". Table 29 outlines the relevant articles of the Minamata Convention for Belize.

Table 29: Relevant Articles of the Minamata Convention on Mercury Management (MCMM) for National Consideration

Relevant Article	Brief Description of Article	Relevance to Belize
Article 1 Objectives	Objective of MCMM is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.	Belize must institute measures to implement this overall objective of MCMM.
Article 4 Mercury-added products	A Party must take appropriate measures to prevent the manufacture, import or export of MAPs listed in Part I of Annex A after the phase-out date or the date of a registered exemption obtained pursuant to Article 6.	Belize must collaborate with facilities and relevant Government agencies that rely on MAPs in conducting business to introduce measures to phase out import of relevant products.
Article 6 Exemptions	Any State may register for one or more exemptions from the phase-out dates listed in Annex A by notifying the Secretariat in writing. The exemptions pursuant to paragraph 1 shall expire five years after the relevant phase-out date listed in Annex A.	Belize should seek an exemption from the Secretariat of no more than 5 years to achieve phase out of products. A phase-down approach is required for dental amalgam.
Article 7 Artisanal and small-scale gold mining	Each Party that has artisanal and small-scale gold mining and processing subject to this Article within its territory shall take steps to reduce, and where feasible eliminate, the use of mercury and mercury compounds in, and the emissions and releases to the environment of mercury from, such mining and processing.	Small-scale gold mining and processing in Belize is minimal but it is noted that should further mining activities develop, the obligations of the Convention should be considered.
Article 8 Emissions	Parties are to control or reduce. emissions of mercury and mercury compounds (total mercury) from point sources listed in Annex D.	Belize's contribution to Annex D emissions comprises waste incineration and burning is quite low at 0.5%.
Article 9 Releases	Parties are to control or reduce release of mercury and mercury compounds (total mercury), to land and water from point sources not addressed in other provisions of the Convention.	Belize's contribution to Waste deposition/landfilling and wastewater treatment is at 1.8%.
Article 11 Mercury wastes	Definition of "wastes" covered under this Convention is the same as for Parties to the Basel Convention.	Belize became a Party to the Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal since August 1997. Its provisions are incorporated in its Environmental Protection Act, CAP 328 as amended 2009 and includes mercury or mercury compounds. Management of disposal is done according to the Act.

Relevant Article	Brief Description of Article	Relevance to Belize
Article 12 Contaminated sites	Parties must ensure that actions to reduce the risks posed by contaminated sites are conducted in an environmentally sound manner.	There are likely to be contaminated sites in Belize, but none has been officially declared.
Article 13 para. 4 Financial resources and mechanisms	Parties that are small island developing states can access funding towards the implementation of the MCMM	As a small island developing State (SIDS), Belize can access financial resources, capacity-building technical assistance and technology transfer. to assist with the implementation of the MCMM.
Article 14 Capacity-building, technical assistance and technology transfer	Parties are to provide SIDS with capacity-building, technical assistance and technology transfer support in implementing the MCMM	Belize can obtain assistance to strengthen its capacity-to implement the MCMM from developed country parties
Article 16 Health Aspects	Parties must develop strategies and programmes to protect, educate and prevent exposure to mercury	Belize must establish and implement programmes to protect, educate and prevent exposure to mercury
Article 17 Information exchange	Parties must exchange a wide range of information including science, technical, economic and legal and health impacts of mercury and mercury compound.	The DOE is the focal point for Belize to exchange relevant information in relation to environmental impacts. The Ministry of Health is the most relevant entity to disseminate information in relation to health impacts and coordination should occur between agencies.
Article 18 Public information, education and awareness	Parties must facilitate information sharing to the public on *inter alia*, health and environmental effects of mercury, and activities to meet obligations taken under Articles 1-17.	Belize must comply with its obligations on information sharing under Article 18
Article 19 Research, development and monitoring	Parties are to develop, *inter alia*, inventories as well as, consumption and emissions and releases to land, and water from mercury and mercury compounds, modelling of levels of mercury, assessments of impacts in vulnerable populations	Belize has limited resources in research and development; but it should be viewed as an opportunity for Belize to initiate inventories/assessments with proper technical assistance.
Article 20 Implementation Plans	Each Party must develop an implementation plan for meeting the obligations of the Convention. The Plan must be submitted to the Secretariat.	Following an initial assessment and accession to the Convention, Belize should develop an implementation plan of the measures it will give effect to in implementing the MCMM. The plan must be developed in consultation with national stakeholders. Guidance

Relevant Article	Brief Description of Article	Relevance to Belize
		on the development of an implementation plan is provided on the Minamata Convention's website.
Article 21 Reporting	Each Party must submit report to the Secretariat, on the measures it has taken to implement the MCMM, the effectiveness of such measures and the challenges in meeting the objectives of the Convention, in particular Articles 3, 5, 7, 8 and 9.	Should Belize become a Party, the national focal point must submit report to the Secretariat of the Minamata Convention as required in Article 21. Coordination with relevant stakeholders should be conducted for the collection of data for reporting. Templates for the report are provided on the Minamata Convention's website.
Article 30 Ratification, Acceptance, Approval or Accession	To become a party to the MCMM a State must deposit an instrument of ratification, acceptance, approval or accession with the Depositary.	To become a Party Belize may deposit its instrument of ratification through the National Assembly or the Minister may by Order make provisions for giving effect to the MCMM in Belize. Belize became a Party to the Basel Convention by accession.

3.1 Assessment of Policies and Legislation

3.1.1 Existing Policies

The existing and draft policies that are directly or indirectly relevant to the management of chemicals in Belize are set out below.

National Development Framework 2010–2030 (Horizon 2030): The Framework sets out the long-term development objectives for Belize. The framework vision includes achieving "a country of peace and tranquillity, where citizens live in harmony with the natural environment and enjoy a high quality of life…" (Government of Belize, 2015, p. 2). Further, it includes Critical Success Factor 3, which is to reach "Sustained or Improved Health of Natural, Environmental, Historical and Cultural Assets" (Government of Belize, 2015, p. 3).

National Environmental Policy and Strategy 2014-2024: A key objective of the Policy and Strategy is to address the need to develop, adopt and implement a comprehensive natural resources and environmental policy and strategy including planning for climate change and mitigating its effects as issues that establish the relationship between sustainable practices and economic development and Belize's efforts to eradicate poverty. The strategic thrust of a "Clean and Healthy Environment" as three main issues to be those dealing with waste management, pollution control and integrated chemicals management. In furtherance the strategy has as its primary objective the integrated management of chemicals. It has as its targets the following:

- the adoption of the draft National Integrated Chemicals Management Bill and its subsequent implementation;

- the implementation of the institutional development plan supporting the establishment of the chemicals management unit and the National Integrated Chemicals Management Authority;

- the complete implementation of the National Pollution Release and Transfer Registry, and;

- the development and implementation of the national chemicals management training program and accompanying public sensitization programme.

These are all measures that aim to improve the chemicals management infrastructure in Belize.

National Emergency Preparedness Plan for Oil Spills, 2008: The aim of the Oil Spill Plan is to outline national arrangements designed to reduce the effect of a spill on Belize by a quick and well-coordinated response. It will set out the arrangements, roles and responsibilities of actors in spill management. The Plan is dated however and in need of updating. The Department of the Environment (DOE) hosted two days of consultations on in 2018 in an effort to finalize a Belize National Oil Spill Contingency Plan which will encompass the provisions of the 2008 Emergency Plan. As of June 2019, this plan has been finalised and approved by Cabinet.

National Hazard Mitigation Policy and Plan 2004: This was prepared through a concerted effort by the Government of Belize, the Caribbean Disaster Emergency Response Agency (CDERA) and the Caribbean Development Bank (CDB) and aims to integrate hazard risk reduction into national development processes and national institutional strengthening for disaster risk reduction. The stated vision for the Policy is "A society safer from natural and technological hazards supported by integrated, social, economic and natural resource development".

As few national or sectoral policies or strategies explicitly integrate either hazard mitigation or Disaster Risk Management, a 10-year National Hazard Mitigation Plan to implement the policy was adopted in 2007 and has proposed a multi-sectoral, integrated and coordinated approach to hazard mitigation.

Belize National Solid Waste Management Policy 2015: Sets out the government's vision and strategic objectives for the management of solid wastes and the policies that will be applied to achieve them. Its purpose is to provide a framework within which individuals and organisations can make a contribution through more efficient use of resources and by making better informed choices and decisions on how to manage and dispose of wastes once products have reached the end of their useful life.

The primary objectives of this Policy are to:

- facilitate preparation, implementation and operation of an integrated and cost-effective solid waste management system;

- establish national legislation that is comprehensive, coherent and effective;

- establish institutional and organisational arrangements that are optimal for the operation of an integrated and cost-effective national solid waste management system, and;

- provide for wastes requiring final disposal.

These policy measures are implemented in a National Solid Waste Management Strategy and Plan.

Overall, the foregoing policy instruments provide only an indirect coverage for chemicals management in Belize. It is in need of strengthening for meeting the requirements of the Minamata Convention.

3.1.2 Conclusion on Policy Framework

Belize is a party to several MEAs that contribute to its policy framework for the management of chemicals. It is therefore already committed to discharging the obligations that they create for the country. The Minamata Convention on Mercury includes measures that are consistent with these instruments. Belize should establish a comprehensive international policy framework on the management of chemicals including mercury. By becoming a Party to the Minamata Convention, Belize will have access to further technical support to develop such policy frameworks if needed.

3.1.3 Existing Legislation

The existing and draft legislation that are relevant to the management of chemicals in Belize are described below.

The Pesticides Control Act, 1985: was first enacted in 1985 and came into effect in 1988. Section 3 of the Act establishes the Pesticides Control Board (PCB) which has the responsibility for all aspects of the importation, manufacture, packaging, preparation for sale, sale, disposal and use of pesticides (s. 4(g)). The Act's focus is on pesticides and does not makes provision for hazardous chemicals that do not fall under the classification of 'pesticide'.

The Act empowers the Minister to make Regulations regarding the importation, sale, storage and use of pesticides in Belize. The provisions of the Act and the Regulations are to be presided over by a Board. The Act provides strict requirements for labelling which must include, inter alia, the name of the distributor, the chemical properties and directions for the proper application thereof. It creates a regime for licensing for persons wishing to import and sell pesticides in Belize.

Some identifiable positives of this Act and its Regulations are that first, they provide

some control for chemical use albeit restricted to chemicals falling under the rubric of pesticides; and second, they can provide an avenue for data collection of chemical imports. In tandem with the labelling requirements, it can provide necessary information on mercury content which can then be used to provide necessary estimates and statistical data with which to inform public health authorities and their policies.

Environmental Protection Act, Chapter 328: was enacted in 1992 and established the DOE. The Act gives the DOE responsibility for the environment and the continuous and long-term assessment of natural resources, to monitor the implementation of the Act and regulations and to take necessary action to enforce its provisions.

Part II of the Act addresses the control and prevention of environmental pollution. According to section 2 "environmental pollutant" means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be injurious to human health or the environment; it includes objectionable odours, noise, vibrations, radio activity, temperature change, or physical, chemical or biological change to any element of the environment" Although there is no direct reference to mercury it may be determined to be include within this broad definition.

Section 4 of the Act vests the DOE with several functions and duties. In relation to mercury management the key provisions are to:

i. control the volume, types, constituents and effects of wastes, discharges, emissions, deposits or other sources of emission and substances which are of danger or a potential danger to the quality of the environment;

ii. specify the permitted level for the emission, discharge or deposit of pollutants into any area, segment, or element of the environment within which the emission, discharge or deposit is prohibited or restricted;

iii. recommend measures aimed at controlling pollution resulting from industrial processes or otherwise, and

iv. conduct, promote, and co-ordinate research in relation to any aspect of environmental pollution or the prevention thereof and to develop criteria for the protection and improvement of the environment.

Measures to prevent and control pollution are set out in Part III of the Act and are specifically considered in sections 11, 13, 14, 15, 16 and 17. These provisions deal with varying aspects of dumping, discharge or disposal of wastes into waterways and create offences for breach of their provisions. The DOE's duty to control the transboundary movement of toxic and hazardous wastes is established in section 7 while section 13 makes it an offence to directly or indirectly damage or destroy flora or fauna, or pollute water resources or the environment. Section 14 controls the dumping of chemical substances from ships and other watercraft by making it an offence to do so.

The Act establishes a permitting system but prohibits the grant of such permit in respect of a substance specified on the list of hazardous substances in the Schedule except in certain circumstances laid out in paragraphs (a) – (d) of section 17(5) of the Act. Mercury and mercury compounds, persistent plastics and other persistent synthetic materials, pesticides and scrap metal are included in the Schedule aforesaid.

The Minister has powers to make a wide range of regulations for the establishment of enforcement measures and the better carrying out of the Act. The regulations include –

- the prevention and reduction of pollution of the air and water including streams and rivers - – Section 7(1)(i);

- the importation, collection, storage, recycling, recovery or disposal of substances which may be hazardous to the environment – Section 45(2) (i);

- the discharge of wastes generally, and fees payable in relation thereto – Section 45(1)(n);

- controlling and minimising the transboundary movement of toxic and hazardous wastes Section 7(i)(m);

Miscellaneous provisions under the Act include:

- the giving of special powers to DOE officers in the event that the environment is in imminent danger due to the discharge of pollutants or any industrial waste or potentially hazardous substance (Section 51), and

- a prohibition to construct, operate or manage a landfill or hazardous waste disposal facility without a permit from the DOE (Section 72(1).

Customs Regulation Act, Chapter 49: The Customs Regulations (Prohibited and Restricted Goods) (Consolidation) Order, 1988, made pursuant to section 103(2) of the Customs Regulation Act, Chapter 49, includes a consolidated list of goods that are prohibited or restricted under the Customs Regulation Act or any other law or regulation. Under section 15, Part I of the Schedule (Prohibited Goods), the importation of pesticides listed in the Fourth Schedule to the Pesticides Act is prohibited. The list of restricted goods in Part II of the Schedule (Restricted Goods) includes explosives, medicinal dangerous drugs and registered or restricted pesticides that are listed under the Second and Third Schedules to the Pesticides Control Act.

The Customs Regulations (Prohibited and Restricted Goods) (Amendment) Order, 2006 amends Part II of the Schedule of the principal Order by adding used tires and lead acid batteries to the “Inwards” list and scrap metal from sources such as derelict vehicles, machinery, and transformers to the “Outwards” list. Section 2 of the Customs Regulations (Prohibited and Restricted Goods) (Consolidation) Order provides that the goods specified in Part I of the Schedule under the headings “Inwards” and “Outwards” are, prohibited to be imported into as well as exported from Belize.

Belize Ports Authority Act, Chapter 233: This Act establishes the Belize Ports Authority and vests it with the power to provide, manage and maintain efficient port services and facilities. The Act does not have as its focus the management of chemicals, but it does contain provisions on pollution caused by the importation or exportation of items or substances that may be of a chemical nature which may include mercury.

Public Health Act, Chapter. 40: was enacted in 1943 making it a very dated instrument that is in need of revision. The central theme of the Act is on public health issues. A Director of Health is the key personnel for implementing and enforcing the measures that are proposed in the Act for maintaining sanitary conditions in Belize. The Minister has power to make regulations for the prevention, control or reduction of pollution or contamination of the air, soil or water caused by any activity or condition resulting in the emission of a pollutant or contaminant into the environment. “Environment” is defined for the purposes of this section as the air, soil and water.

With respect to the management of chemicals, Parts VIII and IX that address Offensive Trades and Sanitation and Prevention of Nuisances are relevant.

Accordingly, section 135 specifies the conditions which shall be deemed nuisances, such as any noxious matter, or wastewater, flowing or discharged from any premises into any watercourse or irrigation channel not approved for the reception of such discharge.

Food and Drug Act, Chapter. 291: was enacted in 1953 and governs food or drink for human consumption and drugs, including medicines, for internal and external use. The Act focuses on the safety of food and health and aims to regulate the production, importation and sale specified items including cosmetics and therapeutic devices. The Food and Drugs (Registration, Labelling and Inspection) Regulations 2017 made under section 11 of the Act adds to the definition of drugs "any substance or mixture of substances, whether for internal or external use, manufactured, sold or represented for use in, the diagnosis, treatment or mitigation.

The Act empowers the Minister of Health to appoint analysts or inspectors to examine or seize articles imported, produced or sold in Belize to determine their composition and to test the human health effects thereof. It is a requirement under Annex A of the Minamata Convention requires that cosmetics with a mercury content above 1ppm should be phased out by 2020. By providing compliance and enforcement measures for cosmetics and therapeutic devices, the Act has some relevance to the Minamata Convention and the management of chemicals in Belize.

Petroleum Act, Chapter 225: This Act covers the importation and storage of petroleum in Belize and mandates that such products be stored in Government petroleum warehouses or other licensed and approved warehouses. Mercury is a trace component of all fossil fuels including petroleum and may be emitted directly to air, water or solid waste streams, scrap processing facilities, gold production, and waste incineration. There is a strict requirement under the Act for all vessels entering the country to disclose the quantity of petroleum, the quantity of volatile petroleum, the brands and marks of the petroleum. The requirement to disclose the amounts of mercury in petroleum will assist Belize in establishing its compliance measures under the Minamata Convention.

Fisheries Act Chapter. 210: The objective of this Act is to provide for the promotion and management of fisheries in the fishery waters of Belize, and to deal with all other incidental and connected matters. As there is a growing concern that human exposure to mercury occurs mainly through the ingestion of fish, this Act assumes some relevance or has the potential to be important to the management of chemicals in Belize. The Act authorizes the Minister to take such measures as are necessary for the promotion of the management and development of fisheries.

The Act promotes regional cooperation in several areas such as harmonized licensing requirements and the sharing of statistics. It also establishes marine protected areas for research purposes.

Cremation and Burials Act, CAP 5:03: This Act regulates the burning of human remains and the construction and operation of crematoria. It sets up a licensing requirement for the construction and operation of crematoria and places restrictions on the cremation of human remains. There are potential health effects of exposure to mercury that are released from dental amalgam restorations during cremation. Section 8 empowers the relevant Minister to make regulations under the Act. The Act has some relevance for the purposes of Annex D of the Convention which identifies waste incineration facilities as one of the point sources of emissions of mercury and mercury compounds into the atmosphere. As there are no regulations to

the Act, it is very difficult to monitor the actual processes and to measure mercury emissions.

Regulations to consider mercury releases from dental amalgam during cremation should be made under the Act.

Standards Act, Chapter. 244: Section 3 of the Standards Act, Chapter 295, established the Belize Bureau of Standards and vests it with responsibility for preparing and promoting standards in relation to goods, services and processes. Inspectors appointed under section 4 of the Act have power, inter alia, to eliminate any process or practice that adversely affects the environment and prevent access to the marketplace of goods which are likely to be a danger to the health or safety of consumers. In accordance with section 17 the Bureau may also examine goods that for which a standard has been declared are being imported.

In discharging its duties, the Bureau is required to promote and encourage the maintenance and use of codes of practice, specifications and standards for, inter alia, the protection of the environment, subject to any rules and regulations made by the Ministry responsible for the environment (section 6)

It should be noted that the Standards Act does not apply to any product which is a drug within the meaning of the Food and Drugs Act or any product which is a pesticide within the meaning of the Pesticide Control Act.

Belize Agricultural Health Authority Act, Chapter. 211: provides for the regulation of agricultural health services including plant health, animal health, veterinary and quarantine services and registration. The BAHA was established in 1991 under section 3 of the Act to, inter alia, to establish and maintain animal and plant health services, and to monitor, regulate and control the use, quality and suitability of bio-engineered products, biologicals, agro-chemicals, animal products, animal feed and fertilizers. Part XI addresses licences and analyses for fertilizers and feed stuffs.

Solid Waste Management Authority Act, Chapter. 224: The Solid Waste Management Authority (SWAMA) was established in 1991 by section 3 of the Solid Waste Management Authority Act, Cap.224, and is responsible for the collection and disposal of all solid waste in a service area. Under the Act, solid waste includes garbage and refuse but expressly excludes hazardous waste which is governed by the Hazardous Wastes Regulations, 2009.

i. Despite the obvious advantages of this Act, it does not provide any detailed method of management of chemicals but seems to leave most of the issues of disposal up to the user.

ii. The Act does not establish any method of collaboration or other framework for the removal of hazardous waste from Belize for export overseas.

Belize Maritime Areas Act, 1992: This Act vests the Minister with power to make regulations for the Territorial Sea, Internal Waters and the Exclusive Economic Zone of Belize. The relevant regulations that have been made under the Act are:

(a) For the safety of navigation and the regulation of marine traffic;

(b) For the conservation of the living resources of the sea;

(c) For the preservation of the marine environment of Belize and the prevention and control of pollution, and;

(d) For the regulation of fishing.

Regulations for the prevention and control of pollution have not been made under the Act.

3.1.4 Regulatory Framework

Effluent Limitations Regulations, 1995 (as amended): The Regulations define "effluent" as sewage or industrial effluent. The Regulations establish prohibitions in respect of specified discharges on land or into inland or marine waters without first obtaining written permission or a licence from DOE. An important power to require every industry to install anti-pollution equipment for the detoxification of effluent and chemical discharges emanating from an industry is vested in the Minister and through the DOE in tandem with the EIA Regulations. Fines and penalties are attached for violations to the Regulations. The Regulations were amended in 2009 to revise inter alia, the definition of "industrial effluent". The provisions of the Regulations are compatible with the objective of Article 1 of the Minamata Convention to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

Pollution Regulations, 1996: The Regulations focus on air emissions of contaminants, water pollution and pollution of land into the environment and the environment from stationary sources such domestic, commercial, agricultural, recreational, industrial or any source or a contaminant that is likely to affect the health and well-being. The DOE must grant permits prior to emissions being made.

Part IX makes it an offence to discharge waste into inland or coastal waters and sets the standard by which discharges may be made to land. The Regulations were amended in 2009 to require petroleum refineries, and refinery processing units to comply with the minimum national standards for the discharge of effluent and emissions set out in Schedules 11 and 12 to the Regulations.

Pollution (Amendment) Regulations, 2009: This amendment to the Pollution Regulations requires petroleum refineries, including refinery processing units, to discharge effluent and emissions in accordance with the minimum national standards prescribed in Schedules 11 and 12. Regulation 14 protects waterways from pollution by prohibiting the discharge of effluent that was poisonous, noxious or polluting, into waters without a licence.

Hazardous Waste Regulations, 2009: These Regulations implement some aspects of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal to which Belize is a party. Regulation 2 defines "hazardous wastes" to include any material or substance that may pose a threat to the environment and human health which will include mercury and therefore coincides with the Minamata Convention. The Convention however sets thresholds by which mercury will be treated as hazardous.

Procedures for the transportation, storage and recording with respect to hazardous waste are also covered in the Regulations. Regulation 20 imposes a ban on the importation of hazardous waste into Belize without the written authority of the DOE. Violations attract high penalties and imprisonment.

Environmental Impact Assessment (EIA) Regulations, 1995 as amended No. 24 of 2007 (as amended 2020): According to the 2007 Amendment, an EIA is "needed in identifying, predicting, evaluating, mitigating and managing the environmental, and key social and economic impacts of development projects, undertakings, programmes, policies or activities, the report of which is presented in a written document called the Environmental Impact Assessment report".

The Regulations prescribe the methods that are used in conducting to evaluate the potential physical, biological, cultural, and

socioeconomic effects of a proposed development and its practical alternatives.

The DOE may approve an EIA subject to such conditions as the Department may specify. The EIA must be accompanied by an Environmental Compliance Plan signed by the developer and the payment of an environmental monitoring fee (Regulation 22A).

A list of projects for which an EIA is mandatory is at Schedule I and includes a waste-disposal installation for the incineration or chemical treatment or final disposal of waste; an installation designed solely for the permanent storage or final disposal of any waste; the treatment of intermediate products petroleum refining, the production of pesticides or pharmaceutical products, paints, varnishes, elastomers or peroxides, an integrated chemical installation, that is to say, an industrial installation or group of installations where two or more finked chemical or physical processes are employed.

The DOE can exercise a discretion on requiring an EIA for activities listed in Schedule II. It is noted that the conduct of small-scale mining and processing of minerals, the storage of chemical products and the production of nitrogenous and phosphatic fertilizers are included in Schedule II.

3.1.5 Draft Legislation

National Integrated Chemicals Management (ICM) Bill, 2017: The objective of the draft Bill is "to provide for the integrated and sound management of hazardous chemicals including their importation, export, production, formulation and processing, transport, distribution, use, storage and disposal; to protect human health, property and the environment from the harmful effects of hazardous chemicals; and to provide sustainable financing to administer sound, integrated hazardous chemicals management." According to the Bill a hazardous chemical is defined as "any chemical which through its chemical action on life processes can cause temporary or permanent harm to human health, property or the environment" which is in conformity with the Global Harmonized System of Classification and Labelling of Chemicals Drugs.

The Act establishes a National Integrated Chemicals Management Committee to advise the Minister and implement activities on all aspects of integrated chemicals management. A National Integrated Chemicals Management Secretariat within the DOE will serve the Committee. The functions of the Committee are set out under section 19 and includes the exchange of information among the ministries and statutory bodies involved with managing hazardous chemicals; developing minimum national standards for the placement of hazardous chemicals on the market; and ensuring the harmonization of Belize's hazardous chemicals management policies and legislation with applicable multilateral environmental agreements and other international and regional initiatives.

Other key provisions of the draft Bill include:

- Establishment and maintenance of a National Chemicals Repository for storing general information
- Establishment of an Integrated Chemicals Management Fund
- Creation of a National Accident Release Prevention Program for the prevention of hazardous chemical accidents,

Part V of the draft Bill deals with the general management of hazardous chemicals and classifies them into five groups including cosmetics, pesticides and industrial chemicals

Section 36 specifies the functions to be carried out by each regulatory body that is involved in the management of hazardous chemicals. The Minister has the power to make regulations for the labelling, transport, packaging, monitoring, record keeping, storage including specifications for buildings, and disposal of hazardous chemicals.

Draft National Integrated Industrial Chemicals Management Regulations: The draft Regulations establish the procedures for applying for a licence to import, export, and transport industrial chemicals.

Draft Occupational Safety and Health Bill, 2014: The Bill has as its focus the securing of the safety, health and welfare of workers, developing codes of practice and in giving effect to the country's obligations in this area. The institutional framework that is designed to implement the Bill comprises a National Occupational Safety and Health Authority that includes as its members the PCB and the BAHA (section 16(1) and an Occupational Safety and Health Inspectorate to serve as the secretariat which will perform the administrative and management functions of the Authority.

The Inspectorate will be responsible for monitoring the level of chemicals, physical agents or biological agents in the workplace, keep, and post accurate records thereof.

3.1.6 Conclusions on Legislative Framework

This legislative framework for chemicals management in Belize adopts a patchwork of laws that lacks comprehensiveness in that each law addresses a different aspect of chemicals management and in some cases resulted in an overlap of the provisions between each law. That patchwork may more than likely have been unintentional but may have been due to a failure to consider existing instruments, not repealing the older statutes or even expediency to establish a legislative response to prevailing circumstances.

The Draft National Integrated Chemicals Management Bill, 2017 and Regulations is an attempt to establish a holistic approach to chemicals management in Belize. It proposes a robust legislative instrument that involves several levels of institutional arrangements for its implementation and enforcement.

A summary of relevant legislation for consideration is provided in Table 30. It is noted that several regulatory pieces may apply to more than one obligation outlined in the Minamata Convention.

Table 30: Summary of Existing Legislation Relevant to Mercury Management in Belize

Provision of the Minamata Convention	Relevant Act, legislation and regulation	Policy and Legislative Gap Analysis (if present)	Proposed Legal Reform Action (if needed)
Article 1	Environmental Protection Act Chapter 328	Lack of comprehensive policy and legislative framework for chemicals management including mercury and other relevant chemicals	Review with a view to harmonising the Draft National Integrated Chemicals Management Bill and Regulations with existing laws and regulations. Identify areas for repeal
Article 4	The Pesticides Control Act, Chapter 216,	Overlap with Customs Regulation Act, Cap. 49	Ensure that the scope of the Pesticides Control Act and Customs Regulation Act are rationalised and clarified
Article 7	Mining & Mineral (General) Regulations CAP 2/26	Contains no provisions that directly relate to use of mercury in mining	The contribution of artisanal and small-scale gold mining is still to be determined. If, however, found to be more than insignificant Belize must amend these Regulations to consider mercury use and develop national action plan to reduce and/or eliminate the use of mercury.
Articles 8, 9, 11	Environmental Protection Act, Chapter 328	Pollution Regulations omit definition of “noxious chemicals” (Article 8). Part IX and X are inadequate as regards releases under Article 9; Hazardous Waste Regulations are adequate re: Article 11.	Add definition of “noxious chemicals” to include mercury to Pollution Regulations. Strengthen Parts IX and X of Pollution Regulations to consider releases under Article 9 of the Minamata Convention.
Article 16	Draft Occupational Safety and Health Bill, 2014	Provisions are lacking for: programmes on occupational exposure to mercury and mercury compounds, health-care services for prevention, treatment and care for those affected by the exposure to mercury or mercury compounds etc.	Establish provisions in Occupational Safety and Health Bill for the development and implementation of strategies and programmes relating to the prevention and /or exposure to mercury and mercury compounds, setting targets for mercury exposure reduction, and public education.

Provision of the Minamata Convention	Relevant Act, legislation and regulation	Policy and Legislative Gap Analysis (if present)	Proposed Legal Reform Action (if needed)
	Mining & Mineral (General) Regulations CAP 226	Regulations do not consider use of mercury in mining activities including small-scale artisanal gold mining. No safety measures for use of mercury in mining by small-scale miners	Most practical approach will be to strengthen the Draft Occupational and Health Bill by establishing adequate health and safety provisions to implement Article 16 that also covers miners under Mining & Mineral (General) Regulations CAP 226.
Article 17	Draft National ICM Bill, 2016	Provisions needed for the exchange of information including information on alternatives to MAPs, activities and processes that emit or release mercury or MAPs	Provisions to implement Article 17 regarding information should be established in the Draft National ICM Bill, 2016.
Article 18	Draft National ICM Bill, 2016	Information on*, inter alia*, facilitating health and environmental effects of mercury and mercury Compounds, alternatives to mercury, activities to implement the MCMM are absent in the Draft ICM Bill.	Establish provisions to implement Article 18 in Draft National ICM Bill, 2016
Article 21	Draft National ICM Bill, 2016	Provisions for reporting to Minamata Convention Secretariat on measures taken to implement the provisions are absent	Establish provisions for reporting to Minamata Convention Secretariat on measures taken to implement the provisions are absent in Draft National ICM Bill, 2016

3.2 Assessment of Institutional Capacity

3.2.1 Key Institutions

The institutions described below are set out in order of their priority and duties as regards the implementation and enforcement of the obligations under the Minamata Convention. Statutory bodies are presented separately.

Department of the Environment (DOE)

This DOE is established within the Ministry of Sustainable Development, Climate Change, and Sustainable Development as the entity responsible for the administration of the Environmental Protection Act, Chapter 328. Its powers, duties and functions are set out in section 4 of the Act and in relation to chemicals management and the Minamata Convention they encompass responsibilities to:

• prevent and control pollution by coordinating all activities relating to the discharge of wastes into the environment;

• control the volume, types, constituents and effects of wastes, discharges, emissions, deposits or other sources of emission and substances which are of danger or a potential danger to the quality of the environment;

• issue the necessary licences, with or without conditions, for use for the exercise of activities that may cause pollution;

• recommend measures aimed at controlling pollution resulting from industrial process;

• make regulations:

- to specify the permitted level for the emission, discharge or deposit of pollutants

- to prevent and reduce pollution of the air and water including streams and rivers

- to prohibit the dumping of wastes in the marine environment

- to control and minimise the transboundary movement of toxic and hazardous wastes.

For the purposes of this Part "environmental pollution" means the presence in the environment of any environmental pollutant that endangers human health, the integrity of the

environment, or disrupts the ecological balance (Section 2) and "hazardous substance" means any substance or preparation which, by reason of its chemical or physio-chemical or biological properties or handling, is liable to cause harm to human beings, other living creatures, plants, micro-organisms, property or the environment; and includes but is not limited to the substances specified in the Schedule (under the Act).

Pesticides Control Board (PCB)

The PCB is a statutory Board established under the Pesticides Control Act CAP 216 as an entity under the Ministry of Agriculture etc. geared towards the comprehensive control of pesticides in Belize. duties to control of pesticides in Belize. Pesticides are used mostly in agriculture and public health for the control of pests and diseases. To discharge its mandate the PCB is responsible to:

(a) ensure that all pesticides manufactured, stored, distributed and sold in Belize adhere to and maintain international product standards in compliance with public health regulations;

(b) advise the Minister of Agriculture etc. on matters relevant to the making of regulations under the Act and for advising on and carrying out all the provisions of the Act and its Regulations;

(c) ensure the proper labelling all labels on containers in which pesticides are distributed, exposed or offered for sale;

(d) approve the manufacture, import, store, use, distribution, sale, exposure or offering for sale of pesticides, and;

(e) issue licences to trade in pesticides.

Pesticides are listed in Article 4 Part I: paragraph 1 of the Minamata Convention as a product for which appropriate measures are to be taken in its manufacture, import or export after the phase-out date specified for those products (2020), except where an exclusion is specified in Annex A or the Party has a registered exemption pursuant to Article 6.

Customs and Excise Department

The Department is established under the Ministry of Finance and governs the importation and exportation of goods into and from Belize and the collection of revenue associated therewith. In that process it ensures that goods entering Belize do not present harm to citizens.

In relation to the management of chemicals the Division performs the following important tasks:

i. Restricting the importation and exportation of goods;

ii. Seizure of goods drugs and contraband items, and;

iii. Processing of air and sea passengers and their baggage.

The Division will however require training in the identification and inspection of products that contain mercury destined for importation into Belize. The seizure of goods is conducted as a joint exercise between public health and customs officials and BAHA and such other entities that the Customs Division thinks appropriate to assist them in deciding on such seizure.

Belize Ports Authority

The Belize Ports Authority is a statutory body established to, inter alia:

(a) operate the ports as appears to it best calculated to serve the public interest;

(b) regulate and control navigation within the limits of such ports and their approaches;

(c) to maintain, improve and regulate the use of such ports and services and facilities therein as it considers necessary or desirable.

With respect to the management of chemicals, the Authority plays an important role as it is responsible for the import and export of cargo, which may include chemicals or chemical compounds.

Ministry of Health (MoH)

The MoH is the largest provider of public health services in Belize. The Ministry undertakes to provide affordable care to a majority of Belizeans through a range of public programs and institutions. The Public Health Unit of the Ministry discharges responsibilities for nuisance related offences involving wastes, water quality and pollution control. In its responsibility for food safety the Unit issued public health advisories one of which is entitled “Mercury in Fish from the Macal River and Other Rivers”.

Article 16 of the Minamata Convention requires Parties to promote strategies, develop targets and develop public education relating to the exposure to mercury and mercury compounds. The Ministry of Health is the entity to discharge these responsibilities to ensure compliance with the Minamata Convention.

3.2.2 Statutory Bodies

Belize Bureau of Standards (BBS)

The BBS is established under the Ministry of Economic Development, Petroleum,

Investment, Trade and Commerce. It is the national standards body responsible for ensuring that goods and services, whether produced domestically or imported, meet established regulatory requirements, including those relating to the health and safety of consumers and the environment.

The Bureau determines whether it is on a mandatory or voluntary basis that a product maintains a particular standard. This can relate to MAPs subject to Article 4, paragraph 1 of the Minamata Convention. Together with the Customs and Excise Department, the Bureau of Standards can ensure that products that are already in Belize and those seeking importation meet the standards required under the Minamata Convention on Mercury.

Belize Solid Waste Management Authority (BSWaMA)

BSWaMA was established by the Solid Waste Management Authority Act, 1991, Chapter 224 and is governed by a Board of Directors which sets its policy and strategic directions. The Authority's main purpose is to ensure that solid waste generated in the country is managed in an environmentally sound manner. The BSWaMA cooperates with several key partners including Local Government bodies in discharging this duty. The Department of the Environment which is responsible for setting and enforcing regulations for proper solid waste management is also one of its partners.

National Emergency Management Organisation (NEMO)

The National Emergency Management Organisation was established to preserve life and property in the event of a threat or occurrence of an emergency in Belize and to mitigate the impact on the country. It ensures that adequate preparedness, response and mitigation measures are in place to deal with them. Article 16 of the Minamata Convention on Health Aspects requires Parties to identify populations at risk and to establish health guidelines relating to the exposure to mercury and mercury Compounds. At present NEMO's work does not include the risk of disaster posed by mercury although it may be understood to be included in its mandate. NEMO can coordinate its activities with the Ministry of Health as it exercises its mandate to develop and implement strategies and programmes in accordance with Article 16.

Belize Water Services Limited (BWSL)

Belize Water Services Limited is regulated by the Water Industry Act (section 15), and is a private Company that provides water and sewerage services to the urban areas in Belize including San Pedro Town, Belize City and Belmopan. It aims to provide water supplies and the conservation, augmentation, distribution and proper use of water resources including preservation and protection of catchment areas and sewage and the treatment and disposal of sewage and other effluents. Article 9 of the Minamata Convention concerns controlling and reducing releases of mercury and mercury compounds to land and water from the relevant point sources not addressed in other provisions of this Convention. Confirmation of the discharge of mercury in land and water by gold mining and other processes in Belize could not be identified at the time of the inventory. To meet Article 9 obligations BWS must take measures to control discharges of mercury into water resources and catchment areas in Belize.

National Integrated Chemicals Management Secretariat

Clause 5 of the Draft Model Integrated Chemicals Management Law proposes to establish a National Integrated Chemicals Management Committee to advise the Minister and implement activities on all aspects of integrated chemicals

management. The functions of the Committee are set out under section 19 and include the exchange of information among the ministries and statutory bodies involved with managing hazardous chemicals; developing minimum national standards for the placement of hazardous chemicals on the market; and ensuring the harmonization of Belize's hazardous chemicals management policies and legislation with applicable multilateral environmental agreements and other international and regional initiatives.

Table 31: Summary Life-cycle Management of Mercury and Mercury-Added Products in Belize

Life Cycle Regulators	Stakeholders
Managing Importation	Customs and Excise Department, Bureau of Standards
Managing Placement in the Market	Pesticides Control Board Bureau of Standards Public Health Department Consumer Protection Department
Production, Commercial Sale and Distribution/Own Use	Pesticides Control Board Department of the Environment
Managing Transport and Distribution	Port Authority
Managing Domestic use	Pesticides Control Board Bureau of Standards Department of the Environment
Managing Disposal	Department of the Environment Solid Waste Management Authority

3.2.3 Institutional Challenges and Priorities

To meet the objectives of the Minamata Convention and fulfil the responsibilities needed for implementation of the Convention adequate capacities must be established in institutions that are responsible for protecting human health and the environment from the negative impacts of mercury. Thus, it is of direct relevance for these two sectors and others such as labour, industry, finance and agriculture that discharge responsibilities for the implementation of different aspects of the Minamata Convention to play a critical role in the implementation of the Convention.

Belize demonstrates some institutional capacity to manage chemicals nationally however the administration is fragmented among the various institutions and there's little collaboration between them. The Minamata Convention includes a range of measures to meet its objectives, including the control of emissions and releases of mercury to the environment and the phasing out or phasing down of certain products or components of products that contain mercury or a mercury compound. On becoming a party to the Minamata Convention it is essential that Belize translates its institutional challenges in key areas to establish compliance with the Convention. These areas in relation to the Minamata Convention are discussed below:

i. Mercury and mercury added product import, use

Two institutions, the Customs Department and the Port Authority, are the main entities that manage the import aspect of mercury and MAPs in Belize. The Convention at Article 4 requires a party to take measures to prohibit the import of MAPs listed in Part I of Annex A after the phase-out date specified for those products. The products list is lengthy but those most relevant to

Belize include batteries and compact fluorescent lights.

The Ministry of Trade with guidance from the DOE, establishes the policy with regard to goods that should be prohibited or restricted from importation into Belize. Customs Department takes the necessary action to enforce the Ministry's policy, making the Department directly relevant to mercury management. To prohibit the import of MAPs into Belize the existing Customs list of prohibited or restricted items will require amendment to include these products. In fact, one key role of the Department is to protect Belize from goods and materials which are detrimental to health and well-being. In pursuance of this role, the Department may restrict the importation of specified goods into Belize under other legislation. Pesticides are also listed in Part I of Annex A for which Belize shall not allow importation. Belize may obtain an exclusion for certain pesticides from the Annex. The Pesticides Control Board must improve coordination with the Customs Department in performing these duties.

The Ports Authority also has its role to play in the management of chemicals being responsible for ensuring the conditions upon which goods that are imported shall be carried or warehoused. This will prevent the release of or accidents involving MAPs in warehouses to protect human health and the environment. Mercury –added products are new items to be prohibited or restricted. The Customs Department and Ports Authority will require training in the identification and inspection of mercury-containing products to give effect to the prohibition.

ii. Mercury waste management

Article 11 of the Minamata Convention governs the methods by which a Party manages mercury waste consistently with guidelines developed under the Basel Convention. The Belize Hazardous Waste Regulations, 2009 fulfils this requirement. Its provisions are implemented and enforced by the DOE. The duties assigned to the Solid Waste Management Authority are also relevant to mercury waste management. However, the capacity of the Authority to recycle, recover, reclaim or directly re-use waste needs strengthening. In accordance with paragraph 5, the Authority is encouraged to cooperate with the PCB and DOE and relevant bodies of the Basel Convention to develop and maintain global, regional and national capacity for the management of mercury wastes in an environmentally sound manner.

iii. Environmental management related to Articles 8, 9, 12

The comprehensive implementation of Articles 8, 9, and 12 is essential to meet the Convention's environmental and human health objective and the mechanisms that Parties should adopt in respect of emissions, releases and contaminated sites. In Belize the DOE is entrusted with the enabling authority for pollution control from any source by the Environmental Protection Act Chap. 328 and the regulations made thereunder. Section 4 of the Act establishes the powers, duties and functions of the Department as including to - prevent and control pollution by coordinating all activities relating to the discharge of wastes into the environment; control the volume, types, constituents and effects of wastes, discharges, emissions, deposits or other sources of emission and substances which are of danger to the quality of the environment.

The Public Health Department, in accordance with the Public Health Act, Cap. 40, discharges duties for the "control or reduction of pollution or contamination of the air, soil or water caused by any activity or condition resulting in the emission of a pollutant or contaminant into the environment". The Solid Waste

Management Authority also responsible to discharge environmental management duties with respect to mercury and mercury wastes, in particular relation to contaminated sites. These duties that are enshrined in Article 12 require the Authority to perform its responsibilities "in an environmentally sound manner incorporating, where appropriate, an assessment of the risks to human health and the environment from the mercury or mercury compounds they contain".

In conformity with Section 4 of the Environmental Protection Act Chap. 328, the DOE is responsible to coordinate the activities of the three entities to comply with Articles 8, 9, and 12 of the Minamata Convention. Multisectoral participation in the implementation of the Minamata Convention is crucial and will provide opportunities to strengthen institutional arrangements for the sound management of mercury.

iv. Mercury and health/awareness Articles 16, 7, 4, 10, 12, 17, 18, 19

The protection of human health is at the core of the Minamata and is, both, directly and indirectly addressed and emphasized throughout the Convention. The more salient Articles are cited above.

Article 16 requires a party to develop and implement strategies programmes utilizing health guidelines to protect populations at risk for exposure to mercury and mercury compounds, setting targets for mercury exposure reduction and public education resting these tasks squarely with the public health sector which is the Belize Public Health Department. The risks associated with mercury are also derived from other sectors that have direct responsibilities for ensuring human health and protection of the environment. In Belize the sectors are:

- the mining sector with respect to small scale mining (Article 7),
- the Customs and Excise Department and Port Authority for the importation of MAPs such as skin-lightening creams (Article 4), and;
- the Solid Waste Management Authority in assessing contaminated sites for risks to heath (Article 12).

The PCB provides information on mercury content and has an indirect involvement with the protecting public health. Moreover, the Ministry of Health will play a critical role in activities related to the exchange of information on health, public awareness-raising and research in and monitoring of health, in line with Articles 17, 18 and 19 of the Minamata Convention. In addition, there are different sources and conditions of occupational and environmental exposure. The measures envisioned under the Convention require, therefore, close cooperation between the Ministry of Health and of the DOE as well as other sectors such as labour, industry, the economy, agriculture and others responsible for the implementation of different aspects of the Minamata Convention.

To meet and fulfil the objectives of the Minamata Convention under Articles 16, 7, 4, 10, 12, 17, 18 and 19 the health sector will be required to establish/strengthen adequate human and technical capacities in the Ministry of Health and in all the other institutions mentioned above. For all these activities there will also be a need to establish regulatory frameworks and legislation to cover practically all health-related aspects of mercury and its compounds.

v. Ratifying and implementing the convention- coordination and collaboration

To become a party to the Minamata Convention Belize must ratify or accede to it by depositing the relevant instrument to the Secretariat (Article 30). But before Belize can ratify or accede to the Minamata Convention it has to take steps to ensure

that the country fully understands, inter alia, the obligations and benefits of becoming a party and that the decision is a well-informed one. The steps are:

- Collection and Analysis of relevant documentation

This will involve doing a survey to determine which legislative and administrative measures need to be taken to implement the Protocol; making co benefit analysis of becoming a Party to the Protocol, including implementation of the measures identified.

- Consult with the government office responsible for issuing accession instruments

For Belize the Ministry of Foreign Affairs is the office responsible for drafting ratification instruments for international agreements.

- Identify the constitutional requirements and process for domestic approval of ratification

The DOE in Belize will contact the Ministry of Foreign Affairs to identify which procedure that leads to the ratification of the Minamata Convention it will adopt. There are no stipulations in the Constitution of Belize regarding the decision to ratify international treaties so in practice, the Government uses its authority to join treaties and ratify them.

Ratification makes the Convention binding at the international level but does not make it domestically binding. To do so Belize must enact national implementing legislation to give effect to the Minamata Convention at the national level. Section 4(1) of its United Nations Resolutions and Conventions (Enforcement) Act, Chapter 24:01 establishes the procedure for undertaking that task. According to that Act where Belize becomes a party to a Convention, it is to be submitted to the National Assembly within thirty days for consideration. The National Assembly may either pass a law or the Minister may immediately by Order make such provisions for giving effect to the Convention within Belize. Because the DOE is the lead entity to control discharges, emissions, deposits or other sources of emission and substances (including mercury) which are of danger or a potential danger to the quality of the environment (section 4(d)), it will choose which of the two procedures it will adopt to implement the Minamata Convention.

The Minamata Convention recognizes that a disparity exists in the human, technical and financial capacities of developed and developing countries to implement its provisions. In so doing several Articles of the Convention promote collaboration and collaboration between Parties, intergovernmental organisations and other entities to provide opportunities to strengthen institutional arrangements for the management of mercury. Some prime examples include Article 10 paragraph (4) that directs Parties to cooperate, as appropriate, with each other to enhance capacity-building for the environmentally sound interim storage of such mercury and mercury compounds; Article 11 paragraph (5): where Parties are encouraged to cooperate with each other to develop and maintain global, regional and national capacity for the management of mercury wastes in an environmentally sound manner and Article 12 paragraph (4) where Parties must: cooperate in developing strategies and implementing activities for remediating contaminated sites.

However, Article 14 on Capacity-building, technical assistance and technology transfer is of specific application to developing country Parties and small island developing States which includes Belize. It provides that Parties are to cooperate to provide, capacity-building and technical assistance to developing country Parties, in particular Parties that are least

developed countries or small island developing States, to assist them in implementing their obligations under the Convention.:

Adequate capacity building through collaboration and cooperation among Parties to the Minamata Convention is essential if Belize is to be able to effectively implement the Convention. In addition, there needs to be opportunities for professional development through training that strengthen staff capabilities.

3.3 Recommendations for Policy, Legislative and Institutional Capacity Strengthening

3.3.1 Status of the Existing Policy, Legislative and Institutional Framework for Mercury Management in Belize

In implementing the Minamata Convention, the responsibilities of government and other stakeholders as advocates for reducing the impacts of mercury on health and wellbeing and the environment on the one hand and in discharging their obligations as users of mercury-containing products on the other are inescapable. Belize has shown some policy, legislative and institutional capacity to manage chemicals nationally however a general observation of this study is that these frameworks and practice do not adequately fulfil what is required to attain compliance with the Convention. The project, Development of the Minamata Initial Assessment in the Caribbean (Belize) (MIA Project) was designed to assist Belize in establishing an appropriate governance framework for becoming a party to the Minamata Convention and find ways to assist it with domestic implementation. A multisectoral National Working Group (NWG) was established under the project to formulate and recommend ways for strengthening the policy, legal and institutional frameworks to establish an environmentally sound management framework for mercury and mercury-containing products in compliance with the Minamata Convention. The MIA project therefore presents an ideal opportunity for Belize to overcome the challenges to effective implementation of the Convention through innovative and sustainable governance arrangements and concrete actions to implement its requirements.

Belize has established policies for environment, health, solid waste, agriculture, water and physical planning that provide some background for chemicals management activities and offer some control over the life cycle of chemicals in particular mercury. However, the policy landscape is fragmented, largely sectoral, lacks cohesiveness and direct relevance to the management of chemicals including mercury; making the lack of a comprehensive policy the most frequently identified weakness in chemicals management in Belize. What is needed is a chemicals management policy that establishes comprehensive strategies on mercury risks by outlining what Belize hopes to achieve under its chemicals management structure and clarifying the methods and principles that it will use to achieve them. The Belize National Environmental Policy and Strategy 2014-2024 and the National Development Framework 2010–2030 (Horizon 2030) are inadequate to fulfil these requirements and makes a prima facie case that the country is not yet in a state of readiness to implement the Minamata Convention.

To become a party to the Minamata Convention Belize must ensure that its existing legal framework and practice are consistent with what is required by the Convention. To signal its intention to comply with these requirements, countries are required to establish specified actions within its laws and institutional arrangements. Several pieces of legislation shore up this goal for Belize. Nevertheless, the elemental architecture is scattered in its

many laws and institutions in Belize. The Environment Protection Act, Chapter 328, in Belize serves as an umbrella Act for a variety of environmental issues and empowers the central government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and tackle specific environmental problems nationwide. The other main instruments that come before the others in importance are the Pesticides Control Act, Chapter 216, Environmental Protection Act, Chapter 328, Solid Waste Management Authority Act, Customs Regulation Act, the Public Health Act, Chapter 49, Belize Agricultural Health Authority Act and Standards Act. The DOE prepared a Draft National Integrated Chemicals Management Bill and a Draft Industrial Chemicals Management Regulations in 2017 to institute a response to the existing fragmented legislative framework for the management of mercury and other chemicals.

The implementation of the Minamata Convention also intersects with other environmental treaties. Greater attention to the environmentally safe handling and disposal of mercury wastes creates policy-making and management linkages with parallel efforts under the Basel Convention, Stockholm Convention, the Rotterdam Convention and the Cartagena Protocol. The Draft Law also seeks to implement these treaties and other MEAs to which Belize is a party.

The Minamata Convention, in addition to the legal framework, also obliges Parties to establish appropriate institutional arrangements for fulfilling its obligations. Presently these entities operate in silos in Belize. They are fragmented and dispersed among related sectors with the result that chemical management is being implemented on a sectoral basis, reducing impact. The establishment of a comprehensive entity were proposed in a Draft National Integrated Chemicals Management Bill to address these weaknesses. In the Bill all key agencies vested with the task of regulating chemicals function under one Board. The agencies include the Registrar of Pesticides, representatives from Health, Pharmacy, Pesticides and academia. (During the field visit to Belize during 23-25 January 2019 officials expressed the view that the Solid Waste Management Authority is unlikely to be represented on the Board. This was attributed to the limited role of the Authority towards chemicals management including mercury).

A Chemicals Unit is also created and staffed by specialist officers who deal with chemicals management only. All officers will be enforcement officers. A much earlier enactment, the Pesticides Control Act, 1988 mirrors these provisions. However, it is only applicable to the management of pesticides. The Draft National Integrated Chemicals Management Bill, 2017 prepared by the DOE and the GEF 5558 Model Draft Law which was later drafted and of similar scope should be considered for implementation in Belize. Both the Draft Bill and Model Law incorporate these institutional mechanisms for fulfilling obligations under the Minamata Convention.

3.3.2 Recommendations

The Minamata Convention puts forward a range of measures related to the management of mercury pollution and of exposure of humans and the environment. From the study there is indication that the existing framework does address some of the measures for implementing the Convention. However, it is obvious that not all these measures are covered within the existing governance arrangements in Belize and several barriers still persist to Belize ratifying and adequately implementing the Minamata Convention. The barriers include insufficient technical and human resources to manage mercury

effectively, the absence of adequate statistical data on the quantities of mercury emitted or released into the environment and scarce financial resources.

There is still work to be done as it regards to production of statistical data on the importation, production and export of mercury and MAPs, accessing data on chemicals and chemical waste, data management and the development of a system of sharing data within relevant institutions. More emphasis needs to be placed on education and awareness of the proper use of chemicals and disposal of chemical waste and on the effects of mercury on human health and the environment. It is anticipated that non-governmental organisations operating in Belize will take up this activity. There is a need for technical and financial support to deliver on this task. Any programme that evolves should encourage and include academic and research institutions, industry associations, trade unions and professional representative bodies that have an interest in the sector.

Typically, donors do not consider chemical and waste management issues as stand-alone issues but consider them as integral parts of development assistance programmes and projects, considering inter alia economical, ecological, cultural and sociological issues. Activities, some of which are mentioned above, are more effectively delivered at the sub-regional or regional levels. Among them cooperation in development and transfer of technology of safe chemical substitutes and the development of capacity for their production are included. New initiatives are particularly needed to develop and manufacture best available technologies that are appropriate for and affordable to Belize. Belize may seek the assistance of the BCRC-Caribbean to provide assistance to strengthen policies and strategies for implementation and enforcement of environmentally sound management of chemicals and waste. Synergies may also be created with south/south counterparts with a view to exchanging information and experiences. Consequently, the policy framework in Belize must be logically connected to their national strategies for sustainable development and integrated into the national development process in order to access donor support.

Following are the recommendations that are put forward as steps that should be initiated in Belize to address the barriers mentioned above.

The Government of Belize should:

- Establish a harmonised policy on the management of chemicals in Belize.

- Enact a comprehensive legislative and regulatory framework for the management of chemicals including mercury to control the manufacture, registration, application, labelling, packaging, marketing, transportation, storage, use and disposal of chemicals including MAPs. The DOE 2017 Draft Integrated Chemicals Management Law and Model Draft Integrated Waste Management Act developed under the GEF 5558 Project executed by the BCRC-Caribbean advance such a framework and should form the basis of the enactment. Both instruments should be harmonised to produce a single the National Law;

- Improve collaboration among the relevant institutions and agencies involved in chemical management;

- Increase infrastructural capacity;

- Establish a National Inventory on the importation and disposal of chemicals;

- Undertake training for Customs and Port Authority officials on procedures for the identification, inspection and confiscation of the management of chemicals;

- Undertake public awareness and education programmes on the impacts of mercury on human health and the environment;

- Assess the costs associated with the ratification of the Minamata Convention among the implications of ratifying the Convention;

- The Belizean Assembly has a critical role in ensuring that the legislative measures required by the Minamata Convention are adopted. It should promote political will to enact the legal framework for the management of chemicals.

Overall, it was the shared impression that the activities to be taken as barriers are not insurmountable and may, by common effort between relevant stakeholders and civil society, be removed by establishing an integrated framework for the management of chemicals. The Draft law prepared by the DOE in 2017 and the Draft Integrated Chemicals Management Act that was prepared under the GEF 5558 project these barriers may be potentially removed.

Table 32: Summary of Applicable Regulatory Framework and Proposed Action for Implementation of the Minamata Convention

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
Article 1 ***Objective***	DOE	Environmental Protection Act, Chap. 328 (Rev. 2011) National Environmental Policy and Strategy 2014-2024 National Development Framework 2010–2030 (Horizon 2030)	Sections 2 & 17 [Schedule] Sections 6 & 7 (i)	Belize prohibits the grant of permits and licences containing mercury and mercury compounds. Minister must make regulations for the prevention and reduction of pollution of the air and water including streams and rivers;	Prescribe regulations to control the release, discharge of mercury and mercury compounds
Article 4 ***Mercury-added products*** ***Schedule B Part 1***	DOE Customs & Excise Dept.	Customs Regulation Act, Chapter 49: Customs Regulations (Prohibited and Restricted Goods) (Consolidation) Order, 1988	Schedule 1	Belize must prohibit the import of applicable products in Schedule B Part 1	Consolidated list of goods that made under section 103(2) under the Customs Regulation Act should be amended to prohibit the import of MAPs
Article 7 ***Annex C***	Mining Unit Ministry of Natural Resources	Environmental Protection Act Cap. 328 (Rev. 2011) Mines and Minerals Act, Cap. 26 (Rev. 2000)	Section 4(b) and (c)	Belize must prohibit the use of mercury in artisanal and small-scale gold mining activities if it is deemed to be more than insignificant according to the Convention's guidelines.	Presently Belize does not engage in the use of mercury in the artisanal and small-scale mining sector as referred in Annex C but exploratory gold mining has been noted in Belize so future developments should be assessed if applicable.
Article 8 ***Emissions***	DOE	Environmental Protection Act, Chapter 328 (Rev. 2011)	Section 4(d)	Belize to reduce emissions of mercury and mercury compounds from the most significant point sources.	Pollution Regulations should be amended to establish specific measures to control emissions.

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
	Public Health Department	Public Health Act, Cap. 40 (Rev. 2011) Pollution Regulations, 1996 Pollution (Amendment) Regulations, 2009 Standards Act, Cap. 295 (Rev. 2003)	Regulations 133 and 135 PART II- V (inclusive)		Emission standards should be established under Standards Act Cap.295
Article 9 ***Releases***	DOE Public Health Department	Environmental Protection Act, Cap. 328 (Rev. 2011) Environmental Protection (Effluent Limitations) Regulations, 1995 Environmental Protection (Effluent Limitations) (Amendment) Regulations, 2009 Pollution Regulations, 1996 Public Health Act, Cap. 40 (Rev. 2011) Belize Maritime Areas Act, 1992	Section 4(c) and (e) Regulations 133 and 135	DOE and Public Health Department must collaborate to avoid duplication of effort and fill gaps.	Inventory of point sources that discharge on land and into waterways must be created.
Article 10	Public Health Department	Public Health Act, Chapter 40 (Rev. 2011)	Regulations 133 and 135	The National Solid Waste Management Strategy so focuses primarily on	The country must provide secure locations for Interim storage of mercury.

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
Interim storage of mercury (ISM)	Solid Waste Management Authority Bureau of Standards	Solid Waste Management Act No 31 of 2000 Environmental Protection Act, Chapter 328 (Rev. 2011) Standards Act Chapter 295 (Rev. 2003)	Regulations that address ISM are lacking	developing new systems for the environmentally-safe disposal of wastes etc. It should expressly consider interim storage of mercury.	Standards for interim storage of mercury should be established to ensure its safety.
Article 11 ***Mercury wastes***	DOE	Environmental Protection Act Chap. 328 (Rev. 2011) Hazardous Waste Regulations, 2009	Sections 4 (c) and 6	A framework for the chemical life cycle is lacking. Draft Integrated Chemicals Management Bill, 2017 Draft Integrated Chemicals Management Bill, 2017 and Draft Model Integrated Chemicals Management Bill, 2018 will address this gap	The Draft Model and the Draft Integrated Chemicals Management Bills establish a holistic framework for chemicals and should be harmonized.
Article 12 Contaminated Sites	Public Health Department Solid Waste Management Authority DOE	Public Health Act, Chapter 40 (Rev. 2011) Solid Waste Management Act No 31 of 2000	Regulations 133 and 135 Hazardous Waste Regulations	Legislative coverage for contaminated sites by mercury in should be established in law geared to reduce the risks posed by such sites.	Belize should access financial resources, capacity-building and technical assistance available under the Convention.

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
		Environmental Protection Act, Chapter 328 (Rev. 2011) Standards Act Chapter, 295 (Rev. 2003) Draft Integrated Chemicals Management Law, 2017 Draft Model Integrated Chemicals Management Law, 2018	Section 4 (d)		
Article 16 ***Health aspects***	Labour Department NEMO Public Health Department	Draft Occupational Safety and Health Bill, 2018 Belize Disaster Preparedness and Response Act, Chapter 145 Public Health Act, Chapter 40 (Rev. 2011)	Regulations are absent Regulations are absent Regulations are absent	Draft Bill must be amended to establish provisions for managing risks associated with mercury exposure including training for health professionals	Amendment to foster collaboration between NEMO, Public Health and Labour Departments in managing risks related to mercury exposure.
Article 17 ***Information exchange***	Public Health Department	Public Health Act, Chapter 40 (Rev. 2011)	Integrated Chemicals Management Regulations is still in draft	Information sharing between key stakeholders should be promoted. Belize may consider establishing a clearing	Collaboration among entities responsible for management of chemicals should be promoted

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
	Solid Waste Management Authority DOE	Solid Waste Management Act No 31 of 2000 Environmental Protection Act, Cap. 328 (Rev. 2011) Draft Integrated Chemicals Management Bill, 2017 Draft Model Integrated Chemicals Management Bill, 2018		house mechanism for information.	
Article 18 *Public information, awareness and education*	Ministry of Health Public Health Department DOE	Public Health Act, Chapter 40 Environmental Protection Act, Cap.328 (Rev. 2011) Draft Integrated Chemicals Management Bill, 2017 Draft Model Integrated Chemicals Management Bill,	Drafts include provisions for public information, awareness	Public information, awareness and education- identifies key information that governments need to share with the public and the mechanisms that can be employed for public awareness-raising	Draft Integrated Chemicals Management Bill, 2017 Draft Model Integrated Chemicals Management Bill, should establish provisions for public information, awareness and education

Provision of the Minamata Convention	Relevant Institutions	Relevant Policy/Legislation	Relevant Provision	Implication for Belize	Proposed Action
Article 20 Implementation Plans	DOE	Draft Integrated Chemicals Management Bill, 2016 Model Draft Integrated Chemicals Management Bill	Drafts make provision for Implementation Plans	DOE is required to develop implementation plan to assess its compliance with the Convention	This reporting exercise is similar to reporting requirements under other MEAs,

Chapter 4: Identification of Populations at Risk and Gender Dimensions

4.1 Preliminary Review of Potential Populations at Risk and Potential Health Risks

Mercury has the ability to travel long distances in the atmosphere, persist in the environment, accumulate in ecosystems and significantly adversely affect human health and the environment and as such, has caused major concerns worldwide. Exposure to mercury can be chronic through long term contact or acute over a brief period of time at high dosage (World Health Organization, 2017). Extensive exposure disrupts the central nervous system which causes tremor, insomnia and memory impairments. Whereas, acute exposure aligns with symptoms such as nausea, abdominal pain, bloody diarrhea, kidney damage or even death (Shirkhanloo et al., 2014).

Although mercury is dangerous to all humans, there are groups that are more sensitive to the health effects and factors that determine the severity of the effects. These factors include:

- Form of mercury (methylmercury is more toxic to humans);
- Amount of mercury;
- Age of person exposed;
- Duration of exposure;
- Route of exposure; and
- Dietary patterns of fish consumption (UNEP/WHO, 2008).

Women of childbearing age; pregnant women; fetuses; newborns; and young children (less than 12 years of age) are included in the groups that are more sensitive to the effect. Fetuses and children are at highest risk when exposed to mercury because their nervous systems are still developing. Studies have shown that the concentration of mercury within a fetus is higher than that of the mother due to active transport of the mercury through the placenta (UNEP/WHO, 2008). Newborns and young children (under the age of 5) are susceptible to the effects of mercury as their nervous systems and organs are still developing (“Growth and Development of Children”, n.d.).

Populations or groups with continuous exposure to high levels of mercury are also more susceptible to the health impacts from mercury. These groups typically include persons with diets featuring significant amounts of fish, especially in fishing coastal communities, and those exposed through occupational roles, such as engaging in waste management activities (directly interacting with waste), healthcare workers, dental personnel and certain industrial workers such as those in cement production facilities or any processes that may use mercury directly in the process such as chlor-alkali facilities (not applicable to Belize). A preliminary risk assessment of populations at risk is shown in Table 33. Persons who fall within more than one of the categories identified should be assessed as a higher risk.

Table 33: Preliminary risk assessment of populations at risk due to sensitivity to mercury (UNEP/WHO, 2008)

Population	Description	Risk Level
Pregnant women and fetuses	Methyl mercury concentrations in fetuses' blood are 1.5 to 2 times higher than his/her mother. This high rate is due to the "active transport of methylmercury to the fetus through the placenta". Fetuses are especially at risk to high mercury levels as their developing nervous systems are very sensitive. Women of childbearing age who are planning to have a child should also be warned of this risk.	High
Nursing women and infant children	Mercury levels within nursing women's blood stream can be transferred to infants via breast feeding. Risks are high due to the child's developing central nervous system.	High
Persons with certain illnesses	Persons with diseases of the liver, heart, kidney, nerves/nervous system and lungs, as well as those who suffer from undernutrition (especially lack of zinc, glutathione, antioxidants, or selenium) and malnutrition are vulnerable to unsafe levels of mercury as their bodies are ill-equipped to protect itself against it.	High to Moderate
Older children and adolescents	Research has shown that although the risk levels are lower, children up to the age of 17 are more at risk to harmful mercury effects when compared to adults. Again, this is due to the fact that the human central nervous system develops from birth to adolescence.	Moderate to Low

Article 16 of the Minamata Convention encourages Parties to develop strategies and programmes to identify these sensitive groups and populations at risk to adopt science-based health guidelines and targets to reduce the negative health impacts of mercury exposure, and to increase the capacity of health-care systems to be able to better monitor, prevent and treat affected populations.

4.1.1 Mercury exposure to humans through seafood

The consumption of fish provides numerous health benefits, such as the provision of important nutrients like Omega-3 for healthy growth and development. However, with the presence of mercury in different waterbody hotspots, methylmercury can be formed and can biomagnify and bioaccumulate in aquatic food webs, potentially contaminating an important food source for the population. Predatory fish and large fish species with longer lifespans tend to contain elevated levels of mercury and therefore extensive consumption of these species can increase the mercury levels and affect human health.

There are many studies on the impact of methylmercury toxicity to the neurological, cardiovascular, and immune systems within humans. For example, neurological impacts are often measured and become evident through lowered IQ levels (Spadaro and Rabl, 2008) and through various neuropsychological tests (Grandjean et al., 1998). Cardiovascular and immunological impacts are often related to chronic exposure to mercury (Sweet and Zelikoff, 2001; Downer et al., 2017). The relative impacts from methylmercury's toxic effects can vary across human populations as some groups are more sensitive to the impacts of exposure. Methylmercury is known to affect neurological development in children and is also linked to cardiovascular disease in adults (Clarkson et al., 2003; Valera et al., 2011; Grandjean et al., 2012).

Since fish and other seafood are regularly eaten by populations in Belize, groups in this country have a higher risk of exposure

to mercury through the frequent consumption of aquatic species with bioaccumulated mercury. Health based organisations such as the WHO, the United States Environmental Protection Agency (U.S. EPA) and the European Commission (EC) have examined fish mercury concentrations to identify the types of fish that are likely to have higher mercury content, and to develop consumption guidelines which indicate the number of seafood meals that could be eaten to stay within recommended doses.

Table 34 shows guidelines for the safe consumption of seafood containing mercury that were created based on the U.S. EPA reference dose of $1x10^{4}$ mg of Hg/kg of body weight/day, a body weight of 132 pounds (60 kg) for an adult female person, and a fish meal size of about 6 ounces (170 grams). These guidelines are for muscle tissues in fish as >95% of Hg in the methyl form, and therefore this consumption guidance cannot be directly used with the shellfish total mercury data.

Table 34: U.S. EPA guidance for seafood consumption based on mercury concentrations

Mercury in Seafood (ppm, ww)	Consumption Guidance
≤ 0.05	Unrestricted
0.05 - 0.11	2 meals per week
0.11 - 0.22	1 meal per week
0.22 - 0.95	1 meal per month
> 0.95	No consumption

For further reference, the WHO and the EC general guidance level for fish mercury concentrations is 0.5 ppm with an "exemption" for larger, predatory fish species of up to 1.0 ppm, which is similar to the U.S. EPA "no consumption" level.

In 2019, a rapid assessment of mercury in fish concentrations in opportunistic samples of fish intended for human consumption (purchased at fish markets or obtained directly from rivers) was conducted by BRI which found some levels that generally exceeded both the safe consumption guideline of 0.22 ppm established by GLC in 2007, and the less-conservative guideline of 0.5 ppm ww, jointly proposed by the WHO and the UN FAO, for fish and fish products (Codex Alimentarius 2009). This indicated that further strategic sampling efforts should be conducted in the future to validate findings.

The continued monitoring of mercury in fish and seafood in Belize needs to be improved to ensure accurate exposure estimates over time, and to inform advisories on healthy dietary practices throughout the country.

4.1.2 Occupational and environmental exposure to mercury

Individuals are often unaware of the possible exposure to mercury and mercury compounds in their everyday, occupational or environmental surroundings. The International Labour Organisation (ILO) reports that 22 percent of workplace fatalities and work-related diseases worldwide are due to improper handling of chemicals and other hazardous substances (Global Employment Trends, 2004). Population groups that have an increased frequency of exposure are at greater risk to the effects of mercury. Table 35 below provides an assessment of the populations who are exposed to higher levels of mercury and their risk level.

Table 35: Preliminary risk assessment of populations at risk due to high/higher mercury exposure

Population	Description	Risk Level
Fishing communities	Persons who frequently consume fish, especially larger predator species, are more at risk to mercury contamination. The level of risk can vary and is dependent on how much	High to Moderate

Population	Description	Risk Level
	fish is consumed, the type of fish consumed and the fish's level of mercury contamination. Recommended mercury consumption guidelines are set by GLC of the Great lakes Fish Advisory Workgroup and WHO and should be consulted by consumers.	
Pescatarians/ frequent fish consumers	Pescatarians, people who do not eat any meat other than fish, or persons who consume fish frequently, are also at high to moderate risk of experiencing adverse mercury health effects due to the frequent consumption of potentially mercury-contaminated aquatic species.	High to Moderate
Persons who work in the waste sector formally or informally	MAPs enter the landfill through general and medical waste streams. Mercury exposure from this occupation can occur if broken bulbs and other damaged MAPs are included in wastes being handled. Training on environmentally sound management of MAPs, upkeep of the machinery and the use of proper safety equipment will reduce the risk of workers being exposed to harmful levels of mercury from the disposal of MAPs. However, without these measures, a moderate risk level stand.	Moderate
Medical and laboratory workers	Some medical and laboratory equipment such as blood pressure gauges and thermometers contain mercury. Exposure to mercury may occur during breakage and subsequent disposal of mercury containing equipment. The risk of exposure in this manner has been determined to be moderate as breakage may not be a common occurrence. Public awareness on the hazards of mercury exposure and proper disposal procedures are not prevalent in Belize.	Moderate
Persons who regularly use cosmetics which contain mercury, particularly skin-lightening creams with mercury	Some cosmetic products are known to contain low to high amounts of inorganic mercury or organic mercury. Mercury in its inorganic form is used for its skin bleaching properties in products such as skin lightening and anti-aging creams. Mercury is known to "inhibit the formation of melanin, the pigment that gives human skin a dark colour" (BRI, 2018). Such use of mercury is often illegal; and where industries are unregulated, dangerous levels of mercury may be used in the creams. Constant exposure to mercury in cosmetic products can lead to mercury poisoning. The level of risk is identified to be moderate to low as cosmetic products which contain mercury are not known to be present in Belize based on factfinding conducted during the inception stage of the MIA Project by the technical expert team, BRI.	Moderate to Low
Persons with dental amalgam	Dental amalgam, used to fill tooth cavities, is made of a combination of mercury, silver, tin and copper. According to UNEP and WHO (2008), persons with dental amalgam fillings have been found to have higher levels of mercury in their bodies when compared to those who do not have dental amalgam fillings. This is due to the inhalation of and/ or ingestion of elemental mercury releases from the fillings. Therefore, the associated risk is considered to be moderate to low.	Moderate to Low
Dental practitioners	Dental practitioners who utilize dental amalgam are exposed to low levels of mercury via inhalation of elemental mercury from the amalgam during mixing and installation. Consultation with the Ministry of Health reveal that the use of dental amalgam has been mostly phased out in Belize.	Low

Training on the risks of mercury exposure and personal protective equipment should be required by all workers in the fields highlighted in Table 25. Best environmental practices (BEP) and best available techniques (BAT) should be identified and promoted to ensure that professionals in Belize use environmentally sound clean-up methods when handling broken mercury containing items. Source separation of mercury wastes should also be promoted in order to reduce the quantities of this waste stream entering the landfills and to decrease the risk of exposure by waste handlers. Awareness raising on the potential presence of mercury in waste products should be conducted for relevant stakeholders.

People living downstream/downwind to, or within areas which are sensitive to mercury contamination are also at an increased risk to the adverse health effects caused by mercury exposure. These higher risk areas are typically around hot spots and point sources of uncontrolled mercury release such as the informal dumpsites throughout the country (referring to any location where waste is disposed of in an uncontrolled or unmonitored manner). Measures should be put in place for the control of mercury releases at these sites to prevent emissions to the environment and decrease the risk to nearby residents. Potential testing of persons who may have been exposed to mercury should also be considered.

4.2 Assessment of Potential Gender Dimensions related to the management of mercury

Gender equality is an integral part of the implementation of the Minamata Convention as it is important to represent equality of the experience and realities of all members of society. The United Nations Economic and Social Council (UN ECOSCO) has defined 'gender mainstreaming' as "a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of the policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated" (UNDP, 2007). It is recommended that gender mainstreaming considerations be incorporated into national activities for the implementation of the Minamata Convention in Belize and also for activities related to achieving the United Nations Sustainable Development Goals.

Gender difference in occupational roles, household roles and cultural practices can affect the level of mercury exposure to men and women and furthermore, toxic chemicals can affect men and women differently due to their varying biological factors. Chemicals can also affect men and women at different stages of their life and women especially tend to have time periods during which they are more vulnerable to the exposure to chemicals and consequently this exposure can result in serious consequences for their babies. Chemicals transferred during fetal development can cause lifelong harm.

4.2.1 Occupational Exposure

In SIDS, it is common to have certain occupational roles and tasks that may be more oriented towards men and vice versa and depending on these occupational roles and social circumstance, there are gender differences towards greater risk of exposure to toxic chemicals, including mercury.

In Belize, the working population is equally split between men and women, however, men are more likely to be exposed to and use chemicals as indicated by their higher levels of participation in the main sectors of the economy associated with chemicals use and management. Women are also exposed to chemicals at a higher level in the domestic spheres.

A more in-depth study of the gender ratios for these professions is needed to accurately confirm and quantify patterns of exposure and at-risk populations. Research should also be conducted to identify the difference in the effect of mercury exposure for men and women. Gathered information should inform a national strategy for reducing the risk of occupational exposure to mercury. The concerns and experiences of each gender should be specifically considered when developing a risk management strategy as each gender is affected in different capacities due to varying environments. Developed policies and programmes should be designed, implemented, monitored and evaluated based on the primary vulnerable group at risk for each field, and in such a way as to equally benefit both men and women or affected group.

4.2.2 Cosmetic Exposure and Gender Differences

Mercury is sometimes used in skin care products and cosmetics found on the markets throughout the Caribbean. For the purpose of skin-lightening and anti-aging soaps and creams, mercury salts are added to inhibit the formation of melanin, the pigment that gives human skin, hair and eyes their color, and as a result lead to a lighter skin tone. Trace amounts of mercury are also legally added to some cosmetics, like mascara, for its properties as a preservative in preventing the growth of microorganisms (BRI, 2018).

It is assumed that if members of the population are indeed engaged in the use of these products, exposure would primarily be to women as global studies have indicated that women are more likely to use these products than men (Pierre-Louis, 2017). Some research has shown that the use of skin lightening creams by women with children have led to greater risks of mercury transfer to their children. Copan, et al., 2015 detailed a case in which a 20-month-old child was diagnosed with mercury poisoning which was attributed to the use of a skin lightening cream (found to contain 38,000 ppm Hg) by the child's mother. The child may have been exposed through skin-to-skin contact, breastfeeding or potentially direct interaction with the cream.

Under the Minamata Convention, Parties have to end the import, export and manufacture of cosmetics with potentially harmful concentrations of mercury (above 1 ppm – parts per million) by 2020.

In many of the Caribbean countries, labelling is not regulated, manufacturers are not required by law to list all the ingredients of their products and some labels on imported products are often written in a foreign language. Consumers of these skin-lightening products are therefore at risk to mercury exposure without even having the knowledge that harmful chemicals are components of the product. It is important to raise awareness regionally on the potential health risks associated with these mercury-containing products.

Chapter 5: Awareness/Understanding of the Workers and Public; and Existing Training and Educating Opportunities of Target Groups and Professionals

The level of awareness on the risks of mercury among identified stakeholders and target populations in Belize vary based on the information made available to them. Measures should be put in place to educate these groups on the hazards of mercury exposure, the possible action to mitigate risks and to reduce mercury releases overall.

Article 18 of the Minamata Convention on Mercury states that:

1. *Each Party shall, within its capabilities, promote and facilitate:*
    a) *Provision to the public of available information on:*
    i. *The health and environmental effects of mercury and mercury compounds;*
    ii. *Alternatives to mercury and mercury compounds;*
    iii. *The topics identified in paragraph 1 of Article 17;*
    iv. *The results of its research, development and monitoring activities under Article 19; and*
    v. *Activities to meet its obligations under this Convention;*

    b) *Education, training and public awareness related to the effects of exposure to mercury and mercury compounds on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate.*

2. *Each Party shall use existing mechanisms or give consideration to the development of mechanisms, such as pollutant release and transfer registers where applicable, 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.*

The development of a communications strategy to raise awareness on the issues of mercury is also a component under the MIA project. Stakeholders from the relevant government sectors such as waste and health as well as NGO stakeholders have been made aware of the areas of focus for sound mercury management throughout the project through working group meetings.

Additionally, awareness raising materials were developed and adapted with consideration for mercury issues that are most relevant to the Caribbean context. The materials included:

1. A series of brief animated videos with accompanying 10-second-long video teasers and promotional digital flyers on the following topics *(developed in coordination under previous GEF 9865 MIA Project and adapted):*
    a. The Mercury Cycle
    b. Background on the Issue of Mercury Globally
    c. Mercury in Household Products (Figure 9)
    d. Mercury in Skin-lightening Creams and its Potential Health Effects
    e. Mercury and Diet;

Figure 9: Still image of animated video developed on mercury in household products

2. Four (4) infographics *(developed under previous GEF9455 MIA project and made available)* on the following topics:
    a. Mercury in Household Products (Figure 10)
    b. Mercury in Industrial and Medical Devices
    c. Mercury in Cosmetics
    d. Mercury and Health;

Figure 10: Excerpt of Mercury in Household Products Infographic Developed

3. National brochure on the State of Mercury in Belize developed by BRI based on the results of the MIA project;

4. Technical briefing documents on:
    a. Belize Biomonitoring brief developed by BRI;
    b. Belize Ecosystem Sensitivity Mapping Brief developed by BRI;
    c. Lessons Learned and Good Practices Report;
    d. Draft National Legal Briefing Note.

Based on the materials produced, a communication strategy for mercury awareness was developed for Belize.

Examples of communication channels included:

1. **Social Media Platforms**: Using the different social media platforms for the DOE and other national stakeholders, as well as the BCRC-Caribbean can allow the messages to reach a wide audience as well as provide the platform to share the products with many other agencies and organizations. Many environmental NGOs can be engaged to share the material on their social platforms as well. Through the use of appropriate hashtags, the messages can be spread across the nation with little effort. The animated videos developed will be launched on the BCRC-Caribbean's and DOE's social media platforms in March 2021.

2. **Public Service Announcements via Television and Radio Platforms:** Engaging popular news channels and radio stations is another media form to ensure visibility of the videos produced.

3. **Environmental Campaigns and Events:** Many countries have nation-wide awareness events or campaigns to increase public education on current environmental concerns. Joining efforts and resources can add value to these environmental events and increase the general knowledge base of the population. Many campaigning events reach a large variety of target groups.

4. **Partnering with NGOs, Youth Groups or Other Project Initiatives:** Many environmental NGOs, youth groups, Rotary Clubs and community groups already have a following or an audience to engage when spreading a message. These awareness-raising products, along with the supporting document and a brief training done by the National Supervisor and/or BCRC-Caribbean, can be shared among interested groups to assist with carrying the message further with joint efforts.

5. **Engaging Local Health Institutions and Store Owners:** Contacting local stores that sell certain MAPs, such as skin-lightening creams or CFL bulbs, can allow for the messages to be understood from the seller's perspective. The flyers or infographics provided can be put in the stores to potentially influence the consumer's behaviour at the direct source. Similarly, with community health institutes, flyers can be placed in the waiting room to engage specific target groups such as pregnant women or women of child-bearing age. Some health institutes have television screens or monitors in the waiting room which can also show the animated videos.

6. **Engaging Students at Primary and Secondary Level:** Through coordination with the Ministry of Education, there are multiple approaches that can be taken to engage students to raise awareness on these mercury issues. One approach can include engaging schools with the provision of an educational package, including a brief training or instruction set for the teachers. This will allow for the information to be incorporated into their lesson plans, curriculum or as a school assembly programme. Another approach can be to host a student workshop where specific classes or students from different schools can attend. These workshops can include presentations, theatre-style video viewing, a drama skit on the topic (Figure 11) and an interactive question-and-answer engagement session.

Figure 11: Local Drama Youth Group mercury awareness skit under the GEF9455 MIA Project previously executed

7. **Engaging Policy Makers:** In addition to the National Minamata Initial Assessment Report, the communications package includes technical briefing documents which will provide information to all key stakeholders and government officials. These documents provide the results of the different components of the project, including the results of the add-on sampling initiatives. These materials will assist in high-level stakeholder engagements or in drafting relevant cabinet briefing notes to promote the ratification and implementation of the Minamata Convention.

The communication strategy can be tailored to meet the priorities of Belize, given the available resources, collaborations and network in the country.

Table 36 summarises considerations for dissemination of the materials developed based on particular target audiences.
Due to the onset of the COVID-19 pandemic, the communication strategy developed under the MIA Project was updated for implementation in 2021.

Table 36: Target Audience Considerations for Dissemination of Communication Material

Audience	Key Message	Channel
General Public / Households	• **Diet:** All products listed • **Health:** Animated Video with associated material and Infographics • **Consumer Products:** All products listed • **Mercury situation in the Caribbean:** Animated Videos with associated materials and live-action video.	Social Media Television Radio Community Meetings Posters & Flyers Training of community health professionals and NGOs for further dissemination
Students	• **Diet:** All products listed • **Health:** All products listed • **Consumer Products:** All products listed • **Mercury situation in the Caribbean:** Animated Videos with associated materials and live-action video.	Social Media Posters Student Engagement Workshops Training of teachers and incorporating into lessons plans
Pregnant Women and Women of Child-bearing age (18-44)	• **Diet:** All products listed • **Health:** Animated Video with associated material, Infographics and Flyer • **Consumer products:** Infographics • **Mercury situation in the Caribbean:** Animated Videos with associated materials and live-action video.	Social Media Posters in Health Centres or Doctor/Dentist offices Television Radio Training of health professionals and NGOs/Women's Groups for further dissemination
Private Sector, Importers and Retailers	• **Consumer products:** All products listed	Stakeholder Meetings Television
Government Agencies / Policy Makers	*Although all products can be used, the more technical products are listed here. • **Diet:** Fish Card and Flyer • **Health:** Infographic Flyer and Report • **Consumer Products:** Infographic	Television Briefing Meetings Government Awareness Events Training of customs and health officials

Chapter 6: Implementation Plan and Priorities for Action

Belize is not yet a Party to the Minamata Convention. Chapter 3 of this report provided an outline of the legislative recommendations for consideration in the implementation of the Minamata Convention. This Chapter highlights some of the practical considerations, based on the findings of the inventory, that may be taken should the Government of Belize choose to become a Party to the Minamata Convention.

Article 20 of the Text of the Minamata Convention on Mercury states that, "each Party may, following an initial assessment, develop and execute an implementation plan, taking into account its domestic circumstances, for meeting the obligations under this Convention" (UNEP, 2019b). Recommended priorities for action that can provide a basis to the development of an implementation plan are outlined this chapter. The development of an implementation plan is the responsibility of the respective Government and is optional. Coordination for the development of a Guidance on national implementation plan development is available through the Global Mercury Partnership and official Minamata Convention on Mercury website. Financial assistance for the implementation of national priority actions is available for Parties to the Minamata Convention as per Article 13 which establishes a mechanism for the provision of financial resources through the Global Environment Facility Trust Fund and a Specific International Programme to support capacity building and technical assistance. Article 14 further lists provisions for capacity building, technical assistance and technology transfer to developing country Parties and countries with economies in transition through regional, sub-regional, national, multilateral and bilateral arrangements and partnerships.

Priority 1: Accession to the Minamata Convention on Mercury

In order to determine the needs for implementation of the Minamata Convention, consultation with various stakeholders is required. Stakeholder participation through consultation with the National Working Group and Focal points for the project is critical to arriving at recommended actions that are suitable to Belize. The information contained in this study was obtained through consultations with government officials and one NGO as stakeholders involved or having an interest in the management of chemicals (provided in Annex 1). Their input was beneficial in clearly identifying what was essential for example, the preferred institutional arrangements, the legislative reform measures, amendments to the policy framework and the timeframe within which the activity will be completed as compliance measures for the ratification and implementation of the Minamata Convention. It is important to note that most stakeholders identified the same gaps and other specific issues of concern.

By participating in the MIA project, Belize has an opportunity to strengthen its governance capacity for the implementation of the Minamata Convention. The country is a Party to other chemicals-related MEAs – Basel, Stockholm and Rotterdam Conventions, Montreal Protocol and Cartagena Protocol- and participates in the Strategic Approach to International Chemicals Management (SAICM) programme. Belize may expand the opportunity presented by the MIA to establish a broad-based chemicals management framework that incorporates these other chemical-related MEAs within its policy, law and institutional arrangements for the Minamata Convention to establish an overall

comprehensive chemicals management framework.

Each organizational format has strengths and limitations. The choice is between having several laws and a single law involving multi-sectors for chemicals management. For a small nation with limited resources and professional capacity, a multisector approach with clear responsibilities for leadership and coordination, on balance, as proposed in the two versions of the Draft Integrated Chemicals Management Bill, makes the most sense.

Mercury management also takes place in a broader context of the global sustainable development agenda, linked to the UN Sustainable Development Goals for good health and well-being, clean water and sanitation, affordable and clean energy, responsible consumption and production, sustainability of life below water, gender equality, and climate actions. Adequate arrangements to overcome these challenges and transforming them into opportunities will ultimately lead to informed and knowledge-based actions on the implementation of the Minamata Convention and help Belize to successfully meet its obligations under the Minamata Convention.

The matrix of the requirements of the Minamata Convention as they relate to Belize's governance arrangements established was presented in Chapter 3 of this report which demonstrated the series of actions that Belize should consider to meet its Party obligations- satisfying key requirements of the Minamata Convention and sending strong signals of the country's readiness to ratify and implement the Minamata Convention.

Priority 2: Phase-Out or Phase-Down of Mercury-Added Products

Based on the results of the inventory, the largest sources of mercury to Belize are from the use and disposal of MAPs and other intentional products and processes.

To facilitate the phase-out or phase-down of MAPs regulated under the Minamata Convention, the Government of Belize should establish standards or regulations that restrict the import of MAPs for which there are available mercury-free alternatives. Maximum allowable mercury content should be set and enforced for products that have no available mercury-free alternatives and transparent product labelling should be ensured. The development of new standards and selection of suitable mercury-free alternatives should be based on research and collaboration with national stakeholders to ensure the effectiveness of measures put in place.

National import regulations for MAPs should be strengthened to facilitate the enforcement of established standards. Belize is a member of the World Customs Organisation and the country uses the 6-8 digit Harmonized System (HS) codes overseen by the World Customs Organization. However, HS Codes for certain MAPs are not specifically identified. National sub-codes to distinguish between MAPs and non-mercury containing products may be created at the discretion of national authorities or collaboration on regional initiatives for the development of specific codes can be done (Global Mercury Partnership, 2018).

Added digits should be specifically defined as an indicator of the presence of mercury in the imported item. For example, the Environment Directorate of Uruguay established a Working Group to create tariff codes for mercury-added medical devices resulting in the addition of sub-codes to differentiate between liquid clinical thermometers with and without mercury (UNEP, 2019c).

- 9025.11 Liquid thermometers

- 9025.11.10 Clinical thermometers
- 9025.11.10.10 Clinical thermometers containing mercury
- 9025.11.10.90 Other clinical thermometers

Officers from the Customs and Excise Department should be trained in the identification of the designated codes and recording of mercury-added imports to support the implementation of policies and legislation related to mercury. Under the GEF Programme, Implementing Sustainable Low and Non-Chemical Development in SIDS (ISLANDS) of which Belize is a participant, Parties to the Minamata Convention on Mercury will conduct activities to build capacity among Customs and Enforcement Officers.

There is global support for the development of an international approach for implementing mercury-specific HS codes through the UN Global Mercury Products Partnership. • Promotion of mercury-free consumer products which are already widespread on the market.

Other general recommendations for the phase-out or phase-down of MAPs including the promotion of alternative mercury-free products and preventing the import and use of certain MAPs are highlighted in Table 37.

A significant challenge to implementing the recommendations provided in Table 37 is the existence of an unfounded perception that some mercury-free alternatives do not perform as precisely and accurately as their mercury-containing counterparts. Therefore, although there is a general push to promote the use of mercury-free and mercury-reduced alternatives in Belize, there is still a need to increase public awareness on the hazards of mercury and the benefits of using mercury-free alternatives to encourage a higher substitution rate.

Table 37: General recommendations for phasing out or phasing down MAPs listed in Annex A of the Minamata Convention on Mercury

MAP	Recommended Action for Phase-Out/Phase-Down
Switches and Relays	• Promote the use of Hg-free alternatives which are already widespread on the market. For example, electronic mercury-free alternatives are proven effective and widely available and many manufacturers now produce mercury-free switches and relays because of restrictions in the EU's RoHS Directive. Mercury-free alternatives include hybrid tilt switches and electronic thermostats.[3] • Take measures to prevent use as components in larger products like pumps, appliances, ovens and circuit boards. • Ensure that allowable high accuracy capacitance and loss measurement bridges and high frequency radio frequency switches and relays in monitoring and control instruments maintain a maximum mercury content of 20 mg per bridge, switch, or relay. • Set up waste electrical and electronic equipment (WEEE) dismantling plants to remove switches and relays from non-hazardous waste streams.
Batteries	• Promote the use of Hg-free alternatives, such as cylinder (alkaline rechargeable) batteries which are already common on the market • Prevent the import and use of mercury containing batteries in devices used for medical, industrial or military applications and electronics. • Ensure that allowable mercury-containing button zinc silver oxide and button zinc air batteries used maintain acceptable limit of <2% Hg content. This limit is typically in accordance with the batteries on the global market currently. • Put measures in place, eg. WEEE dismantling plants, to remove batteries from non-hazardous waste streams.
Lighting Devices (CFLs, LFLs, HPMV, CCFLs, EEFLs)[4]	• Promote the use of LEDs and other Hg-free lamp alternatives for general purpose lighting and LCD backlighting (The amount of Hg needed per lamp has decreased over the years due to technology/production improvements, including better dosing; therefore, meeting this requirement globally is becoming easier. The People's Republic of China which manufactures many of these products for worldwide export is Party to the Minamata Convention and have implemented plans to meet the obligations for manufacture in accordance with the Convention's obligations [Kamande, 2017]). • Set and enforce low maximum mercury content limits for lamps imported and used. • Restrict the use of HPMV and enforce the use of available alternatives. • Purchase bulb-eaters to facilitate recycling or environmentally sound disposal of end-of-life fluorescent tubes. • Set up WEEE dismantling facilities to separate CCFLs and EEFLs from non-

[3] Some of the recognized existing guidance documents are available at the following links (Kamande, 2017):
- Report on the major mercury-containing products and processes, their substitutes and experience in switching to mercury-free products and processes, UN Environment OEWG2: http://www.mercuryconvention.org/Portals/11/documents/meetings/oewg2/English/2_7.pdf
- Mercury-added Product Fact Sheets, Northeast Waste Management Officials Association: http://www.newmoa.org/prevention/mercury/imerc/FactSheets/
- Developing National Strategies to Phase Mercury Out of Thermometers and Sphygmomanometers Including in the Context of the Minamata Convention on Mercury, WHO: http://www.who.int/ipcs/assessment/public_health/WHOGuidanceReportonMercury2015.pdf

[4] CFLs, LFLs and high-pressure mercury vapour lamps (HPMV) are used for general lighting purposes; Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) are used in electronic displays.

MAP	Recommended Action for Phase-Out/Phase-Down
	hazardous waste streams.
Non-Electronic Measuring Devices **(Barometers, Hygrometers, Sphygmomanometers, Thermometers etc.)**	• Promote the use of cost-effective Hg-free alternatives. Digital and aneroid Hg-free alternatives to these products are already popular on the global market. Guidance documents on phasing out these products have been developed by the World Health Organization and Health Care Without Harm who began a global campaign to shift the production of mercury-added medical devices to Hg-free alternatives by 2017. • Enforce on-site separation of these devices from non-hazardous waste streams and waste incineration streams.
Cosmetics (Skin Lightening Products)	• Establish measures to regulate the import and local manufacture of skin lightening products. • Compile a local inventory of mercury containing cosmetics to better inform governments and public. • Develop and enforce proper and transparent labelling standards. • Promote the use of cost-effective Hg-free alternatives. • Ban the manufacture, import and export of mercury-added cosmetics. • Conduct public awareness campaigns.
Dental Amalgam	• Encourage the use of cost-effective and clinically effective mercury-free dental restoration options to phase-out the use of Hg-added dental amalgam. • Provide training and education opportunities for professional dentists and students in dental school on mercury-free dental restoration options and best practices[5] to prevent release of mercury into the environment.

Priority 3: Strengthening of the national or regional capacity to test and monitor mercury in human health and the environment.

Overall, in the Caribbean, there is a need for greater resources and capacity to monitor mercury in the environment. Periodic monitoring and evaluations are needed to ensure that potential mercury sources are identified and control methods are effectively reducing the mercury releases and emissions in the environment.

Under the 2019 second round of the Specific International Programme, Antigua and Barbuda was awarded funding for "Facilitating capacity-building with technical assistance and technology transfer for managing mercury in the Caribbean" in which a Caribbean Region

[5] To prevent the release of mercury into water supplies during the removal of existing mercury-containing dental amalgams, dentists should be strongly encouraged to purchase brands of dental chairs that are fitted with amalgam separators which trap excess amalgam. Amalgam captured by the filters should be captured during periodic cleaning efforts, and the mercury-containing waste should be transported to a facility for recycling. Temporarily stored dental amalgam should utilize the underwater storage method outlined on page 13 of the UNDP/GEF Global Healthcare Waste Project: "Guidance on the cleanup, temporary or intermediate storage, and transport of mercury waste from healthcare facilities" document (Emmanuel, 2010).

Mercury Monitoring Network will be set up. The Network will ensure the strengthening of national laboratory capacity and assess mercury in air deposition, fish, birds, humans and cosmetics. This activity was planned to commence in 2020, however due to the COVID-19 pandemic, it will likely take place from 2021. Through discussions with BRI under the MIA Project, Belize will aim to participate in the Caribbean Region Mercury Monitoring Network.

Priority 4: Environmentally Sound Management of Mercury Wastes

Many household consumer products and medical waste products that contain mercury or mercury compounds end up at the national landfills mixed in with municipal waste. Even after the importation of MAPs is phased-out, it is expected that the generation of wastes containing mercury will continue due to the extensive lifespan of some MAPs. Proper waste management methods are therefore essential for the protection of Belize's health and environment from releases of mercury.

While some of the mercury used in products can be collected and recycled, Belize faces issues which reduce the feasibility of such measures. These issues include a lack of enforced requirements for manufacturers (imported from) to list all of the components of their products, which leaves users and disposers unaware of the need for special disposal; inefficient collection, waste separation, and disposal systems; a lack of access to storage and recycling facilities; and little public awareness on the hazards of MAPs and their proper disposal. Further, the small amount of mercury that may become available for national recovery may not be enough to develop an economically viable system.

Information that may contribute to the development of mercury waste thresholds was submitted to the second meeting of the COP to the Minamata Convention (UNEP, 2018). This information included national data presented by experts such as:

- Mercury compounds in use;
- MAPs in use;
- Data on mercury content in waste contaminated with mercury or mercury compounds;
- Existing mercury thresholds in national legislation; and
- Proposed threshold values for mercury concentrations.

The suggested threshold values could be used to inform the development of standards for the environmentally sound disposal of mercury wastes, and to establish guidelines for reducing health risks caused by emissions and releases of mercury from the mismanagement of mercury-containing wastes.

Development of proper separation methods for the disposal of MAPs both at the household consumer level and in landfill management procedures is necessary for sound management of mercury releases in Belize. The Government should ensure that the public has access to environmentally sound facilities/locations that could aid in the disposal process, as well as information and guidelines on disposing MAPs. Source separation of wastes containing mercury should be encouraged, and a nation-wide collection system should be established to reduce the landfilling of mercury wastes. Training of waste management personnel, as well as educating the general public on the identification of MAPs are necessary to ensure the effectiveness of implemented measures.

Under the GEF Programme, ISLANDS of which Belize is a participant, sound management of chemicals and waste will be addressed through strengthening the capacity of sub-national, national and regional institutions and strengthening the

enabling policy and regulatory framework in project countries. Mercury management will be largely addressed under this Programme planned for 2021- 2026 for Parties to the Convention. In order for Belize to benefit from the specific mercury activities under the GEF ISLANDS programme, the Government must accede to the Minamata Convention. Some of the proposed activities under the GEF ISLANDS Programme include:

- The development of legislative and institutional framework for the environmentally sound management of mercury containing products, and development of national strategies for adoption and implementation;
- training of the customs/border control and trade officers, environmental inspectors, and officers responsible for the sound management of chemicals;
- establishment of standards and building of capacity to control/limit and prevent the import of mercury added products; the promotion of Sustainable Procurement to reduce the manufacture/import of products containing hazardous chemicals and;
- harmonisation of BAT/BEP for the management of existing hazardous waste management strategies and initiatives.

Priority 5: Integration of gender into mercury abatement projects.

Under a rapid analysis conducted by Gender Consultant, Ms. Candice Ramessar, under a related MIA Project (GEF 9865), the importance of including sensitivity guidelines for engendering projects addressing mercury pollution was highlighted. Table 38 provides suggested guidelines that can be considered in the development and implementation of mercury and overall chemicals management initiatives.

Table 38: Integrating Gender into Mercury Abatement Projects

INTEGRATING GENDER INTO MERCURY ABATEMENT PROJECTS			
Planning Stage	**Design Stage** Gender considerations should be implemented in the design framework and organisation of the project	**Implementation Stage**	**Monitoring and Evaluation (M&E) Stage**
Identify key gender issues and considerations related to chemicals and waste management (through literature review and general research). **Determine** how gender inequalities affect exposure to mercury pollution (through literature review and interview with experts from the scientific and gender fields. **Identify** structural and other societal factors for men and women (but particularly women) exposure and vulnerability to mercury pollution (this can be done through a literature review of gender documents of the country and region including Country Gender Assessments and Poverty Assessments as well as reports on Social Protection and Human Rights). **Acknowledge** and note women's and fetuses' vulnerability to chemical pollution and exposure (Collation of notes	**Allocate** resources for the conduct of a gender analysis (In the early stages of the project preparatory phase assign a budget line item for the carrying out of gender analysis. Some donors such as the GEF provide a grant for the preparation of projects. The gender analysis should be done by someone who is experienced in the field of gender or other social sciences field with experience in gender studies or practice. **Procure** gender expert to conduct gender analysis. **Conduct** gender analysis of chemical pollution and gender in the area of focus. (For national and regional projects, the gender analysis can focus on the gender issues at the national and regional levels. However, if the project will work in local communities and those communities are known then the gender analysis should also focus on the local/community levels. Gender Analysis typically asks the questions. **Refine** gender issues and considerations identified in the planning stage. **Incorporate** gender in the project results framework by developing sensitive/responsive programme objectives.	**National** gender awareness and sensitization at inception workshops to demonstrate the projects commitment to gender equality and mainstreaming. **Adopt** a gender mainstreaming strategy in the project policies. **Build** the capacity of the programme's team and partners to conduct gender analysis and mainstream gender. **Implement** gender action plan, including ensuring the allocation of specific and sufficient resources (financial, human, time) to enable the achievement of programme objectives. **Implement** activities in a culturally sensitive manner. **Conduct** activities that leverage other gender interventions in the country (including the National Gender Agencies and Women representative organizations) or region and use them to build	**Adopt** an M&E process and methodology to capture the gender dimension of the programme. **Define** quantitative and qualitative gender-sensitive indicators to measure projects impact on men and women have contributed to addressing the issues and achieving the expected outcomes, and to what extent the programme has equitably addressed both women's and men's needs. **Develop** culturally sensitive and gender-specific data collection tools and methodologies. **Conduct** culturally sensitive and gender-specific data collection exercises including single-gender activities and activities respectful of women and men's schedules and social and reproductive roles.

INTEGRATING GENDER INTO MERCURY ABATEMENT PROJECTS			
Planning Stage	**Design Stage** Gender considerations should be implemented in the design framework and organisation of the project	**Implementation Stage**	**Monitoring and Evaluation (M&E) Stage**
from the literature review and interviews).	**Define** goal, objectives outcomes, outputs, and activities that will contribute to addressing both women's and men's needs. **Develop** criteria for participation in project activities that will ensure gender balance in participation. **Ensure** social inclusivity by the design of activities to reach all sectors of society, especially vulnerable populations. **Ensure** that programmes and activities reflect socio-ethnocultural sensitivity. **Embed** in the project design the socio-ethnocultural and gender sensitivity especially in awareness, communications, monitoring, and evaluation programme activities and these activities promote gender equality and the empowerment of women and men. **Develop** a gender action plan with a budget based on the proportionality of the project. **Allocate** resources for the gender action plan implementation including human resources. **Identify** clear responsibilities for the gender action plan or gender sensitivity activities including the allocation of specific personnel.	political commitment and community support. **Highlight** women vulnerability in mercury pollution and their potential as powerful advocates in raising awareness of the issue. **Advocate** for gender mainstreaming as essential in addressing the issue of chemical pollution in the countries and regions.	

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Annex 1: Stakeholder Engagement Process

Key National Stakeholders Engaged (as of November 2020)		
Names	**Position**	**Agency**
Mr. Martin Alegria	Chief Environmental Officer	Department of the Environment (DOE)
Mr. Edgar Ek	Deputy Chief Environment Officer	DOE
Mr. Anthony Mai	Senior Environmental Officer	DOE
Mr. Leonides Sosa	Environmental Officer	DOE
Dr. Isani Chan	Consultant	DOE
Ms. Celi Cho	Public Awareness & Outreach Unit	DOE
Ms. Shanee Rhaburn	Public Awareness & Outreach Unit	DOE
Mr. John Bodden	Senior Environmental Health Officer	Ministry of Health
Dr. Job Joseph	Communicable Disease Surveillance Focal Point	PAHO/WHO
Ms. Lumen Cayetano	Director	Belize Solid Waste Management Authority
Mr. Emerson Garcia	Officer at Solid Waste Management Authority	Belize Solid Waste Management Authority
Mr. Lorin Frazer	Senior Customs and Excise Officer	Customs and Excise Department
Mr. Albert Roches	Environmental Officer BNE	Belize Natural Energy Limited
Ms. Kadie Usher	Communication Director	Belize Electricity Limited
Mr. Englebert Emmanuel	Accreditation Unit	Ministry of Health
Ms. Ann William	Director	Ministry of Human Development
Dr. Raphael Samos	Senior Dental Surgeon (MOH)	Ministry of Health
Mr. Jesus Yam	Senior Labour Officer	Ministry of Labour, Local Government and Rural Development
Ms. Colette Eusey	BAHA Officer	Belize Agricultural Health Authority
Ms. Karen Link	Lecturer	University of Belize (UB)
Ms. Elisa Montalvo	Solicitor General	Attorney General's Ministry

Annex 2: UNEP TOOLKIT Calculation Spreadsheet

The UNEP Toolkit Calculation Spreadsheet is available for download at the following link:

https://bcrccaribbeanorg-my.sharepoint.com/:x:/g/personal/tahlia_alishah_bcrc-caribbean_org/EXqxnMBgCnhCsayFc3cK_wwBbB2zIOr_lCmG9j435g_YFQ?e=Z76r9V

Should any issues occur in accessing the link provided, please contact info@bcrc-caribbean.org.

Annex 3: Five-Year Data Set of Imported Consumer Products

For the purpose of the development of the inventory of mercury releases related to consumer products with mercury (Section 2.5 of this report), import data from 2015- 2019 was obtained from the Customs and Excise Department. The five-year dataset was used to identify potential trends in imports of mercury-containing consumer products. Due to the uncertainty in the presence of mercury in certain products listed, confirmed trends were not able to be obtained. The five-year dataset is provided below for reference in future assessments to further monitor progress in the phase-out of imports of mercury-added consumer products.

HS-Code	Indicators	2015	2016	2017	2018	2019
85061000	**Battery Type:** Manganese dioxide	4430	1723	3179	2950	2834
85063000	Mercuric oxide primary cells or batteries	-	-	31	102	85
85064000	Silver oxide primary cells or batteries	262	773	100	55	387
85065000	lithium primary cells or batteries	9940	3529	5541	6578	4813
85066000	Air-zinc primary cells or batteries	11	1	16	21	37
85068000	Other primary cells/ batteries excl.	107053	46761	62536	78852	52652
28530000	Inorganic compounds amalgams	16170	11311	10512	1986	-
90251100	Thermometer, not with other instruments, liquid-filled for direct reading	12015	886	3911	879	12144
9025190000	Barometers	257	20	16	23	72
90262000	instrument/apparatus to measure or check the pressure of liquids/gases containing mercury	8057	8548	7440	6666	10756
902730000	Spectrometers, spectrophotometers and spectrographs using optical radiations, such as UV, visible, IR	25	13	2	18	8
902750000	Instrument and appartus for physical or chemical analysis, using UV, visible or Iroptical radiations (Exlc. Spectrometers, spectrophotometers, spectrophotometers, spectrographs and gas or smoke analysis apparatus)	8	60	12	25	15
903210000	Thermostats mercury free	4813	6257	5164	7089	6832
85393110	Discharge lamps, fluorescent, hot cathode with double ended cap	24925	64030	73863	73826	400555
85393200	Mercury or sodium vapour lamps; metal halide lamps	6468	18867	2761	4987	4773
85393910	low energy consumption lamps	83233	85050	120519	79117	78543
85394900	Ultra-violet or infra-red lamps excl. arc lamps	2951	6735	17701	7997	13024
85171200	Portable radio/telephones, Cell Phones	77131	54805	68161	43752	37935

HS-Code	Indicators	2015	2016	2017	2018	2019
85285900	Monitors incorporating television, LCD Screens	43	23	29	58	44
85287390	other monochrome, LC Screens	3	0	42	17	287
90322000	Manostats	50	102	33	94	72
90328900	Automatic regulating or instruments and apparatus	16873	37900	17705	20811	17289
85394100	Arc-lamps	2888	1252	1981	20	1311
8528720000	Reception apparatus for television	10566	14963	12998	11486	11831
8539100000	Sealed beam Lamp Units, Reception apparatus for television	2929	2025	1668	1057	1963
8539210000	Tungsten halogen, Reception apparatus for television	20275	2180	19166	15382	13343
8539220000	Other filament lamps, of a power not exceeding 200 W and for a voltage exceeding 100 V	83869	78332	152967	56601	50725
8539290000	Electric Filament lamps	62968	38061	54119	26909	21562