# THE REPUBLIC OF KIRIBATI MINAMATA INITIAL ASSESSMENT REPORT



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**THE KIRIBATI MINAMATA INITIAL ASSESSMENT REPORT**

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Prepared by the Biodiversity Research Institute under the GEF Project (GEF ID: 9187): "Development of the Minamata Initial Assessment in the Pacific Region (MIA Pacific)".

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# ABOUT THIS DOCUMENT

*The Kiribati Minamata Initial Assessment Report was developed under the project, GEF Project (GEF ID: 9187): "Development of the Minamata Initial Assessment in the Pacific Region (MIA Pacific)".*

*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 Secretariat of the Pacific Regional Environment Programme (SPREP) functioning as the Executing Agency. The Biodiversity Research Institute (BRI) was the lead technical consultancy on the project.*

*The report consists of:*

- *an inventory of mercury releases primarily based on 2020 data, performed in accordance with UN Environment's "Toolkit for identification and quantification of mercury releases", Inventory Level 2 (version November 2019);*
- *an assessment of the policy, legislative and institutional framework in relation to the implementation of the Minamata Convention on Mercury;*
- *assessments relating to populations at risk, education and awareness-raising strategies and;*
- *recommendations and priorities for action to ensure the effective implementation of the Minamata Convention on Mercury.*

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# List of Abbreviations

| Abbreviation | Full Name |
|---|---|
| AMAK | Aia Maea Ainen Kiribati |
| BAT | Best Available Techniques |
| BEP | Best Environmental Practices |
| BRI | Biodiversity Research Institute |
| BTC | Betio Town Council |
| CBD | United Nations Convention on Biological Diversity |
| CBO | Church based organisation |
| CCFLs | Cold Cathode Fluorescent Lamps |
| CCKM | Coordination, Communication and Knowledge Management |
| CFLs | Compact Fluorescent Lamps |
| COP | Conference of the Parties |
| COVID-19 | Coronavirus Disease of 2019 |
| CSOs | Civil Society Organisations |
| ECOSOC | Economic and Social Council |
| ECD | Environment and Conservation Division |
| EEFLs | External Electrode Fluorescent Lamps |
| EH | Environmental Health |
| EHU | Environmental Health Unit |
| ESM | Environmentally Sound Management |
| g | Gram |
| GDP | Gross Domestic Product |
| GEF | Global Environment Facility |
| GIC | Glass ionomer cement (dental fillings) |
| GIS | Geographic Information Systems |
| GLC | Great Lakes Commission |
| HCW | Healthcare waste |
| HDI | Human Development Index |
| Hg | Mercury |
| $HgCl_2$ | Mercury Chloride |
| HgO | Mercury Oxide |
| HgS | Mercury Sulphide |
| $HgSO_4$ | Mercury Sulfate |
| HIDLs | High Intensity Discharge Lamps |
| HPMV | High-Pressure Mercury Vapour |
| HS Code | Harmonised System Codes |
| ICM | Integrated Chemicals Management |
| ISLANDS | Implementing Sustainable Low and Non-Chemical Development in SIDS |
| KANGO | Kiribati Association of Non-Government Organizations |
| KDP | Kiribati Development Plan |
| Kg | Kilogram |
| Kg Hg/y | kilograms per year |
| KIEP | Kiribati Integrated Environment Policy |
| $km^2$ | Squared kilometres |
| KPAs | Key Priority Areas |
| KRCS | Kiribati Red Cross and Red Crescent Society |
| KUC | Kiritimati Urban Council |
| KV20 | KIRIBATI 20-YEAR VISION |
| KWMRRS | Kiribati Waste Management Resource Recovery Strategy |
| lbs | Pounds |
| 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 |
| MEAs | Multilateral Environmental Agreements |
| MELAD | Ministry of Environment, Lands and Agricultural Development |
| MEHR | Ministry of Employment and Human Resource |
| MFMRD | Ministry of Fisheries and Marin Resource Development |
| Mg | Milligrams |
| MHMS | Ministry of Health and Medical Services |
| MIA | Minamata Initial Assessment |
| mm | Millimetres |
| MOE | Ministry of Education |
| MOJ | Ministry of Justice |
| MW | Megawatts |
| NCCC | National Chemical Coordinating Committee |
| NGOs | Non-Governmental Organisation |
| NPTEL | National Programme on Technology Enhanced Learning |
| ODS | Ozone Depleting Substances |
| OSH | Occupational Safety and Health |
| POPs | Persistent Organic Pollutants |
| PET | Polyethylene terephthalate |
| PPE | Personal protective equipment |
| Ppm | Parts Per Million |
| PUB | Public Utilities Board |
| SAICM | Strategic Approach to International Chemicals Management |
| SCH | Solid, chemical and hazardous |
| SDG | Sustainable Development Goals |
| SEP | Strategic Environment Plan |
| SIDS | Small Island Developing States |
| SOE | State owned enterprises |
| SOPs | Standard operating procedures |
| SPC | Secretariat of Pacific Communities |
| SPREP | The Secretariat of the Pacific Regional Environment Programme |
| sq. km | Square Kilometres |
| SWM | Solid Waste Management |
| T | Tonne |
| THg | Total Mercury |
| TUC | Teinainano Urban Council |
| UN | United Nations |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USA | United States of America |
| US EPA | United States Environmental Protection Agency |
| USP | University of the South Pacific |
| WEEE | Waste Electrical and Electronic Equipment |
| WHO | World Health Organisation |
| WTO | World Trade Organization |
| Ww | Wet Weight |
| µg/L | Microgram per litre |

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## Executive Summary

The Minamata Convention on Mercury is a global multilateral environmental agreement that aims to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds through a number of obligations. The Minamata Convention on Mercury entered into effect on August 16, 2017, and has 147 Parties as of November 2023. In the Pacific region, 6 countries are Party to the Convention including the Republic of Kiribati.

To better inform needs for implementation of the Minamata Convention, Kiribati participated in the Minamata Initial Assessment (MIA) Project which aims to facilitate the ratification and implementation of the Convention using scientific and technical knowledge. The project is funded by the Global Environment Facility (GEF), implemented by the United Nations Environment Programme (UNEP) and executed regionally by the Secretariat of the Pacific Regional Environment Programme (SPREP). The Environment and Conservation Division (ECD), Ministry of Environment Lands and Agricultural Development (MELAD) acts as the National Project Focal Point for its implementation nationally.

Under the MIA Project, an inventory of mercury releases was developed using the "Toolkit for Identification and Quantification of Mercury Releases" (Toolkit) Level 2, made available by the Chemicals Branch of UNEP. Other aspects of the MIA Project included an assessment of the regulatory and institutional capacity needs for effective mercury management; identification of strategies to identify potential contaminated sites and risks to human health and the development of an awareness raising strategy for mercury management.

**Results of the Inventory of Mercury Releases**

It is important to note that in calculating estimations of mercury releases using the Toolkit, there were various uncertainties and complexities involved. Due to the limited available data for certain categories and the assumptions made, the estimations of mercury releases for Kiribati using this inventory should not be considered as definitive but rather as a guide for the identification of priorities and further assessments.

17.44 kilograms (Kg) of mercury (Hg) were determined to be released in Kiribati per year. 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 70% of estimated national mercury releases mainly due to the use and disposal of mercury containing electrical switches and relays, which accounted for inputs of approximately 12.00 Kg of mercury per year (Kg Hg/y).

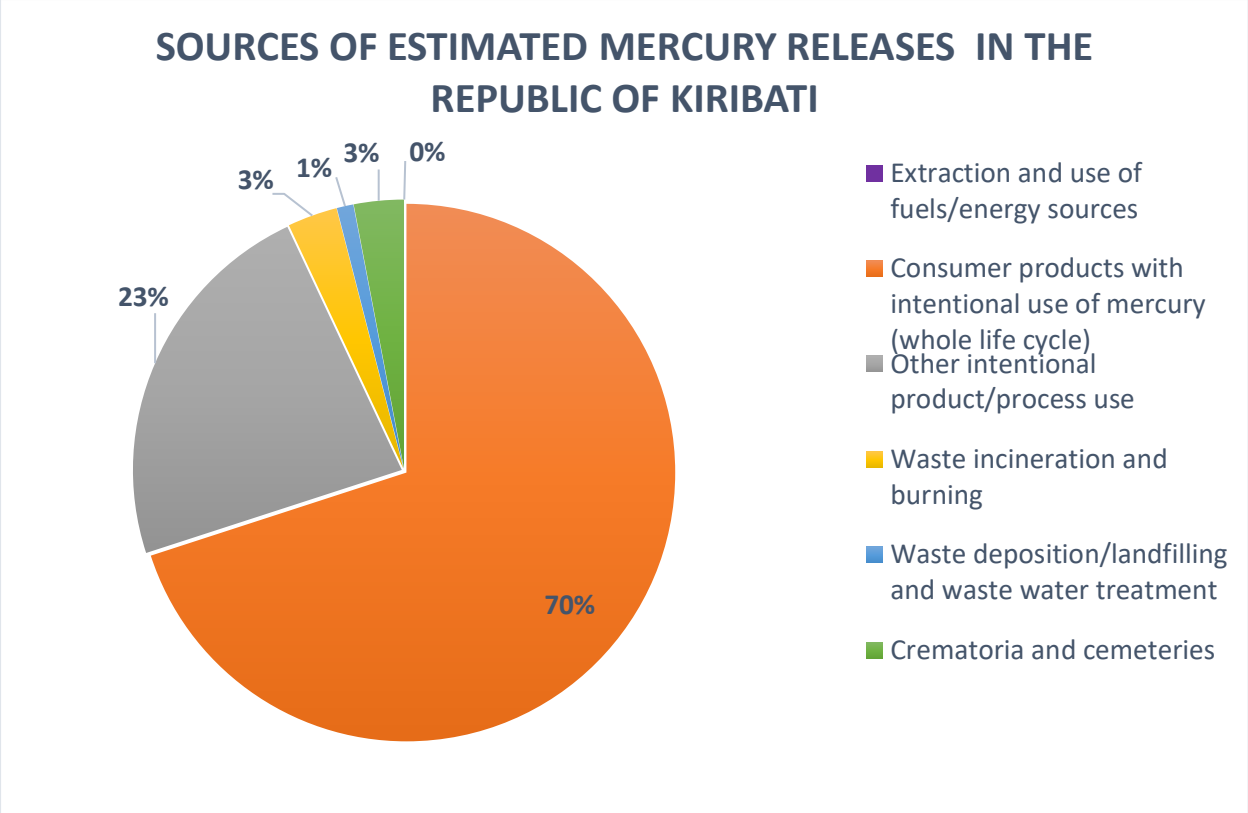



*Figure 1: Pie Chart showing the main sources of estimated mercury releases in Kiribati.*

The second highest category source of mercury releases at 23% was "Other Intentional Products/Process Uses" referring to the preparation, use and disposal of dental mercury-amalgam fillings (3.46 Kg Hg/y) and the use and disposal of manometers and gauges with mercury (0.50 Kg Hg/y).

For the source categories, the output pathways for mercury releases were also assessed. Mercury emissions to general waste was found to the be highest in comparison to other pathways at 11.00 Kg Hg/y. This was found to be mainly due to the use and disposal of consumer products with mercury and waste deposition. Releases to land and air accounted for the second and third highest output pathway for mercury releases at 1.93 Kg hg/y and 1.89 Kg Hg/y respectively. This was followed by releases to water at 1.66 Kg Hg/y.

Kiribati was found to have no major sources of mercury stockpiles, supply or trade.

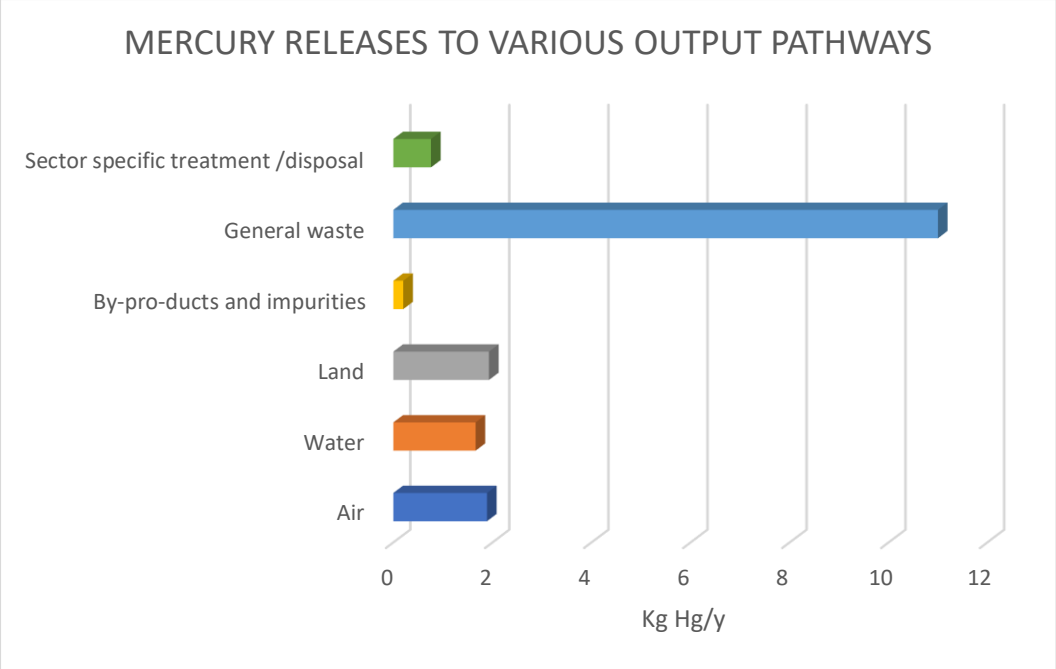



*Figure 2: Bar Chart showing the mercury releases estimated according to output pathway in Kiribati.*

**Major Findings of the Policy, Regulatory and Institutional Framework Assessment**

For the overall implementation of the Minamata Convention on Mercury, responsibility falls under the remit of the ECD in coordination with several relevant stakeholders across the government sector, public and private sector as well as, non-governmental organisations and civil society organisations.

To formally recognise the obligations for Kiribati as a Party to the Minamata Convention on Mercury, a regulation under the Environment (Amendment) Act 2007 should be developed by the ECD (in coordination with relevant stakeholders) for approval by the government. This should include the prohibition of the import of mercury, mercury compounds and mercury-added products as outlined under Annex A (Part II) of the Minamata Convention and for Annex A (Part II), mercury in bulk form for dental amalgam.

Coordination with the Customs Division and private sector retailers to ensure the implementation of the prohibition of mercury products and the promotion of safe mercury-free alternatives should be carried out. Coordination with the Ministry of Health and Medical Services to meet the obligations for phase down of dental amalgam and phase out of mercury added medical devices is recommended.

Other regulatory recommendations include the development of regulations under the Environment (Amendment) Act 2007 to include environmental standards for management of mercury releases to the air, water, land and for waste management. MELAD should bear the responsibility for development of these standards with reference to guidance provided under the Minamata Convention. Coordination with the other national authorities and the health

sector, where needed, to ensure management of potential mercury releases through proper health and sanitation practices should be conducted.

New or updated national plans and policies related to environmental management and strategic planning should also include the provisions of the Minamata Convention and any related agreements.

Challenges in implementation include the limited human resource capacity and technical capacity to carry out continuous activities related to mercury management. To address this, it is important to recognise the linkages between mercury issues and issues related to other hazardous or potentially harmful chemicals and how approaches can be harmonised. It is recommended that a mercury management coordination be formally established under the existing National Chemical Coordinating Committee and the National Waste Management Committee. Furthermore, it is important to recognise regional linkages that can be made to further opportunities for information exchange and capacity building, which is ongoing through agencies such as SPREP, among others.

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

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. Areas that are particularly sensitive to mercury deposition- where methylation rates are highest and biomagnification in the food web is greatest, and where animals experience significant reproductive harm- are called biological mercury hotspots. These areas generally represent aquatic ecosystems or have an aquatic connection within the food web.

A map of Tarawa, Kiribati was developed to identify the locations of potentially mercury contaminated sites. Further geospatial data on the other islands of Kiribati is recommended to provide a clearer indication of potential sites of interest for the country as a whole. Additionally, further research on the spatial distribution of potentially contaminated sites in relation to ecosystem characteristics that increase the methylation potential of mercury inputs should be conducted to inform locations prioritized for further study on the threat from mercury on human health and the environment and for future use in evaluating the effectiveness of the Minamata Convention. These, and any additional, potentially contaminated sites should be verified by the relevant national authorities.

Methylmercury, the organic form of mercury, is the most toxic form of mercury to humans as it is a neurotoxin that can cause physiological harm and behavioural disorders in people. Humans are most exposed to methylmercury through dietary consumption. Fish from the sea or freshwater systems can be a major source of methylmercury. In general, fish species that are small, short-lived, and forage low in the food web contain less methylmercury, while predatory species that are long-lived and grow larger can contain higher levels of methylmercury. Many of the fish available in the Pacific are safe to eat, although more information is needed about

the mercury concentrations to better characterize how mercury is distributed in different species of fish in the waterscape of Pacific nations.

Monitoring mercury exposure to humans will help the global community to meet the requirements of the Minamata Convention on Mercury and will also help identify global biological hotspots that represent elevated levels of mercury exposure that may pose serious threats to both ecosystem and human health. Gender and occupational considerations in terms of identifying vulnerable groups for monitoring should be made.

**Awareness-raising Strategies for Mercury Management**

The current level of awareness on the risks associated with mercury amongst workers (such as dental professionals and waste disposal workers) and the general public is not considered to be high and measures should be adapted to educate these groups on the issue. Under the MIA Project, a brief animated awareness raising video was developed for dissemination in Kiribati. The video aims to educate the general public on the potentially mercury-added household products that may be present, the need for safe disposal and the promotion of mercury-free alternatives that are already popular on the local market. It is recommended that the video be shared widely via social media by MELAD and other national stakeholder organizations.

To educate key stakeholders on the estimated sources of mercury releases and recommendations for mercury management developed under the project, a technical briefing document that summarizes the main findings of the MIA Project was developed by BRI.

Additionally, through Kiribati's participation in the GEF-funded programme, Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS), further mercury-related activities for information dissemination, inclusive of gender considerations, will be carried out. The materials developed under this project and the ongoing GEF ISLANDS Programme, can be utilized in future public education campaigns on environmental awareness.

In terms of mercury's potential impact on human health and possible exposure through diets, fish consumption guidelines that are based on scientific research are recommended to assist vulnerable populations in determining the recommended frequency in consuming fish that considers their health benefits versus potential mercury risks.

Coordination with other relevant governmental, private and non-governmental organizations such as the Fisheries Division and the Ministry of Health and Medical Services is recommended to further promote mercury management awareness.

**Priority Areas for Consideration in the Implementation of the Minamata Convention**

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

1. Develop an Act or Regulation to formally recognise the obligations of the Minamata Convention and facilitate its implementation.
2. Establish a Coordinating Mechanism for mercury management.
3. Implement measures to address identified sources of mercury release through:

a. Promotion of the continued phase-out and phase down of mercury-added products and;
b. Ensuring Best Available Techniques/Best Environmental Practices (BAT/BEP) implementation for monitoring and preventing mercury releases from sources such as landfills and waste incinerators.

4. Public awareness and sensitisation of relevant stakeholders on mercury issues
5. Strengthen understanding of mercury issues in Kiribati through monitoring programmes.

Under the ongoing GEF ISLANDS programme, Kiribati will also benefit from the development of draft model legislation to control mercury-added products for use by Pacific SIDS that can be tailored for adoption, and the provision of support for the sound repackaging, shipping, collection, and disposal of mercury waste.

# Introduction

### Mercury and the Minamata Convention on Mercury

Mercury (symbol: Hg), also known as quicksilver, is a natural element that exists in the earth's crust. Emissions of mercury to the environment may occur due to volcanic eruptions and other natural occurrences, but the majority of mercury releases have been found to be due to anthropogenic activities such as primary mercury mining, and re-emissions of mercury already in the environment, mainly as a result of previous human activity (UNEP, 2019a).

The release of mercury to the environment is of serious concern due its highly toxic and persistent nature, which can negatively affect human health and the environment. Mercury has been listed by the World Health Organisation (WHO) as one (1) of the top ten (10) chemicals or groups of chemicals of major health concern (WHO, 2017).

Mercury exists in three (3) main forms:

1. *Elemental or metallic mercury* which is a silvery-coloured liquid at room temperature and standard pressure. This form has been used in a variety of activities such as artisanal and small-scale gold mining (ASGM) in which mercury is used for its ability to form an amalgam with gold particles. It has also been used in the manufacture of some consumer products such thermometers, dental amalgam, fluorescent light bulbs, and some electrical switches.
2. *Inorganic mercury compounds* which are formed when mercury bonds with other chemicals to form compounds or salts. This may occur naturally or due to man-made activities for use in several industrial processes and in the manufacture of products.
3. *Organic mercury compounds* which are formed when mercury combines with carbon to form compounds. The most toxic organic mercury compound is methylmercury (MeHg) which typically forms in water or sediment when anaerobic bacteria convert elemental or inorganic mercury to MeHg. This form tends to bioaccumulate in the food chain and humans are typically exposed to MeHg consumption of certain contaminated fish or shellfish over a period of time (UNEP, 2019b).

Exposure to mercury can range from short-term effects such as headache, dizziness, skin and eye irritations to more serious and long-term impacts on the nervous, digestive, respiratory, renal and immune systems, and may be fatal depending on the level and length of exposure (WHO, 2017). The most vulnerable populations to the harmful impacts of mercury include children and pregnant or breastfeeding women as mercury can cross into the placenta and breastmilk.

The effects of mercury on ecosystem health can also be detrimental as studies have shown that the growth, behaviour and reproduction of fish with high concentrations of mercury can be negatively impacted. This can in turn impact the food web as wildlife who then regularly consume mercury-contaminated fish have been shown to have decreased reproductive success (BRI, 2019). Aquatic ecosystems such as beaches, lakes, mangroves among others, are particularly sensitive to mercury accumulation.

In recognising the need to address the issues posed by mercury, the global multilateral environmental agreement, the Minamata Convention on Mercury, was developed. The Convention aims to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds through a number of obligations that, among other things, regulate:

- mercury supply, sources and trade;
- mercury-added products;
- manufacturing processes;
- artisanal and small scale gold mining;
- interim storage and disposal of mercury and mercury compounds;
- mercury waste management;
- mercury emissions and releases management, among other activities.

The Minamata Convention on Mercury entered into effect on August 16, 2017, and has 147 Parties as of November 2023. In the Pacific region, six (6) countries are Party to the Convention with several others actively taking measures to become a Party.

## Project Background

The MIA Project aims to facilitate the ratification and 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

[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.

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

Further details on the project outputs are detailed in Table 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 MIA development** | 1.1 Technical assistance provided to the Kiribati to develop the MIA while building sustainable foundations for its future implementation |
| **Development and validation of the Minamata Initial Assessment** | 2.1 Identified and strengthened national coordination mechanism dealing with mercury management that will guide the project implementation |
| | 2.2 National institutional and regulatory framework 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 strategy 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

The Republic of Kiribati is a small island nation comprising of 33 coral atolls and islands that are spread across approximately 3.5 million square kilometres ($km^2$) of the Central Pacific Ocean to form 3 main groups: the Gilbert, Line and Phoenix Island Groups (PRIF, 2018). Kiribati is mainly made up of a series of ring-shaped atolls with central lagoons, with the exception of a remote, raised limestone island named Banaba Island in the Gilbert Island Group (PRIF, 2018). Most atolls are encompassed by barrier reefs and are approximately 6 metres above sea level.

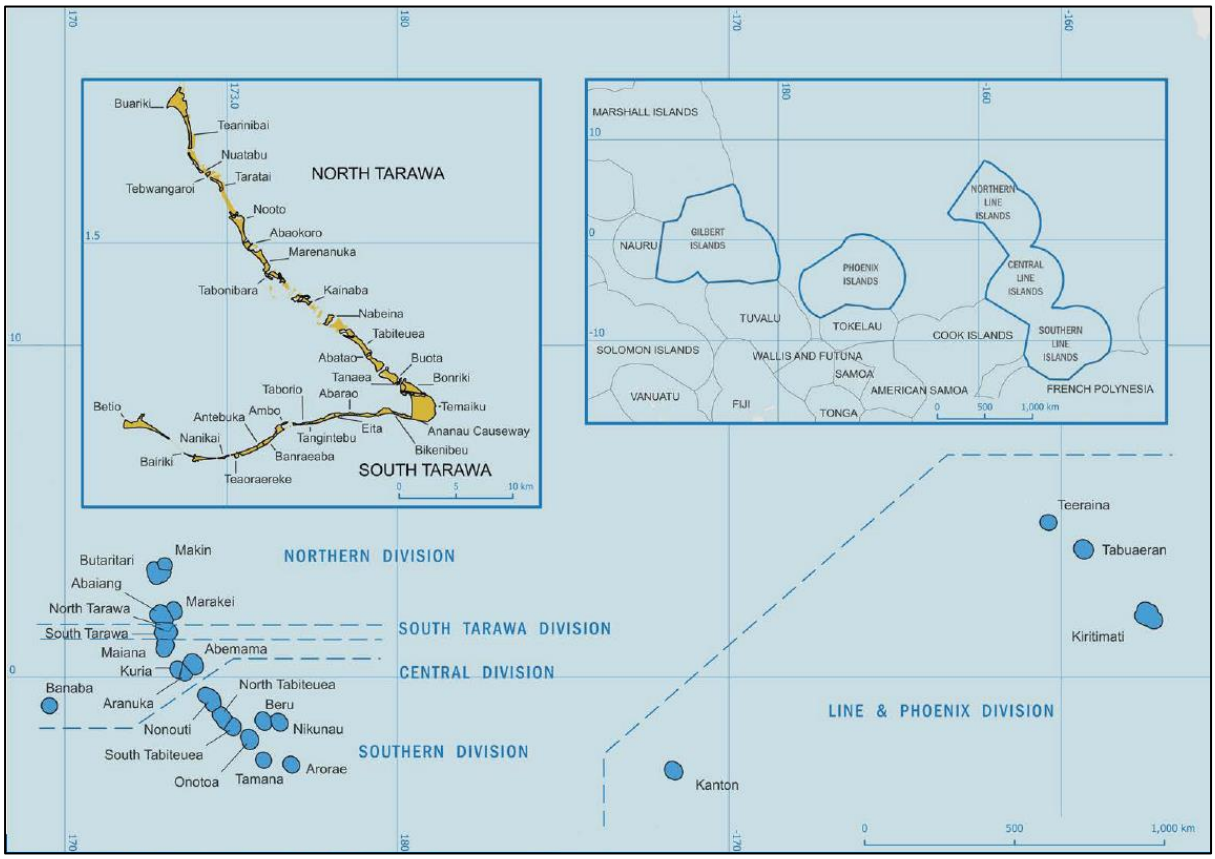



*Figure 3: Map showing the distribution of atolls and islands of Kiribati (SPC, 2022)*

Of the 33 land masses, 20 atolls and 1 raised island are inhabited and have a total land area of 726 $km^2$. The capital of Kiribati is South Tarawa which is located in the Gilbert Island Group and is home to approximately 53% of the total national population according to a 2020 census (SPC and KINSO, 2022). South Tarawa is a chain of islets that connect to North Tarawa and make up the Tarawa atoll (as seen in Figure 3). The second largest population is located in Kiritimati in the Line Island Group with approximately 6.2% of the national population. Total population in 2020 was estimated to be 119,438 inhabitants (SPC, 2022).

The majority of the population are native-born with less than 1% estimated from other countries such as Tuvalu and China (UN Women, 2022). The official languages spoken are English and Gilbertese or taetae ni Kiribati (or Kiribati). Culturally, Kiribati has varying traditional practices and values amongst its islands, though society has been predominantly patriarchal with efforts being made in recent years to include women in more decision-making processes (UN Women, 2022). Based on the 2020 population census, approximately 36% of the population are children under the age of 14 while the number of elderly over 65 years of age was 4% of the total population (SPC, 2022).

## 1.2 Political, Economic and Legal Profile

While under British colonial rule, Kiribati was mainly known as The Gilbert Islands until its independence in 1979. That same year, the United States of America (USA) also relinquished its previous claims to the Phoenix and Line Islands. Following independence, Kiribati became a parliamentary democratic republic with a President ("Te Beretitenti") being recognized as Head of State and Head of the Government (SPREP, 2021). The legal system follows the British parliamentary system in addition to the local customary law to form the Constitution and unicameral House of Assembly/Parliament ("Maneaba ni Maungatabu") which comprises of 44 elected members and a nominated member from the Banaban community in Rabi, Fiji Islands (UN Women, 2022). There are 3 branches of government: the executive, legislative and judiciary.

Kiribati is a low-income Small Island Developing State (SIDS) with the lowest Gross Domestic Product (GDP) amongst other sovereign nations in Oceania (UN Women, 2022). The main exports are fish and coconut-based products such as coconut oil and copra (SPC, 2022). Some financial support is provided via overseas remittances and agreements. Many locals in the rural islands especially, have a subsistence-based lifestyle and rely on coastal fishing for sustenance and for revenue through sales (UN Women, 2022). In more urban areas, the majority of the population work in the public and formal private sector in administration. Approximately 29% of persons are employed in wholesale and retail trade; 23% are either formally or informally part of the agriculture and fishing industry while 14% are in the public administration sector. For sectors such as education and health/social work, women make up the majority of professionals employed (UN Women, 2022). The development of infrastructure and building of workforce skills to boost the tourism sector is being considered as another potential source of income.

## 1.3 Environmental Overview

The people of Kiribati rely heavily on the marine environment for sustenance, economic gain, transport and cultural practices for food, transport, traditional practices and economic opportunity. Due to limited space, the terrestrial landscape has faced environmental pressures as a result of agriculture and urbanization (Government of Republic of Kiribati, 2013). Kiribati is among the most vulnerable to the impacts of climate change and rising-sea levels.

To enhance national capacities to address environmental challenges and protect the environment, Kiribati is a Party to several Multilateral Environment Agreements (MEAs). A list of some relevant MEAs that Kiribati is a Party to is provided in Table 2, including the Minamata Convention on Mercury.

*Table 2: Multilateral environmental agreements to which Kiribati is a Party*

| Treaty | | Year of Becoming a Party |
|---|---|---|
| | Minamata Convention on Mercury | 2017 |
| | Basel Convention on the Control of the Transboundary Movement of Hazardous Waste and their Disposal | 2000 |
| | Stockholm Convention on Persistent Organic Pollutants | 2004 |
| | Convention on Biological Diversity | 1994 |
| | Paris Agreement (as part of United Nations Framework Convention on Climate Change) | 2016 |
| | Waigani Convention (The Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region) | 2001 |

# 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 Kiribati, the presence of these sources was identified through consultations with national stakeholders (Table 3). Stakeholders were engaged through questionnaires, email correspondence, interviews, and project meetings. The categories identified as not being present will not be discussed further in the report

*Table 3: Identification of mercury release sources in Kiribati; 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 | N |
| 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 | N |
| 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 | N |
| 5.3.4 | Other minerals and materials | N |
| **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 | N |
| 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 | N |
| 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 | N |
| 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** |
| 5.9.5 | Wastewater system/treatment | **Y** |

| Toolkit Category # | Source category | Source presence (Y/N/?) |
|---|---|---|
| **5.10** | **Cremation and cemeteries** | |
| 5.10.1 | Crematoria | N |
| 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 Kiribati. This includes mercury intentionally used in products such as 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 Kiribati for the source categories identified as being present in Table 3 are shown below in Table 4.

*Table 4: Summary of mercury inputs to Kiribati*

| Source category | Estimated Hg Input (Kg Hg/y) |
|---|---|
| **Extraction and use of fuels/energy sources** | |
| Mineral Oil- Extraction, refining and use | **0.04** |
| Biomass fired power and heat production | **Assumed to be negligible** |
| **Consumer products with intentional use of mercury** | |
| Thermometers with mercury | **Assumed to be negligible** |
| Electrical and electronic switches, contacts and relays with mercury | **12.00** |
| Light sources with mercury | **0.12** |
| Batteries containing mercury | **No data available** |
| **Other intentional products/process uses** | |
| Dental mercury-amalgam fillings | **3.46** |
| Manometers and gauges | **0.50** |
| **Waste incineration** | |
| Incineration of medical waste | **0.48** |
| Informal waste burning | **Assumed to be negligible** |
| **Waste deposition/landfilling and wastewater treatment** | |
| Controlled landfills/deposits | **0.09** |
| Informal dumping of general waste | **Assumed to be negligible** |
| Wastewater system/treatment | **No data available** |

| Source category | Estimated Hg Input (Kg Hg/y) |
|---|---|
| **Cremation and cemeteries** | |
| Cemeteries | **0.47** |

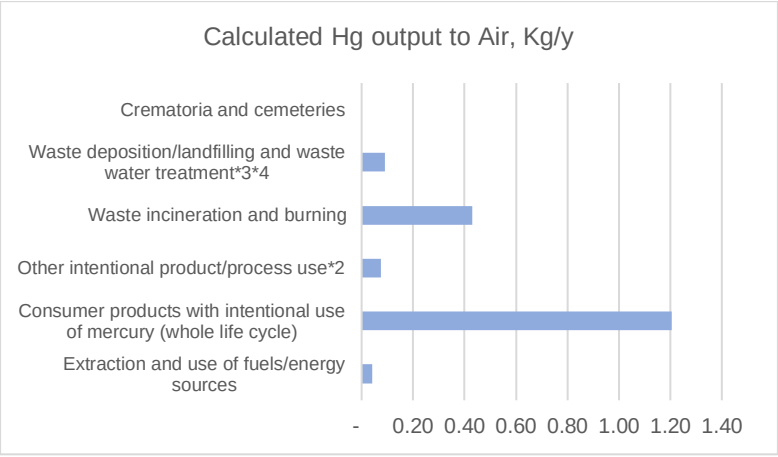
### 2.1.3 Summary of Mercury Releases

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*

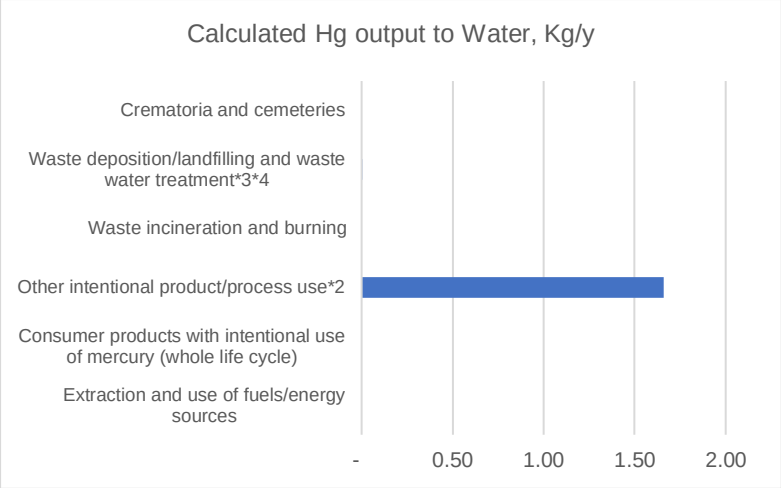
| Calculation Result Type | Description<br>***(NOTE: Not all examples provided are relevant to Kiribati but are included for general reference)*** |
|---|---|
| Estimated Hg input, Kg Hg/y | The standard estimate of the amount of mercury entering this source category with input materials, for example 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:<br>• Point sources such as coal fired power plants, metal smelter, waste incineration;<br>• 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:<br>• Wet flue gas cleaning systems on coal fired power plants;<br>• Industry, households, etc. to aquatic environments;<br>• Surface run-off and leachate from mercury contaminated soil and waste dumps. |
| Land | Mercury releases to the terrestrial environment: General soil and ground water. For example, releases from:<br>• Solid residues from flue gas cleaning on coal fired power plants used for gravel road construction;<br>• Uncollected waste products dumped or buried informally;<br>• Local un-confined releases from industry such as on-site hazardous waste storage/burial;<br>• Spreading of sewage sludge with mercury content on agricultural land (sludge used as fertilizer);<br>• Application on land, seeds or seedlings of pesticides with mercury compounds. |

| Calculation Result Type | Description<br>*(NOTE: Not all examples provided are relevant to Kiribati but are included for general reference)* |
|---|---|
| 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:<br>• Gypsum wallboard produced from solid residues from flue gas cleaning on coal fired power plants;<br>• Sulphuric acid produced from desulphurization of flue gas (flue gas cleaning) in non-ferrous metal plants with mercury trace concentrations;<br>• Chlorine and sodium hydroxide produced with mercury-based chlor-alkali technology; with mercury trace concentrations;<br>• Metal mercury or calomel as by-product from non-ferrous metal mining (high mercury concentrations). |
| 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:<br>• Confined deposition of solid residues from flue gas cleaning on coal fired power plants on dedicated sites;<br>• Hazardous industrial waste with high mercury content, which is deposited in dedicated, safe sites;<br>• Hazardous consumer waste with mercury content, mainly separately collected and safely treated batteries, thermometers, mercury switches, lost teeth with amalgam fillings, etc;<br>• Confined deposition of tailings and high-volume rock/waste from extraction of non-ferrous metals. |



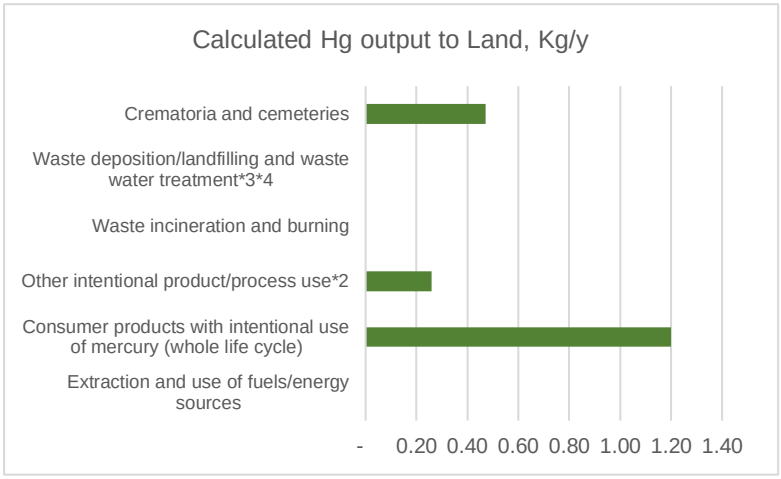

The use and disposal of consumer products with mercury resulted in the highest estimated air emissions of mercury annually at 1.21 Kg/y. Waste incineration accounted for the second highest estimated mercury emissions to air with 0.43 Kg/y.

*Figure 4: Mercury Emissions to Air Output Pathway from Present Mercury Source Categories*



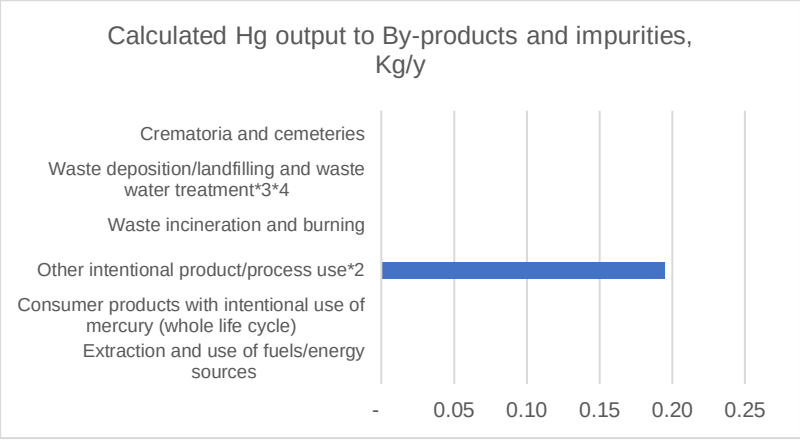

Other intentional product/process use which refers to the preparation, use and disposal of dental amalgam fillings as well as manometers and gauges resulted in 1.66 Kg Hg/y of releases to water.

*Figure 5: Mercury Releases to Water Output Pathway from Present Mercury Source Categories*



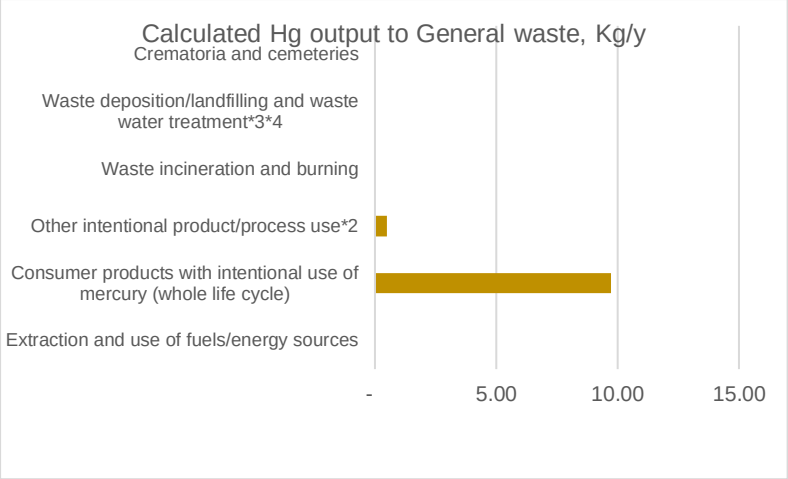

Consumer products with mercury resulted in an estimated 1.20 Kg/y of mercury being released to land, likely due to disposal in landfills. The release of mercury from bodies after burial was estimated to be responsible for approximately 0.47 Kg/ of mercury being released.

*Figure 6: Mercury Releases to Land Output Pathway from Present Mercury Source Categories*



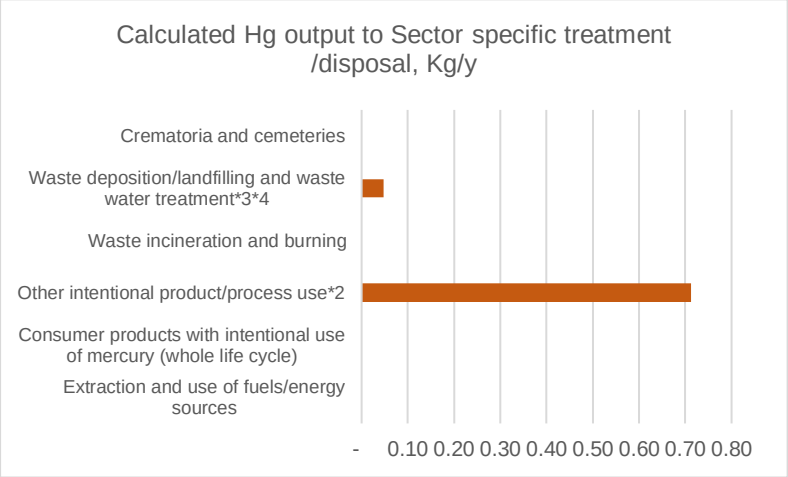

0.20 Kg/y of mercury were estimated to be released to by-products and impurities, mainly due to the preparation, use and disposal of dental amalgam fillings under the category: other intentional products/process use.

*Figure 7: Mercury Releases to By-products and Impurities Output Pathway from Present Mercury Source Categories*




The disposal of consumer products with mercury resulted in the highest estimated releases to general waste (9.71 Kg/y Hg) followed by other intentional products/process use with 1.01 Kg Hg/y.

*Figure 8: Mercury Releases to General Waste Output Pathway from Present Mercury Source Categories*




For sector-specific treatment/disposal pathways, Other intentional product/process uses was found to be responsible for 0.71 Kg/y of mercury releases followed by waste disposal with 0.05 Kg/y.

*Figure 9: Mercury Releases to Sector Specific Treatment/Disposal Output Pathway from Present Mercury Source Categories*

Table 6 summarises mercury releases to the various output pathways in Kiribati based on Toolkit calculations using mainly 2020 data and default values or previous years' data 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 Kiribati are not included in the table.

*Table 6: Summary of estimated yearly mercury releases in Kiribati*

| **Source category** | **Calculated Hg output, Kg/y** | | | | | |
|---|---|---|---|---|---|---|
| | **Air** | **Water** | **Land** | **By-products and impurities** | **General waste** | **Sector specific treatment/ disposal** |
| **Extraction and use of fuels/energy sources** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Mineral oils - extraction, refining and use** | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Biomass fired power and heat production** | - | - | - | - | - | - |
| **Consumer products with intentional use of mercury** | | | | | | |
| **Thermometers with mercury** | - | - | - | - | - | - |
| **Electrical switches and relays with mercury** | 1.20 | 0.00 | 1.20 | 0.00 | 9.60 | 0.00 |
| **Light sources with mercury** | 0.01 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 |
| **Batteries with mercury** | - | - | - | - | - | - |
| **Cosmetics and related products with mercury** | - | - | - | - | - | - |
| **Other intentional product/process use** | | | | | | |
| **Dental mercury-amalgam fillings** | 0.08 | 1.51 | 0.26 | 0.20 | 0.71 | 0.71 |
| **Manometers and gauges with mercury** | 0.05 | 0.15 | 0.00 | 0.00 | 0.30 | 0.00 |
| **Waste incineration*3** | | | | | | |
| **Incineration of medical waste** | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| **Informal waste burning** | - | - | - | - | - | - |
| **Waste deposition/landfilling and wastewater treatment** | | | | | | |
| **Controlled landfills/deposits*3** | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Informal dumping of general waste*1*3** | - | - | - | - | - | - |
| **Waste water system/treatment*2** | - | - | - | - | - | - |
| **Crematoria and cemeteries** | | | | | | |
| **Cemeteries** | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 | 0.00 |
| **SUM OF QUANTIFIED INPUTS AND RELEASES *1*2*3*4** | **1.89** | **1.66** | **1.93** | **0.20** | **11.00** | **0.76** |

***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.*

Total annual mercury releases in Kiribati were estimated to be 17.44 Kg Hg/y.

The following sub-categories were estimated to be the top sources of mercury:

1. Electrical switches and relays with mercury (12.00 Kg Hg/y)
2. Dental Amalgam Fillings (3.46 Kg Hg/y)
3. Manometers and gauges with mercury (0.50 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 Kiribati, 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.

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

### 2.2.1 Use of Mineral Oils

Through the extraction, refining and use of various fuels, small amounts of mercury impurities which may be naturally present, can be released into the environment. In Kiribati, no extraction or refining of fuel sources occurs but fuels such as diesel, gasoline and aviation fuel are imported for electricity generation and transportation purposes.

When oil products are combusted, mercury is primarily emitted to the air. Mercury concentrations in oils vary widely based on their source geology and in order to estimate potential releases in the Toolkit, globally available data on mercury concentrations in oils assessed over the years was analysed.

**Data Collection and Assessment**

For collection of data for use of mineral oils, 2020 data obtained from the International Renewable Energy Agency (IRENA) was utilized. According to data obtained from Energy Profile – Kiribati (IRENA, 2023), the total energy supply from non-renewable sources (indicated to be mineral oils) was 1,001 TJ (terajoules) in 2020. It was then assumed that 75% would be used for power generation and the remaining 25% used mainly for transport.

For input into the Toolkit, these values were converted to tonnes per year (t/y) using the Unit Conversion tab in the UNEP Toolkit. Table 7 summarises the converted values used for data entry.

*Table 7: Summary of Estimated Imports of Fuels in 2020 Converted to tonnes/year.*

| Type of Fuel | Estimated Supply of Oils (TJ/year) | Estimated Supply of Oils (tonnes/year) |
|---|---|---|
| **Amount of Diesel used for power generation** | 750.75 (75% of total) | 17,459.25 |

| | | |
|---|---|---|
| **Amount of diesel estimated to be used for transport mainly** | 250.25 (25% of total) | 5,819.75 |

Table 8 summarises the mercury inputs and releases to Kiribati from the extraction and use of mineral oils. 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 use of mineral oils*

| Use of Mineral Oils | Unit | Transportation and other uses | Other Oil Combustion Facilities (Powerplant) |
|---|---|---|---|
| **Activity rate** | t/y | 5,819.75 | 17,459.25 |
| Input factor for phase | mg Hg/t | 2.00 | 2.00 |
| **Calculated input to phase** | **Kg Hg/y** | **0.01** | **0.03** |
| **Output distribution factors for phase:** | | | |
| - Air | N/A | 1.00 | 1.00 |
| - 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 | 0.01 | 0.03 |
| - 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 | - | - |

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.

Biomass may naturally contain mercury as an impurity which can be released during burning as a fuel source (UNEP, 2019a). Vegetation also absorbs atmospheric mercury overtime which is readily re-released to the air upon combustion (UNEP, 2019a).

**Data Collection and Assessment**

Combustion of biomass for cooking and other purposes may be conducted on a small scale in Kiribati. Quantifiable data on the amount of biomass that may be used for cooking purposes was not available at the time of the inventory. Based on population size, it was assumed that mercury releases from this source would be negligible.

## 2.3 Data and Inventory on Consumer Products with Intentional Use of Mercury

Mercury has been added intentionally in several consumer products over the years due to its useful properties such as its high density and low vapour pressure. At each stage of the lifecycle

of a product, mercury may be released due to the type of manufacturing processes used, handling procedures and disposal methods (UNEP, 2019a). In recent years, global trends have indicated that production and use of mercury-added products has greatly reduced due to more awareness of the dangers posed by mercury and technological advancements that have made mercury-free alternatives more accessible. While mercury releases from production and use are expected to be reduced, releases from the disposal of products over the years is also a factor considered in the Toolkit. Disposal of the products after use may occur 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).

In Kiribati, no production of products containing mercury occurs. However, items may be imported, used and disposed of locally.

### 2.3.1 Use and Disposal of Thermometers

Mercury has been used in thermometers due to its various properties such as a high boiling point and high coefficient of expansion (UNEP, 2019a). 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**

In the past ten (10) years, mercury-free digital thermometers have become more common on the global and national market. Additionally, due to the onset of the COVID-19 pandemic in 2020, mercury-free contactless infrared thermometers were promoted. Observations made in Kiribati reflected the global trend towards mercury-free thermometer varieties. While confirmation of the complete phase-out of mercury-added thermometers could not be confirmed at the time of the inventory development, it was assumed that mercury releases from this source would be due to mercury added thermometers disposed of over the past 10 – 20 years. Based on population size, it was assumed that these releases would be negligible, as specific data to confirm numbers of thermometers within the country was unavailable.

### 2.3.2 Use and Disposal of Electrical Switches and Relays

Mercury has been used in some switches and relays, generally found in various electronic equipment due to its high density, conductivity and sensitivity to temperature (UNEP, 2019a). Over the past twenty (20) years, mercury-free alternatives have become more common on the market (examples shown in Table 9). However, 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.

*Table 9: Mercury-added Electrical Switches and Relays and their Alternatives (IMERC, 2014; IMERC, 2018).*

| Potentially Mercury-added Component or Product | Mercury-free Alternative(s) |
|---|---|

| | |
|---|---|
| Float switch | Mechanical, magnetic dry reed, optical, conductivity, metallic ball, sonic or ultrasonic, pressure transmitter, alloy, thermal, and capacitance float switches |
| Tilt switch | Metallic ball, electrolytic, mechanical, solid-state, and capacitance tilt switches; potentiometers |
| Pressure switch | Mechanical or solid-state switches |
| Temperature switch | |
| Mercury displacement relay | Dry magnetic reed, electro-mechanical, and solid-state relays; silicon-controlled rectifiers |
| Mercury wetted reed relay | |
| Mercury contact relay | |
| Flame sensor | Electronic ignition systems |
| Mercury thermostat | Electromechanical Thermostats (e.g., reed switch, snap-switch etc.); Digital Thermostat (electronic programmable) |

## Data Collection and Assessment

As electrical switches and relays are typically found as components of larger products, determining quantities that are in use in a country and their mercury content is extremely difficult. Default Toolkit calculations were used to estimate mercury input to society and output from this category. The calculations utilized the number of inhabitants from 2010 (SPC, 2022) to give a more accurate estimation of the historical consumption and 2022 disposal rates. A default electrification rate of 82.9% was used in the calculations. Table 10 details the factors used to estimate mercury releases to various output pathways from the use and disposal of mercury-added electrical switches and relays.

*Table 10: Analysis of mercury inputs and outputs from the historical use and disposal of mercury-added electrical switches and relays.*

| Electrical Switches and Relays with Mercury | Unit | Use and Disposal of Electrical Switches and Relays |
|---|---|---|
| **Activity rate** | inhabitants (2010) | 103,058 |
| Input factor for phase | Percent of population with access to electricity | 82,9 |
| | g Hg/y*inhabitant | 0.14 |
| **Calculated input to phase (no separate collection. Waste handling controlled)** | **Kg Hg/y** | **12.00** |
| **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 | 1.20 |

| Electrical Switches and Relays with Mercury | Unit | Use and Disposal of Electrical Switches and Relays |
|---|---|---|
| - Water | Kg Hg/y | - |
| - Land | Kg Hg/y | 1.20 |
| - Products | - | - |
| - General waste treatment | Kg Hg/y | 9.60 |
| - Sector specific waste treatment | - | - |

### 2.3.3 Use and Disposal of Light Sources

Mercury has been 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. While mercury-free Light Emitting Diode (LED) bulbs have become more popular in recent years, mercury added lighting devices are still found in stock globally.

Mercury is not considered a threat to the environment when it is contained within the glass tube of the bulbs. However, when lighting devices are broken accidentally or through disposal, mercury can be released into the environment (UNEP, 2019a).

Lighting products containing mercury are not produced in Kiribati, however, they are imported.

**Data Collection and Assessment**

Import data on lighting devices being imported over the past five (5) years was not available at the time of the inventory.

In order to estimate the number of CFLs and LFLs sold in 2020 for entry in the Toolkit, assumptions based on population data and retail store observations were made as detailed in Table 11.

*Table 11: Assumptions made in Data used for Input in Toolkit to Estimate Mercury Releases for Lighting Products*

| Toolkit Source Category for Lighting Products | Estimated Number of Items Sold in 2020 | Assumptions made |
|---|---|---|
| Fluorescent Tubes (double ended) | 9,058 | Solar power is a significant source of energy used in Kiribati and it can be assumed that mercury-free lighting devices are also used by the population that rely on solar generated power. According to SPC (2022), there are 7,011 households in South Tarawa depend on grid electricity and a further 25% of the rural population that depend on electricity (approximately 2,047 households). Assuming that each of these households (total 9,058 households) use at least 1 mercury- |

| Toolkit Source Category for Lighting Products | Estimated Number of Items Sold in 2020 | Assumptions made |
|---|---|---|
| | | added LFL per year, it was estimated that 9,058 LFLs were purchased in 2020. |
| Compact Fluorescent Lamp (CFL single end) | 18,116 | The estimation that there were 9,058 households using non-solar powered energy was also applied to estimate the number of single-ended bulbs purchased in 2020.<br><br>It was assumed that 4 single-ended bulbs were used in households per year and that 2 would be mercury-added CFLs.<br><br>This resulted in the assumption that (2 x 9,058) CFLs estimated were purchased in 2020. |
| HIDLs (includes High pressure sodium lamps and Metal Halide Lamps) | 0 | The number of mercury added HIDLs was assumed to be negligible. |
| Note: This estimation also did not take into account businesses or public institutions. | | |

Table 12 summarises the mercury inputs and releases to Kiribati from the estimated number of mercury-added lighting devices sold in 2022. The input factors and output distribution factors used to estimate mercury releases were obtained from the Toolkit.

*Table 12: Analysis of mercury inputs and outputs from the use and disposal of lighting devices*

| Use and Disposal of Lighting Devices | Unit | LFLs | CFLs |
|---|---|---|---|
| **Activity rate** | items/y | 9,058 | 18,116 |
| Input factor for phase | mg Hg/t | 8.00 | 2.70 |
| **Calculated input to phase** | **Kg Hg/y** | **0.12** | |
| **Output distribution factors for phase *(No separate collection; Waste Handling Controlled)*:** | | | |
| - Air | N/A | 0.05 | |
| - Water | N/A | - | |
| - Land | N/A | - | |
| - Products | N/A | - | |
| - General waste treatment | N/A | 0.95 | |
| - Sector specific waste treatment | N/A | - | |
| **Calculated outputs/releases to:** | | | |
| - Air | Kg Hg/y | 0.01 | |
| - Water | Kg Hg/y | - | |
| - Land | Kg Hg/y | - | |
| - Products | Kg Hg/y | - | |

| Use and Disposal of Lighting Devices | Unit | LFLs | CFLs |
|---|---|---|---|
| - General waste treatment | Kg Hg/y | 0.11 | |
| - Sector specific waste treatment | Kg Hg/y | - | |

### 2.3.4 Use and Disposal of Batteries

Mercury has been used in various types of batteries such as 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) over the years. Mercury concentrations have ranged greatly amongst different types of batteries from less than 1% wet weight (w/w) to 30-32% w/w. Once intact, mercury added batteries do not pose a threat to human health or the environment while in use but become a hazard when the batteries are damaged or disposed of.

As of 2019, global market data on mercury-added batteries found that many well-known global battery suppliers only supply mercury-free batteries. Furthermore, as of January 2021, China prohibited the manufacturing and import of mercury-added batteries except for the types still allowed under the Minamata Convention (UNEP, 2019b).

In Kiribati, batteries are imported for use in various equipment and applications. There is no separate collection of mercury-added batteries for disposal. It has been noted that under the Container Deposit Scheme, recycling of lead-acid batteries and home appliances among other items, is conducted. The feasibility of including these types of mercury-added batteries can be considered.

**Data Collection and Assessment**

Data on the imports of mercury-added batteries over the past 5 years was unavailable at the time of the inventory. Popular brands of batteries observed in the Pacific include:

- *Duracell*
- *Energizer*
- *Rayovac*
- *Kodak (had label stating '0% mercury')*

While Duracell, Energizer and Rayovac did not have labelling to confirm the absence or presence of mercury, further research indicated that all have stated that their batteries manufactured after 2019 are mercury-free.

As there is no separate collection of these types of batteries for end-of-life disposal, mercury releases to general waste are expected for mercury-added batteries imported, used and disposed of prior to the phase-out of mercury by the major manufacturing brands. Due to the lack of available data, mercury releases for batteries could not be quantified.

## 2.4 Data and Inventory on Other Intentional Product/Process Use

### 2.4.1 Dental mercury-amalgam Fillings

Dental amalgam, which is a mixture of metals including mercury, is used in dental restoration procedures to fill cavities (FDA, 2017). The amalgam can be supplied to dentists in the following forms:

- Pre-capsulated dental amalgam (silver amalgam) (single-dental restoration capsules of pre-dosed amalgam)
- Powdered mercury alloy or liquid elemental mercury (requires manually taking out needed amounts and mixing).

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, 2019a).

Under the Minamata Convention on Mercury, the manufacture, import and export of dental amalgam is not yet prohibited but a phase-down approach is outlined by which Parties should adopt at least two (2) of several suggested approaches for restricting use. Further to the recommended measures, as of 2022, Parties are obligated to, "exclude or not allow, by taking measures as appropriate, the use of mercury in bulk form by dental practitioners". The use of pre-capsulated single-dose dental restoration capsules which have a lesser risk of mercury exposure is allowed.

As of 2022, Parties will also be expected to take appropriate measures to prevent dental amalgam use for patients under 15 years of age, and of pregnant and breastfeeding women, except when considered necessary.

**Data Collection and Assessment**

In order to estimate mercury releases from dental amalgam fillings, 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 1.00 for Kiribati according to the Toolkit) as well as the number of inhabitants.

Population data from 2020 was used to calculate the mercury input from the preparation of dental amalgam fillings at dental clinics in Kiribati. Mercury input and releases occurring from the use of amalgam fillings were expected to have been from amalgam placed years prior in 2015 since mercury amalgam can last between 5-15 years before needing to be replaced. Mercury input from the disposal of dental amalgam was calculated using the country's population from 10 years prior, 2010, due to the life expectancy of the fillings. Population data was sourced from the SPC (2022).

According to the Toolkit, the overall input of mercury to society from the preparation, placement, use and disposal of dental amalgam over the years was calculated to be approximately 3.46 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 13.

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

*Table 13: Analysis of mercury inputs and outputs from the preparation, use and disposal of dental amalgam in 2020.*

| **Dental Mercury-Amalgam Fillings** | **Unit** | **Preparation** | **Use** | **Disposal** (In countries where only dental chair filters/strainers are used in most clinics) |
|---|---|---|---|---|
| **Activity rate** | Inhabitants Dentists per 1000 inhabitants | 119,438 | 110,136 | 103,058 |
| Input factor for phase | g Hg/(y*inh) | 0.2 | 0.2 | 0.2 |
| **Calculated input to each phase** | **Kg Hg/y** | **3.77** | **3.47** | **3.25** |
| **Total input** | **Kg Hg/y** | **3.46** ***(once double-counting was factored in)*** | | |
| **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 | 0.08 | - | - |
| - Water | Kg Hg/y | 0.53 | 0.07 | 0.91 |
| - Land | Kg Hg/y | - | - | 0.26 |
| - Products | Kg Hg/y | - | - | 0.20 |
| - General waste treatment | Kg Hg/y | 0.45 | - | 0.26 |
| - Sector specific waste treatment | Kg Hg/y | 0.45 | - | 0.26 |

### 2.4.2 Use and Disposal of Manometer and Gauges

Mercury has been used in some manometers, gauges, pressure valves and other measuring devices (UNEP, 2019a) historically, as it has a 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 have become less common as mercury-free alternatives are readily available.

**Data Collection and Assessment**

Specific data on the number of medical blood pressure gauges imported and used in Kiribati in 2020 was not obtained for this inventory due to difficulties in differentiating mercury-

containing from mercury-free blood pressure gauges. In order to estimate 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. 2020 population data and electricity rates were used in The Toolkit. It was also noted that no separate collection of manometers and gauges occurs within a controlled waste handling system.

The total input from the use and disposal of other manometers (not including medical devices) in 2020 was estimated to be 0.50 Kg Hg/y. A summary of estimated mercury releases from manometers and gauges is shown in Table 14.

*Table 14: 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 | 119,438 |
| Input factor for phase | Percent of population with access to electricity | 82.9 |
| | g Hg/y*inhabitant | 0.005 |
| **Calculated input to phase** | **Kg Hg/y** | **0.50** |
| **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 | 0.05 |
| - Water | Kg Hg/y | 0.15 |
| - Land | - | - |
| - Products | - | - |
| - General waste treatment | Kg Hg/y | 0.30 |
| - Sector specific waste treatment | - | - |

## 2.5 Data and Inventory on Waste Incineration

### 2.5.1 Incineration of Medical Waste

Medical waste is any waste generated from medical activities taking place at hospitals, healthcare facilities, dental clinics, etc. and 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).

Mercury may be released from incinerated medical products that may include medical thermometers, blood pressure gauges, dental amalgam fillings and mercury containing chemicals; it may also be released from human secretions.

**Data Collection and Assessment**

2014 data on medical waste incineration was obtained from the "Baseline Study for the Pacific Hazardous Waste Management Project- Healthcare Waste: Kiribati" (ENVIRON Australia Pty Ltd, 2014). Medical waste is incinerated at the Tungaru Hospital Incinerator located in Tarawa, using a MediBurn incinerator that operates with diesel as its fuel source. The incinerator was estimated to process approximately 20,000 Kg/y. This estimation was assumed to be comparable with more recent years and was used for input in the Toolkit as indicated in Table 15 below. A second incinerator that operates using wood fuel was located at Kiritimati Island London Hospital, however, it was no longer in use as of the 2014 report.

*Table 15: Analysis of mercury inputs and outputs from medical waste incinerated.*

| Medical Waste Incineration | Unit | Medical Waste |
|---|---|---|
| **Activity rate** | Waste incinerated, t/y | 20 |
| Input factor for phase | g Hg/t waste | 24 |
| **Calculated input to phase** | **Kg Hg/y** | **0.48** |
| **Output distribution factors for phase:** | | |
| - Air | N/A | 0.90 |
| - Water | - | - |
| - Land | - | - |
| - Products | - | - |
| - General waste treatment | - | - |
| - Sector specific waste treatment | N/A | 0.10 |
| **Calculated outputs/releases to:** | | |
| - Air | Kg Hg/y | 0.43 |
| -Water | - | - |
| - Land | - | - |
| - Products | - | - |
| - General waste treatment | - | - |
| - Sector specific waste treatment | Kg Hg/y | 0.05 |

### 2.5.3 Open Waste Burning on Landfills and Informally

Informal/open waste burning refers to waste incineration undertaken in informal conditions such as in barrels, containers, or on bare land without emission controls (UNEP, 2019a). Mercury present in waste is released to air and incineration residue which may pollute the air, land, groundwater and surface waters (UNEP, 2019a).

**Data Collection and Assessment**

Informal burning of waste has been noted in communities or at waste disposal sites. Informal burning occurs in outer islands and more rural areas where there is a lack of waste collection services, poor waste segregation and limited availability of land for a landfill or waste disposal site. While no quantities of waste burnt have been recorded for the inventory development, it has been noted that mainly small amounts of green waste are burnt which may have trace amounts of mercury present that can be released to the air but in quantities that are assumed to be negligible.

## 2.6 Data and Inventory on Waste Deposition/Landfilling and Wastewater Treatment

### 2.6.1 Controlled Landfills

Controlled landfills refer to specially designated areas for waste deposition which are specially designed to prevent or reduce releases and emissions of waste components to the environment. Different types of designs for controlled landfills exist ranging from areas lined with impermeable materials such as clay or the development of leachate ponds to isolate liquid run-off to more technical engineering designs. Wastes deposited in landfills with efficient built-in measures are more effective at preventing contamination of surrounding areas with hazardous waste components including mercury (UNEP, 2019a).

Mercury in municipal waste varies typically depending on the amount of discarded, damaged or broken mercury-added products disposed of in the landfills (UNEP, 2019a). Mercury contained within mercury-added products may evaporate resulting in air emissions and small amounts of mercury may leach into waterways.

**Data Collection and Assessment**

In Kiribati, several disposal sites are located across the country: Betio Landfill; Nanikaai Landfill; Bikenibeu Landfill; Abaiang dumpsite; Kiritimati dumpsite; and Maiana (hazardous waste) dumpsite. Each of these sites have been classified as "unregulated" as measure such as adequate leachate management and daily cover usage are lacking (SPREP, 2023). Waste disposal was not regularly measured but it was noted that at least 2 of the designated sites, Betio and Nanikaai Landfills, were approaching or had already exceeded their maximum waste capacity (SPREP, 2023). A waste audit conducted that estimated waste disposed per household was used to determine the amount of waste disposed from these sites per year.

Estimated waste volumes from a 2021 waste audit were determined to be approximately 8,752 t/y (SPREP, 2023). Waste separation does occur in Kiribati; however, the separation of potentially mercury-added products was not noted.

Table 16 provides a summary of the estimated mercury releases from controlled landfills/deposits for Kiribati. 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 was 0.09 Kg Hg/y released to air.

*Table 16: Analysis of mercury inputs and outputs from controlled landfills/ deposits*

| Controlled Landfills/ Deposits | Unit | Controlled Landfills |
|---|---|---|
| **Activity rate** | Waste landfilled, t/y | 8,752 |
| Input factor for phase | g Hg/t waste | 1 |
| **Calculated input to phase** | **Kg Hg/y** | **8.75** |
| **Output distribution factors for phase:** | | |
| - Air | N/A | 0.01 |
| - Water | N/A | 0.0001 |
| - Land | - | - |

| Controlled Landfills/ Deposits | Unit | Controlled Landfills |
|---|---|---|
| - Products | - | - |
| - General waste treatment | - | - |
| - Sector specific waste treatment | - | - |
| **Calculated outputs/releases to:** | | |
| - Air | Kg Hg/y | 0.09 |
| -Water | Kg Hg/y | 0.00 |
| - Land | - | - |
| - Products | - | - |
| - General waste treatment | - | - |
| - Sector specific waste treatment | - | - |

### 2.6.2 Informal Dumping of General Waste

Informal dumping refers to the disposal of general waste in areas that are not specifically designated for waste and are without any safeguards to prevent the release of pollutants into the environment (UNEP, 2019a). Waste may consist of residential, green and construction waste which may have trace amounts of mercury present in materials or through the disposal of mercury-added products.

**Data Collection and Assessment**

Informal dumping of waste has been noted to occur in some locations in Kiribati, particularly near coastal areas. The volumes of waste dumped was not available for entry in the Toolkit. Based on population size, it was assumed that volumes of waste informally dumped would be negligible in terms of potential mercury releases.

### 2.6.3 Wastewater System/Treatment

Wastewater systems or treatment process are considered to be an intermediate mercury release pathways for mercury that may have originated from mercury-added products such as dental amalgam that may have been entered waterways through preparation or disposal or from other mercury-added products such as broken thermometers and other devices or industrial discharges. Atmospheric mercury, originating from both natural and anthropogenic sources may also enter wastewater when washed out by precipitation which makes its way into soil, surface and ground water (UNEP, 2019a).

Depending on the type of wastewater treatment, mercury content and distribution will vary as it may be released into waterways after treatment, distributed through sludge as fertiliser on land or as waste deposited at a landfill (UNEP, 2019a).

**Data Collection and Assessment**

The volume of wastewater generated in Kiribati has not been quantified and as such, no data on this source could be determined for the inventory of mercury releases.

## 2.7 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.

### 2.7.1 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**

The number of deaths in Kiribati was estimated using the 2020 average death rate of 6.24 per 1,000 inhabitants (O'Neill, 2023) and the population data for 2020 of 119,438 (SPC, 2022). An estimate of 745 deaths in 2020 was then used for entry in the Toolkit. Estimated mercury releases from burials are shown in Table 17.

*Table 17: Analysis of mercury inputs and outputs from cemeteries*

| Cemeteries | Unit | Cemeteries |
|---|---|---|
| **Activity rate** | Corpses buried/y | 745 |
| 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 | 0.1308 |
| **Calculated input to phase** | **Kg Hg/y** | **0.47** |
| **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 | 0.47 |
| - Products | - | - |
| - General waste treatment | - | - |
| - Sector specific waste treatment | - | - |

## 2.8 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 mercury-added products) 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.

Kiribati does not currently have any notable stocks of mercury and/or mercury compounds as no significant activities occur that would require such stocks.

## 2.9 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 endeavor 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 Kiribati, and therefore the interim storage provisions outlined in Article 10 of the Minamata Convention are not currently applicable to Kiribati.

## 2.10 Identification of 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.

Table 18 indicates potential sites that may be sources of mercury contamination. Figure 10 shows a map of Tarawa, Kiribati where tracking of the locations of potentially mercury contaminated sites was initiated. Further geospatial data on the other islands of Kiribati is recommended to provide a clearer indication of potential sites of interest for the country as a whole.

*Table 18: Potentially contaminated sites for further analysis.*

| Potentially Contaminated Site | Description |
|---|---|
| Landfills | In Tarawa, 3 main landfills are located along the south of the island. Mercury-added products are not disposed of separately and therefore, result in mercury deposited at these sites. |
| Hospital | Medical waste generated at hospitals is potentially contaminated with mercury. On-site waste storage areas and wastewater may be sources of mercury contamination. |
| Medical Waste Incinerator | Medical waste generated at hospitals is potentially contaminated with mercury. When disposed of or incinerated, mercury contained within equipment or dental amalgam, may be released to the environment. A medical waste incinerator is located at Tungaru Hospital, Tarawa that operates with diesel as its fuel source. |
| Sewage outflow | Wastewater can contain mercury waste from a variety of sources, including intentional use in products or processes Wastewater can contain mercury waste from a variety of sources, including intentional use in products or processes. The wastewater outflow was not able to be captured geospatially at the time of the inventory development. |
| Power plant and fuels | Fossil fuels naturally have small amounts of mercury that can be released during incineration or accumulate slowly through time. In Kiribati, the operational power plant is mainly powered by diesel. |

Mercury inputs to the environment do not always directly correlate with mercury levels in biota and humans. Once in the environment, mercury can be converted into its more toxic and bioavailable form, methylmercury, by communities of iron- and sulphur- reducing bacteria. Methylmercury can bioaccumulate in individual organisms through time and biomagnify up trophic levels. A suite of factors impacts the potential of a particular system to methylate mercury depending on how favourable conditions are for the bacterial communities to methylate mercury.

For example, the wet-dry cycle associated with wetlands and mangroves or the ability of forest canopies to scavenge mercury from the air make them ecosystems particularly sensitive to mercury inputs. Sensitive systems may exhibit high concentration and effects of mercury in biota despite low to moderate mercury inputs, while conversely, areas with low methylation potential may exhibit little mercury impact despite high inputs. As a result, it is important to understand the spatial context of potentially mercury contaminated sites to inform the threat from mercury contamination in the environment.




*Figure 10: Map indicating potentially mercury contaminated sites in Tarawa, Kiribati.*

Further research on the spatial distribution of potentially contaminated sites in relation to ecosystem characteristics that increase the methylation potential of mercury inputs should be conducted to inform locations prioritized for further study on the threat from mercury on human health and the environment and for future use in evaluating the effectiveness of the Minamata Convention. Additionally, these – and any additional – potentially contaminated sites should be verified by the relevant national authorities.

## 2.11 Impact of Mercury on Human Health and the Environment[2]

Elemental mercury, which is found in manufactured products, is not necessarily toxic to humans. Exceptions may include dental amalgam and cosmetics, but these products are still under scientific investigation, so their potential harm is not yet fully characterized.

Methylmercury, the organic form of mercury, is toxic to humans because it can biomagnify in food webs and bioaccumulate over time in organisms. A neurotoxin, methylmercury can cause

[2] Section contains extracts from "State of Mercury in the Pacific Region" (BRI, 2023).

physiological harm and behavioral disorders in people. Fish from the sea or freshwater systems can be a major source of methylmercury. In general, fish species that are small, short-lived, and forage low in the food web contain less methylmercury, while predatory species that are long-lived and grow larger can contain higher levels of methylmercury. Many of the fish available in the Pacific are safe to eat, although more information is needed about the mercury concentrations to better characterize how mercury is distributed in different species of fish in the waterscape of Pacific nations.

Studies have shown that high mercury concentrations in fish (measured in methylmercury) can have negative impacts on fish growth, behavior, and reproduction. Consequently, fish-eating wildlife are shown to have decreased reproductive success when methylmercury concentrations in fish are high. As a neurotoxin, methylmercury can also have negative effects on behavior such as foraging or nest protection. The process of methylation, the conversion of elemental mercury to organic methylmercury, varies widely on the landscape and within the waterscape.

Areas that are particularly sensitive to mercury deposition—where methylation rates are highest and biomagnification in the food web is greatest, and where animals experience significant reproductive harm—are called biological mercury hotspots. These areas generally represent aquatic ecosystems or have an aquatic connection within the food web.

Aquatic ecosystems, either marine (e.g., beaches and coral reefs) or freshwater (e.g., lakes and rivers), are often prime areas for high methylation rates. Fish and wildlife predators that live in rivers and lakes, or that forage in a food web associated with these habitats (e.g., mangroves), often contain elevated mercury levels. The combination of high methylation rates and longer-lived animals higher in the food web creates the greatest risk of adverse effects.

Habitats at the greatest risk of mercury methylation include wetlands, mangroves and aquatic habitats near contaminated sites (such as landfills). Wildlife at greatest risk of mercury contamination (besides fish species) include Albatrosses, Cormorants, Frigatebirds, Petrels, Shearwaters and Tern.

BRI, in collaboration with other entities under the Minamata Convention on Mercury, is working on several fronts to conduct and promote mercury biomonitoring across the globe. Biomonitoring is the process of assessing the health of organisms and ecosystems and tracking changes in mercury risk and exposure over time. Monitoring mercury exposure to humans will help the global community to meet the requirements of the Minamata Convention on Mercury and will also help identify global biological hotspots that represent elevated levels of mercury exposure that may pose serious threats to both ecosystem and human health.

In Kiribati, coordination between BRI and MELAD is ongoing to conduct a rapid mercury analysis of potential fish species of interest.

# Chapter 3 Policy, Regulatory and Institutional Framework Assessment

## 3.1 Regulatory Obligations Under the Minamata Convention on Mercury

The Minamata Convention on Mercury consists of 35 Articles with 5 supporting Annexes.

General areas of focus include control measures for mercury management, support mechanisms in place for Parties and administrative notes that refer to the functioning of the Minamata Convention itself.

Articles 1 and 2 state the overall objective of the Minamata Convention and relevant definitions outlined in its text. Table 19 provides an overall summary of the Articles of the Convention that are related to Party obligations and indicate their relevance to Kiribati for further discussion in this Chapter.

*Table 19: Summary of the Articles of the Minamata Convention on Mercury in relation to their Relevance to Kiribati*

| Article | Brief Description of Article | Relevance to Kiribati |
|---|---|---|
| Article 3 Mercury Supply, Source and Trade | Parties are obligated to control primary mercury mining activities and individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks exceeding 10 metric tons per year within a territory. | Not relevant to Kiribati as no primary mercury mining occurs and no stocks of relevant quantities exist as stated. |
| **Article 4 Mercury-added products** | Parties are obligated to phase-out the manufacture, import and export of certain mercury-added products listed in Annex A Part I of the Convention. Under Annex A Part II, phase-down obligations for dental amalgam fillings are detailed. Following the Minamata Convention's Fourth and Fifth Conference of the Parties (COP-4 and COP-5) outcomes, further amendments to Annex A have been implemented. | While Kiribati does not manufacture or export mercury-added products, imports of certain mercury-added products are detailed in Chapter 2 of this report that must be phased out or phased down according to the Convention's obligations. |
| Article 5 Manufacturing processes in which mercury or mercury compounds are used | Parties must phase out the use of mercury or mercury compounds in manufacturing processes described in Annex B of the Convention. | Not relevant to Kiribati as the related manufacturing processes do not take place. |

| Article | Brief Description of Article | Relevance to Kiribati |
|---|---|---|
| Article 7 Artisanal and small-scale gold mining | Parties must control the use of mercury and mercury compounds in artisanal and small-scale gold mining activities. | Not relevant to Kiribati as the related activities do not take place. |
| **Article 8 Emissions** | Parties must control and, where feasible, reduce emissions of mercury and mercury compounds to the atmosphere (air) through measures to control emissions from the point sources listed in Annex D of the Convention. | In Kiribati, as identified in Section 2.5 of this report, medical waste incinerators are present. "Waste incineration facilities" are included in Annex D for management. |
| **Article 9 Releases** | Aims to control and, where feasible, reduce releases of mercury and mercury compounds to the land and water from relevant point sources determined in the Party's national inventory. | Sources of mercury releases to land and water have been identified in Chapter 2 of this report for management. |
| Article 10 Environmentally sound interim storage of mercury, other than waste mercury | Aims to implement measures for environmentally sound interim storage of mercury and mercury compounds in relation to Article 3. | Not relevant as the related Article 3 is not relevant to Kiribati. |
| **Article 11 Mercury wastes** | Outlines obligations for the environmentally sound management, transport, storage and disposal of mercury wastes as defined under the Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal. | Potential generation of mercury waste sources have been identified in Chapter 2 for management. Kiribati is also a Party to the Basel Convention. |
| **Article 12 Contaminated sites** | Encourages Parties to endeavour to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds. A guidance document[3] on the management of contaminated sites was adopted by the Conference of the Parties of the Minamata Convention on Mercury to support countries. | Under Section 2.10 of this report, a strategy for the identification of potential mercury hotspots was developed. This can be used to further guide the Government of Kiribati in the identification of mercury-contaminated sites and the development of measures to address them. |
| **Article 16 Health Aspects** | Encourages Parties to promote the development and implementation of various tools and techniques to identify and protect populations at risk, particularly vulnerable populations, of mercury exposure. | Education and awareness strategies should be developed and can be guided through the findings of the MIA and through related GEF ISLANDS Project activities to be implemented. |
| **Articles of the Minamata Convention on Mercury related to Support Mechanisms for Implementation (may be briefly referenced in this Chapter)** | | |

[3] Available at: Guidance_Contaminated_Sites_EN.pdf (mercuryconvention.org)

| Article | Brief Description of Article | Relevance to Kiribati |
|---|---|---|
| Article | Brief Description of Article | Relevance to Kiribati |
| **Article 13 Financial resources and mechanisms** | Aims to support small island developing states (SIDS) in the implementation of the Convention through an established financial mechanism. | As a SIDS, Kiribati can access financial resources and capacity-building assistance for the implementation of the Convention. The MIA Project was enabled under this Article as well as the GEF ISLANDS Project. |
| **Article 14 Capacity-building, technical assistance and technology transfer** | Encourages Parties to provide appropriate capacity-building and technical assistance to developing country Parties for the implementation of the Convention's obligations. | Kiribati can access available assistance from Parties. Currently, through the MIA Project and GEF ISLANDS Project, Kiribati can benefit from the lessons learned sharing amongst participating countries. |
| **Article 17 Information exchange** | States that Parties should facilitate the sharing of relevant scientific, technical, economic and legal mercury information developed. This can be done through the Secretariat of the Minamata Convention or other relevant organisations. | The MIA Report and findings conducted under this MIA Project will be shared with the Secretariat of the Minamata Convention, Global Mercury Partnership and other relevant organisations as needed. |
| **Article 18 Public information, education and awareness** | Notes that each Party should promote and facilitate the sharing of available information on mercury to the public. The facilitation of education, training and public awareness related to the health and environmental effects of exposure to mercury should be done with relevant intergovernmental and non-governmental organisations as appropriate. | This may be done under the guidance of MELAD and facilitated through the findings of the MIA and GEF ISLANDS. |
| **Article 19 Research, development and monitoring** | Notes that Parties shall endeavour to develop and improve upon various mercury monitoring and research activities. | Under the MIA Project, Kiribati has developed an inventory of mercury releases, developed potential mercury hotspot mapping, initiated mercury biomonitoring among other activities to promote research, development and monitoring. |
| **Article 20 Implementation Plans** | Details that following the MIA activities, each Party may develop and execute an implementation plan to meet their obligations to the Minamata Convention. | Chapter 6 of this MIA Report provides considerations that Kiribati can take into account for the development of an implementation plan which should be developed further in consultation with national stakeholders. Additional guidance[4] on the development of an implementation plan is provided on the Minamata Convention's website. |
| **Article 21 Reporting** | States that each Party shall report on the measures taken to implement the Convention and note the effectiveness of measures and possible challenges. | The national focal point must submit report to the Secretariat of the Minamata Convention in coordination with relevant |

[4] Forms and guidance documents | Minamata Convention on Mercury (mercuryconvention.org)

| Article | Brief Description of Article | Relevance to Kiribati |
|---|---|---|
| | | stakeholders. An online reporting tool has been made available to Parties. |
| **NOTE:** *Other Articles not included in this table generally refer to the functioning of the Minamata Convention itself and will not be discussed in detail in this report.* | | |

## 3.2 Assessment of Relevant Policies and Legislation in Kiribati

In Kiribati there is no specific legislation that deals with chemicals or, in particular, mercury and mercury compounds. Generally, the aim of relevant existing legislation is to protect Kiribati's environment and the population by controlling and regulating the importation, manufacture, sale, distribution, use, export or disposal and other movement of chemicals, including those that are dangerous and harmful. The key existing legislations that may be of relevance include:

### Pharmacy & Poison Ordinance, Cap 70

The Ordinance is intended to control and manage the practice of pharmacy and the sale and distribution of drugs and poisons. It also prohibits the importation of drugs and poisons without a license. Section 62 of the Ordinance provides for the making of a regulation with respect to the manufacture of pharmaceutical preparation containing poisons and for the sale and supply of poisons. The Schedules of this Ordinance provide a list of poisons prohibited for sale except in the manner prescribed in the Ordinance. Under those lists, none was mentioned in respect of a specific chemical nor of mercury.

### Food Safety Act 2006

The Act seeks to improve food quality in Kiribati, to safeguard public health and to regulate the standard of imported foods. Section 33 of the Act provides for a regulation to be made. Schedule 1 of the Regulation provides for maximum permitted level of chemical contaminants including mercury.

### Environment (Amendment) Act 2007

Although the Act does not specifically refer to a particular chemical, it does regulate, control, and manage hazardous substances. It is a general requirement under the Act that an Environment License has to be issued for every environmentally significant activity carried out. This license controls, manages, and regulates potentially hazardous chemicals in a particular activity. The Act also provides for the disposal of any hazardous substances.

This Act also produces a number of Regulations including the Ozone Depleting Substance (ODS) Regulation 2017 which aims to regulate the importation, the use, management and storage of ODS gases, and its exportation as well. Under this Regulation such importations, uses, management, storages and exportations cannot be carried out unless a license has been issued by a concerned authority.

### Occupational Health and Safety Act 2015

The Occupation, Health and Safety Act 2015 make provision for the safety, health and welfare of people at work in Kiribati. It also establishes procedures for the administration of these matters. Under the Act (Section 13), an employer must take appropriate steps to control hazards which are identified and assessed as posing a threat to the safety, health or welfare of employees, and where practicable, the hazard must be eliminated. Mercury or mercury compounds are not specifically stated in this Act however the objective of the Act is generally to manage and operate all chemicals which also include mercury.

### Customs Act 2019

This Act controls the importation of all types of goods. Under the Act, there is a specific list of restricted and prohibited goods, though mercury or mercury-added products are not currently listed. However, the Act provides that the importation of any goods which are restricted or prohibited under any other national laws are recognized and should therefore be restricted or prohibited as well.

## NON-REGULATORY MECHANISMS FOR MANAGING CHEMICALS (INCLUDING MERCURY)

### The National Profile of Chemicals Management Infrastructure in Kiribati (2008)

This report identifies and describes the chemical wastes that became major chemical pollutants and a threat to the local environment, mainly on South Tarawa. This report provides background information of the existing chemical wastes that have been disposed and placed in some islands of Kiribati, mainly on South Tarawa. It also indicates health risk associated with these chemical wastes to the health of people and the Kiribati environment. Mercury wastes are not specifically identified.

### Kiribati Vision 20 Years (2016-2036)

Kiribati Vision 20 is a long-term development plan of the Kiribati Government targeting 20 years from 2016 to 2036. This plan has 4 pillars which are wealth, peace & security, infrastructure for development and governance. In this plan chemical wastes including mercury are not specifically stated however, they are integrated under cross cutting issues under which the emphasis is on threats that pose harm and risks to human life due to climate change. The plan implements and builds on existing policy measures to protect vulnerable citizens from the negative effects of climate change. It also emphasizes accessibility and utilization of financial mechanisms to reduce the risks of climate change in a more sustainable way.

### Kiribati Development Plan 2016-2019

The Kiribati Development Plan 2016-2019 is the Government's strategic plan within the 4-year term. This plan highlights all forms of Government manifesto that will be implemented during the Government tenure in the 4-year period. This strategic plan also emphasizes environmental threats that have existed and pose threats upon people, land and marine environment. These threats include lagoon pollution, accumulation of solid waste and water pollution. In addition, the plan identifies the soil and water pollutions that have been caused from improper waste oil discharging and

improper chemical waste disposal. This strategic plan also highlights solutions towards hazardous e-wastes and bulky waste of old vehicles such as collection and shipment of these solid wastes out of Kiribati. Finally, this plan pinpoints environmental issues and areas that need to be addressed for the protection of the environment and human life. Mercury or mercury compounds are not specifically mentioned; however, provisions of chemical wastes disposal are stressed as the major threats to the land and marine environment.

### Kiribati Integrated Environment Policy (KIEP) & Strategic Environment Plan (SEP) 2021 – 2036 DRAFT

The KIEP & SEP 2021-2036 is a newly developed document that combines the environment policy and the environment strategic plan till 2036. It outlines the Ministry of Environment's action plans that will be needed to implement the Integrated Environment Policy. The components/sections of the document are clarifying various ideas, varying from the long-term vision, emphasizing people living in a safe and healthy environment and the long-term mission which involves safeguarding, managing, supporting and promoting sustainable natural environment. Furthermore, the goal of this document is strongly stressing the protection, conservation, sustainability and utilization of the environmental resource for the future generation. Additionally, the key objective of this document clearly highlights the improvement and enhancement of all environmental resources, values and heritages.

However, the KIEP & SEP 2021-2036 focuses on the prevention and reduction of chemical waste and liquid pollutants such as oil and POPs but there is no specific section that strongly stipulates mercury and other mercury compounds. Fortunately, the document identifies the progress of the Government commitment towards implementation of 2 Multilateral Environmental Agreements (MEAs) that have been ratified by Kiribati: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (under which mercury waste management is identified) and the Stockholm Convention on Persistent Organic Pollutants.

### The Kiribati National Quality Policy 2017-2023

The Kiribati National Quality Policy 2017-2023 is a trade policy implemented and coordinated by the Ministry of Commerce Industry and Cooperatives in collaboration with other Government ministries. The primary aim of this policy is to ensure that all imported goods reach a quality standard recognized internationally and nationally. The main aspect of this policy is to clarify measures that will help in the implementation of the 6 Key Priority Areas (KPAs) of the Kiribati Development Plan (KDP) 2016-2019, which includes "the Environment" as the 5$^{th}$ KPA. MELAD is assigned to accelerate the implementation of the framework for waste management and recycling under KPA 5 Environment.

### Kiribati Waste Management Resource Recovery Strategy (KWMRRS) 2020-2029

KWMRRS 2020-2029 is a policy implemented and coordinated by MELAD. The primary focus of this policy is to set a clear direction for national action plans at different levels within 10 years, which will tackle solid, chemical and hazardous (SCH) wastes issues in both urban and rural areas. In relation to chemical wastes including mercury, the policy highlights the following chemical action plans:

- Promote best chemical waste management practices aligning with MELAD Strategic plan, policies, KDP, KV20, SDG.
- Implement plans on SCH wastes including the strategic approach to international chemical management implementation plan.
- Utilize the updated Persistent Organic Pollutants National Implementation Plan (POPs NIP 2019) and the MIA to support the implementation of the KWMRRS.
- Manage laboratory chemical waste stockpiles and contaminated sites under the responsibility of MELAD.
- Conduct chemical surveys at the Tungaru Central Hospital and at Senior Secondary Schools that have science laboratories. Both Hospital and school laboratories have serious concerns based on storage and disposal.
- Identification chemical waste stockpiles in Kanton, Banaba, Kiritimati, and Tarawa.

An assessment of the policy and regulatory measures in place as relevant to the compliance of the provisions of the articles under the Convention at the national level is provided in Table 20.

*Table 20: Assessment of Existing Legislation Relevant to Mercury Control Measures in Kiribati*

| Provision of the Minamata Convention | Relevant Act, legislation and regulation | Policy and Legislative Gap Analysis (if present) | Proposed Legal Reform Action (if needed) |
|---|---|---|---|
| **Overarching Minamata Convention on Mercury** | Environment (Amendment) Act 2007<br><br>National Quality Policy 2017<br><br>Kiribati Vision 20 Years (2016-2036)<br><br>The National Profile of Chemicals Management Infrastructure in Kiribati (2008)<br><br>Kiribati Development Plan 2016-2019<br><br>Kiribati Integrated Environment Policy (KIEP) & Strategic Environment Plan (SEP) 2021 – 2036 DRAFT | No legislation or policies formally recognise the Minamata Convention on Mercury to which Kiribati is a Party. | Under the Environment (Amendment) Act 2007, a regulation to formally recognise the obligations of the Minamata Convention on Mercury similar to the Ozone Depleting Substances Regulation 2017 should be developed.<br><br>The National Quality Policy 2017 raise the quality and safety levels of products and services in Kiribati. Any updates to this policy or similar policies/strategies such as the Kiribati Vision 20 Years (2016-2036), s The National Profile of Chemicals Management Infrastructure in Kiribati (2008), Kiribati Development Plan 2016-2019 and Kiribati Integrated Environment Policy (KIEP) & Strategic Environment Plan (SEP) 2021 – 2036 DRAFT. should include consideration of Kiribati's obligations under the Minamata Convention on Mercury and any other related environmental agreements that Kiribati is a Party to. |
| **Article 4:** Mercury-added Products | Environment (Amendment) Act 2007<br><br>Customs Act 2019<br><br>Pharmacy & Poison Ordinance, Cap 70 | No legislation or policies mention the control of mercury-added products. | Under the Environment (Amendment) Act 2007, a regulation to formally recognise the obligations of the Minamata Convention on mercury and under Article 4, prohibit the importation of mercury-added products as outlined under Annex A (Part II) of the Minamata Convention and for Annex A (Part II), mercury in bulk form for dental amalgam (as well as mercury and mercury compounds overall). An example that can be used for reference is the Ozone Depleting Substances Regulation 2017. |

| Provision of the Minamata Convention | Relevant Act, legislation and regulation | Policy and Legislative Gap Analysis (if present) | Proposed Legal Reform Action (if needed) |
|---|---|---|---|
| | Trade Policy Framework 2017 – 2027 | | The regulation should also apply under the Customs Act 2019 and if needed, the Pharmacy and Poison Ordinance, Cap 70.<br><br>To further enhance identification of mercury-added products being imported, guidance on the use of Harmonised System (HS) Codes to categorise products should be incorporated. Guidance for the possible development of specific HS Codes for mercury-added products is being developed.<br><br>The Trade Policy Framework 2017 – 2027 could be revised to include information on the trade of mercury-added products and other potentially hazardous chemical products. |
| **Articles 8:** Emissions, **Article 9:** Releases, **Article 11:** Mercury Wastes | Environment (Amendment) Act 2007<br><br>Occupational Health and Safety Act 2015<br><br>KWMRRS 2020 – 2029 | No legislation or policies in place currently regulate the release of mercury to air, water, land or waste from point sources. | An amendment or regulation under the Environment (Amendment) Act 2007 should be developed to include environmental standards for management of mercury releases to the air, water, land and for waste management. Guidance on appropriate mercury thresholds can be obtained through the Minamata Convention Secretariat. Following the Fifth Conference of the Parties for the Minamata Convention in November 2023, mercury waste thresholds for imported and exported waste were established.<br><br>Section 33 of the Occupation Health and Safety Act 2015, notes a regulation for various matters including the regulating or prohibiting of the manufacturing, supply, storage, transport or use of any substances can be developed. The inclusion of a clear definition to include the environmentally sound handling, storage, transport and disposal of broken or end-of-life mercury-added products can be considered. Inclusion of health and safety measures to reduce mercury emissions from the operation of medical waste incinerators can also be included. |

| Provision of the Minamata Convention | Relevant Act, legislation and regulation | Policy and Legislative Gap Analysis (if present) | Proposed Legal Reform Action (if needed) |
|---|---|---|---|
| | | | Following the KWMRRS 2020- 2029, the development of waste management regulations under the Environment (Amendment) Act 2007 or a standalone waste management act that includes obligations for the environmentally sound handling of waste including hazardous waste (like mercury, mercury compounds and waste mercury-added products) should be considered. |
| **Article 12:** Contaminated Sites | Draft KWMRRS 2020 – 2029 | The Draft KWMRRS 2020 – 2029 contains information on specialized trainings to be conducted on contaminated sites remediation as can be seen in section 2.2 and strategic goal 3, though mercury-specific language is not included. | Considerations for the next revision of the Draft KWMRRS 2020 – 2030 can include specific actions to carry out the proper assessment of contaminated sites by mercury or mercury compounds. |
| **Article 16:** Health Aspects | Kiribati Vision 20 Years (2016-2036) | No current legislation or policies in place. | The inclusion of the development of strategies to identify and protect at-risk populations from the health impacts of mercury and other potential pollutants should be considered as a cross-cutting issue under the Kiribati Vision 20 Years (2016 – 2036). |
| **Article 13** Financial Resources and Mechanisms**;** **Article 14** Capacity-building, technical assistance and technology transfer**;** **Article 17** Information Exchange**;** **Article 18** | Environment (Amendment) Act 2007<br><br>Food Safety Act 2006 | No current legislation or policies in place. | Under the Environment (Amendment) Act 2007, a regulation to formally recognise the obligations of the Minamata Convention on Mercury that will include the identification of a national focal point responsible for coordinating with other national, regional and global institutions to develop initiatives for funding opportunities, capacity building and mercury monitoring. Obligations for the focal point to carry out regular information exchange and reporting should also be included.<br><br>For example, through the GEF ISLANDS project executed regionally by SPREP and in coordination with other SIDS, mercury related management efforts will be carried out. |

| Provision of the Minamata Convention | Relevant Act, legislation and regulation | Policy and Legislative Gap Analysis (if present) | Proposed Legal Reform Action (if needed) |
|---|---|---|---|
| Public information, education and awareness**;**<br>**Article 19**<br>Research, development and monitoring**;**<br>**Article 20**<br>Implementation Plans;<br>**Article 21**<br>Reporting | | | Under Section 33 of the Act, a regulation to be made. Schedule 1 of the Regulation provides for maximum permitted level of chemicals contaminants including mercury which can further be enforced and monitored as part of the obligations under the related Articles of the Convention. |

## 3.3 Institutional Framework Assessment

### Roles of Institutions in chemical management

There is an important contribution that all relevant stakeholders must undertake towards the successful management of chemicals and hazardous wastes at the national level. This section will outline the relevant key authorities and their roles and responsibilities towards the Convention including an assessment of some of the key institutions that are relevant to the management of mercury issues.

The institutions involved are the government ministries and departments, non-government organizations, church-based and civil-based organizations and their roles are briefly outlined as follows:

- **Ministry of Environment, Lands and Agricultural Development (MELAD)**

MELAD is the main coordinating body for environment and chemicals management in Kiribati and a focal point for the Minamata Convention on Mercury through its Environment and Conservation Division (ECD). The Ministry is in charge of hazardous waste management and its emissions to air, and releases to land and water.

*Environment and Conservation Division (ECD)*

The main role of ECD is to safeguard the natural environment upon which life depends, including sound chemical management to protect human health. This is also the lead coordinating agency for environmental management in Kiribati. It is the body responsible for all MEAs including the Minamata Convention on Mercury and is responsible for ensuring the national compliance with related articles of the Convention. Nationally, ECD is also responsible for regulating all major development projects that are likely to have environmental impacts through its Environmental Licensing Section.

The ECD also coordinates various environmental coordinating committees. One of these national environment committees is the National Chemical and Hazardous Waste Management Coordination Committee with membership from various government departments, state owned enterprises (SOE), Church-based organisations (CBOs) and non-governmental organizations (NGOs). The core objective of the committee is to provide a platform for all stakeholders to review, assess and make recommendations of cross-cutting matters and issues on chemical management including mercury issues. Also, this platform becomes a means of communicating environment waste and pollution issues and campaign programs to the various stakeholders, institutions, the public and communities.

- **Ministry of Health and Medical Services (MHMS)**

The Ministry of Health and Medical Services is responsible for the procurement of large quantities of different types of pharmaceutical products and chemicals including mercury-added measuring devices that may be used in medical related work. Health care services are provided free to all Kiribati nationals and residents such as government-approved foreign nationals and missionaries that resulted in minimal healthcare expenses.

There are different units that are responsible for the coordination of the different aspects of chemical and waste management within MHMS. These units are:

*Environmental Health Unit (EHU)*

The Environmental Health Unit is mandated to implement various programs including food safety, Water Sanitation and Hygiene, water monitoring and treatment, and healthcare waste management in all healthcare facilities. The Unit is responsible for coordinating healthcare waste (HCW) management and is a Secretariat to the HCW Management Committee with membership from all units in MHMS who contribute to healthcare waste management with the ECD as its major partner and advisor.

The EHU is also responsible for the oversight of the incinerator operation including the collection of all healthcare waste from all health centers, dispensaries and Betio Hospital in South Tarawa, as well as the incineration of healthcare wastes in Kiritimati London Hospital. During visits to the outer islands, the EH team also conducts surveys of healthcare waste disposals at the different health centers and dispensaries who practice open burning in concreted pits as their means of incinerating infectious wastes and expired drugs. The EHU is an active member of both the National Chemical Coordinating Committee and the National Waste Management Committee.

*Pharmacy Unit*

The Pharmacy Unit is the sole provider of all pharmaceuticals and assists with specialized procurement of tools and equipment. Pharmaceuticals and equipment are distributed to all health dispensaries including all health centers and the four hospitals in Kiribati. Ordering of pharmaceuticals and equipment (including thermometers) is done in bulk to avoid shortages.

*Laboratory Unit*

The Laboratory Unit uses a lot of chemicals in its line of work. They have accrued quite a large quantity of used and expired chemicals that need to be properly and safely disposed of. However, there is no proper system/plan for safe waste disposal, so these chemicals continue to accumulate.

*Dental Unit*

The Dental Unit is responsible for, and is, phasing out the use of dental amalgam in their new system. However, these are sometimes used when and as needed. Old stocks of dental amalgam are currently being stored and need to be addressed.

- **Ministry of Justice – Customs Division (MOJ- Customs)**

The Customs Division of the Ministry of Justice is a key division for the implementation of the Minamata Convention and is responsible for the enforcement of relevant legislation, not limited to control of border security and the facilitation of legitimate trade and industry. This involves inspection, recording and compiling and providing of the statistics and information of all imported products into Kiribati.

- **Ministry of Employment and Human Resource (MEHR)**

The Ministry of Employment and Human Resource is responsible for awareness, implementation, and enforcement of health and safety in the workplaces in Kiribati which involves risk assessment and management of hazardous chemicals including mercury. The

OSH inspectors are mandated under the Occupational Health and Safety Act 2015 to conduct inspection, rectify work-related matters and award scheduled penalty to non-compliance that involves unsafe working environment and practices. Furthermore, the MEHR is coping to establish and reform health and safety management within workplaces in Kiribati with limited knowledge and resources.

- **Ministry of Fisheries and Marin Resource Development (MFMRD)**

The MFMRD is responsible for the sustainable development of the fisheries and marine resources of Kiribati. This may include providing avenues for scientific research on existing natural or man-made resources or products.

- **Local Authorities**

In the urban areas of South Tarawa, the local authorities (councils) are responsible for the management of the landfills. They also do waste collection from designated collections points and places/areas that pay for the waste collection service. These wastes are dumped into landfills that are managed by the two local authorities of Betio Town Council (BTC) and Teinainano Urban Council (TUC). Recently, a local waste collection service is provided by MOEL Trading, a company selling green bags for organic wastes. The company provides this service on a fixed schedule covering villages in South Tarawa from Tanaea to Betio. This urban area has a successful recycling scheme for PET bottles and cans which are purchased to be exported.

In Kiritimati Island, the Kiritimati Urban Council (KUC) provides the same service for the urban areas of the island and dump waste in an isolated part of the island that is not easily accessible.

- **Ministry of Education (MOE)**

The Ministry of Education is the largest government ministry and is responsible for quality education of children in Kiribati. The MOE through the Core Curriculum Unit has its responsibility in the designing of holistic programs for students at different levels (Primary to Tertiary). The unit develops and assesses the educational syllabus for science development in which sound chemicals including mercury information and knowledge may be incorporated for knowledge transfer and dissemination to generations.

Apart from that, the Facilities Management Unit is responsible for assessing, and managing the upgrading of school facilities and infrastructure to meet international standards, especially chemical laboratories. However, there is a need to introduce the system with schools in managing chemicals including mercury, particularly with the chemical inventory, storage and chemical spill and disposal management.

*Tertiary institution*

The USP Kiribati campus is the only tertiary institution in the country located on the main island of South Tarawa. This is an extension campus of the University of the South Pacific (USP) and does not have an extensive laboratory but may have some basic equipment containing mercury compounds.

- **State Owned Enterprises**

*Public Utilities Board (PUB)*

PUB's services operating and maintaining the sewerage system existing at the major villages in Betio, Bairiki and Bikenibeu. The rest of its customers that have Septic tanks are serviced by a Vacuum Truck.

- **Non-Government organizations (NGOs) and Church-Based Organizations (CBOs)**

NGOs like the Kiribati Association of Non-Government Organizations (KANGO), the Kiribati Red Cross and Red Crescent Society (KRCS) and the women's group, 'Aia Maea Ainen Kiribati' (AMAK) are some of these associated members of the National Chemical Coordinating Committee (NCCC), a group established for the coordinated management of chemicals (mainly under the Stockholm Convention). Their main role is to provide a perspective from the community during the deliberations in all matters related with chemicals including mercury for the current issue. They often work with communities and are active members of the NCCC in advocating and promoting campaign programs including waste management.

## Institutional challenges and priorities

From the responses to the interviews conducted and the survey questionnaire circulated, it was identified that the management of chemicals including mercury and mercury-added products at the different institutions is disjointed even though there is a national coordinating body such as the NCCC. Challenges at the different institutions working with, handling or having a role in the management of chemicals are:

*i. Challenge in coordinating chemical issues*

The responsibility for coordinating all chemical and waste issues is under the mandate of the ECD of MELAD. The coordination is being done through the NCCC, however, without a national policy in place, the ECD can only monitor and advise other stakeholders on mercury issues but have no implementing power.

There is an urgent need to develop a legal framework, either a policy or regulations, that will ensure chemical management is prioritized as needed, and empower the responsible departments to implement chemical management (including mercury). Currently, all the chemical stakeholders understand the importance of proper chemical management but have limited capacities with competing important priorities.

*ii. Cross-cutting issue challenges*

There is an urgent need for a national framework either as a national policy or as a regulation to the existing environmental acts and regulations to be developed. This will ensure the chemical and waste management issues are prioritized and addressed in other relevant institutions. Waste management contributes to the Kiribati Development Plan encouraging a national campaign on waste management for a cleaner environment.

*iii. Knowledge, resources and information sharing issues*

Coordination amongst national agencies for the sharing of information on chemicals management is lacking. The current platform for discussing chemical issues is the National Chemical and Hazardous Waste Management Coordination Committee and the meetings of this committee not always well-attended due to competing workloads. Creating an electronic platform for chemical management and issues would be ideal for storage of essential

information that can be easily accessed by anyone. At the same time, this platform can be used to share information among the national partners and even supporting organizations like SPREP.

*iv. Sector-specific gaps*

Tabulated below is the sector-specific roles and gaps that needs to be improved/addressed to ensure compliance to the convention provisions.

*Table 21: Institutional Gap Analysis and measures identified*

| Name of institution or key ministries and authorities | Summary of responsibilities and potential role relevant to the Convention of Mercury | Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met: |
|---|---|---|
| Ministry of Environment, Lands and Agricultural Development (MELAD) | Lead coordinating agency for the environment and chemical management in Kiribati and a focal point for the Minamata Convention on Mercury.<br><br>Lead agency for the GEF ISLANDS project which will include mercury management activities.<br><br>Oversight of the management of hazardous waste and its emissions to air, and releases to land and water through the SAICM implementation Plan.<br><br>MELAD's departments can develop an overarching regulation to enforce the Minamata Convention's obligations. | Lack of capacity (human resources, technical assistance and funding) and implementing mechanisms (regulations) to effectively coordinate the implementation of the Minamata Convention on Mercury. (High Priority) |
| Ministry of Health and Medical Services (MHMS) | Pharmacy Unit is responsible of the importation and storage of all pharmaceuticals supplies and equipment which may include mercury-added products.<br><br>The Dental Unit is phasing down the use of dental mercury-amalgam in their new medical system.<br><br>The EHU is responsible of the operations of the incinerator machine including the collection of all healthcare waste. Remote and rural healthcare centres apply open burning in concreted pits. The EHU is also mandated to protect the health of the community by monitoring health hazards | Lack of awareness and implementation mechanism to prohibit the import of mercury-added medical measuring devices (High Priority).<br><br>There is a small quantity of expired dental amalgam that will need to be properly and safely disposed. Absence of capacities (knowledge, qualified staff, SOPs, training programs) to dispose chemical waste including related mercury waste needs to be addressed. (High priority).<br><br>Need for increased capacity of waste incinerator or for hazardous waste management and absence of emission control monitoring of waste incinerator present (High priority). |

| Name of institution or key ministries and authorities | Summary of responsibilities and potential role relevant to the Convention of Mercury | Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met: |
|---|---|---|
| | including chemicals that may contaminate food, water, and living environments of communities. | Interim storage of chemicals including mercury, mercury compounds and mercury wastes, are not standardized hence the absence of relevant system and institutional capacity (High priority). |
| Ministry of Infrastructure and Sustainable Energy (MISE) | Provide and conduct test analysis of water quality. | Limited number of qualified staff to do water quality testing (Low Priority) |
| Ministry of Justice (MOJ)- Customs Division | With relevant legislation, the Customs Division monitors imports of products. | Lack of capacity and tools/implementing mechanisms to effectively detect and prohibit import of mercury-added products and compounds (High Priority) |
| Ministry of Employment and Human Resource (MEHR) | Conduct health and safety awareness and auditing to workplaces particularly to ensure a safe working environment particularly from chemical hazards. | Absence or lack of capacities (knowledge, qualified staff, SOPs, training programs) to manage and monitor the life cycle of sound chemicals including mercury. (High Priority) |
| Ministry of Fisheries and Marine Resource Development (MFMRD) | Responsible for coordinating the analysis and testing of fish quality for international market exports. Currently local fish markets are not monitored in similar ways. | Lack of capacity for analysis and testing of fish quality with local fish markets for population consumption (Medium priority) |
| Local Authorities | Collect and dispose household and public waste including hazardous waste including mercury waste at landfills. | Poor operational capacities, including infrastructure for collection, treatment, storage and disposal of hazardous waste including mercury wastes (High priority).<br><br>Absence of knowledge and capacity to sort and treat hazardous waste (High Priority). |

Given Kiribati's current situation with the barriers identified, it is very important that there should be proper coordination between government ministries, NGOs, CBOs, civil societies and private sectors to give effective measures in the implementation of the Convention.

Kiribati has many chemical bodies established in Kiribati overseeing chemical management priorities. Rather than creating a new working group to manage mercury, working sessions to assess needs should be coordinated through bodies like the NCCC. An online sharing platform can be used to share information at the national, regional and international level in order to

facilitate information exchange and generate knowledge. Guidance on the development of regulations to monitor mercury releases, prohibit mercury imports, and implement other obligations of the Convention can be sought through the Minamata Convention Secretariat. Under the GEF ISLANDS regional project and overall global program, activities to build legislative and technical capacity for mercury management will be carried out.

# Chapter 4: Identification of Populations at Risk and Gender Dimensions

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

Mercury is known to be highly toxic to human health, but its level of impact varies based on a number of factors including:

- form of mercury (methylmercury is the most toxic form of mercury to humans);
- amount of mercury the person is exposed to;
- age, sex, and condition of person exposed;
- duration of exposure;
- route of exposure; and
- dietary patterns of fish consumption (WHO, 2021a)

Figure 11 below summarises the typical ways in which humans may be exposed to mercury and its effects which can range from short-term to long-term.

**HUMAN EXPOSURE TO MERCURY AND ITS COMPOUNDS**

| Mercury form | Source of exposure | Pathway of exposure | Absorption rate | Main excretion pathways | Toxicity |
|---|---|---|---|---|---|
| Elemental $Hg^0$ | Dental amalgam, air, accidental spills, worksites, food from contaminated sites | Inhalation | 75–85% | Urine, faeces | Acute: lungs, gastrointestinal tract |
| | | Ingestion | Almost no absorption | | Chronic: central nervous system, kidneys |
| | | Dermal | | | |
| Inorganic $Hg^{2+}$ | Cosmetics, soaps | Ingestion | 10–30% | Urine | Acute: gastrointestinal tract (vomiting, bloody diarrhoea), kidneys (nephritis) |
| | | Dermal | Can be high | | Chronic: kidneys (kidney damage), central nervous system, skin (acrodynia in children), immune system |
| Organic MeHg | Food, mother during pregnancy | Ingestion | 95% | Faeces (half life ($T_{1/2}$) is 45–70 days in adults) | Central nervous system, cardiovascular system |
| | | Parenteral | 100% | | |
| | | Transplacental | | | |

*Figure 11: Human exposure to mercury and its compounds (WHO, 2021b).*

Depending on the type of exposure, mercury can affect several functions throughout the body. Children, infants and foetuses (through their mother during pregnancy) are more susceptible to central nervous system damage that can result in long term developmental issues with brain function and motor skills (WHO, 2021b). Newborns may typically be exposed to mercury through the consumption of contaminated breastmilk. As such, new mothers, pregnant women and women who may become pregnant are also considered to be vulnerable to the effects of mercury (WHO/UNEP, 2008). Other vulnerable groups include persons who suffer from diseases of the liver, kidney, nervous system, and lung (WHO/UNEP, 2008).

In the Pacific, research has been conducted to assess potential trends in mercury exposure. In 2018, a global study was conducted in which hair samples for 757 women of child-bearing age were analysed for mercury concentrations and it was found that 58% of samples indicated an elevated mercury body burden exceeding 1 ppm (IPEN et al., 2018). Kiribati was among the countries assessed that had an average range of mercury concentrations that exceeded 1 ppm for the total samples analysed. Based on the responses to surveys conducted for the sample group, frequent consumption of fish was a common trend found amongst persons with high mercury concentrations in their hair samples (IPEN et al., 2018).

Humans are most exposed to the most toxic form of mercury, methylmercury (MeHg), through dietary consumption. Due to the presence of mercury in waterways and the bioaccumulation of mercury up the food chain, frequent consumption of mercury-contaminated fish is considered to be the most common source of methylmercury exposure to humans (WHO/UNEP, 2008). Predatory fish and large, long-living fish species tend to contain elevated levels of mercury, though further analysis of fish species should be conducted to more accurately inform this.

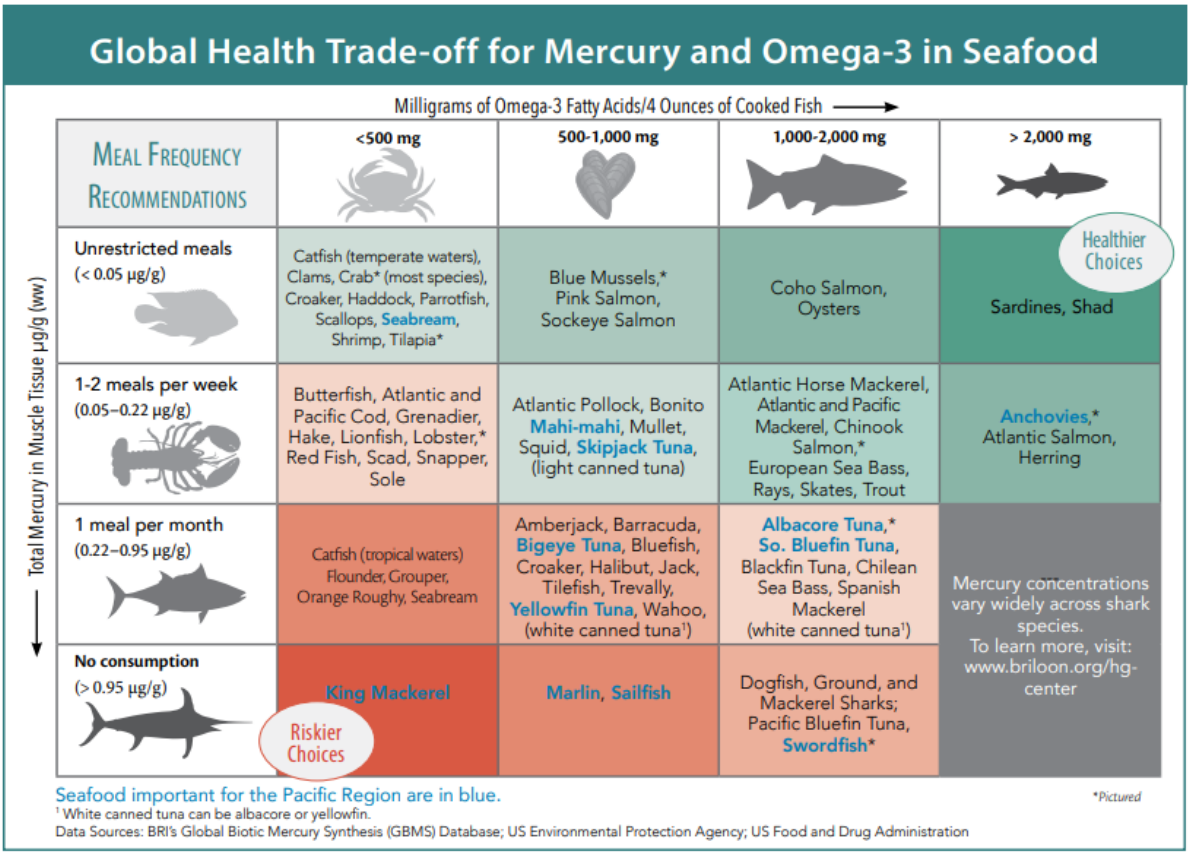



*Figure 12: Example of Fish Consumption Guidelines developed for the Pacific Region (BRI, 2022).*

Fish are a staple to many people in the Pacific region and other SIDS as fish are an essential source of protein that tends to be more accessible than other sources of animal protein; additionally, certain species such as tuna are exported commercially (FAO, 2022). Recognising the benefits associated with fish consumption, it is essential to educate the population on

recommended consumption patterns to help limit mercury exposure to protect human health as well as the livelihoods of persons who depend on fisheries economically. Fish consumption guidelines (as illustrated in Figure 12) that are based on scientific research are recommended to assist vulnerable populations in determining the recommended frequency in consuming fish that considers their health benefits versus potential mercury risks.

In terms of occupational exposure to mercury in the Pacific, possible groups that may be affected include dental care professionals who prepare dental amalgam fillings, and waste handling and disposal personnel who may deal with mercury-containing waste.

Dental care professionals (this includes dentists and dental assistants/technicians) may be exposed to low levels of mercury when preparing dental amalgam fillings for implantation. Exposure may occur via inhalation of mercury vapors. To limit exposure, the use of proper personal protective equipment (PPE) such as face masks and gloves are recommended. Further to that, limiting the type of dental amalgam used to pre-capsulated types rather than using powdered alloys or elemental mercury will reduce the risk of exposure.

Many consumer products with mercury such as lighting devices and thermometers, do not pose a danger to human health while in use, but once broken, mercury can be released to the environment and to humans. During the handling of waste that may contain these items, waste workers may be routinely exposed to mercury. The use of proper PPE is recommended for all waste handlers. Diverting end-of-life mercury-added products from landfills for environmentally sound storage, handling and disposal will greatly reduce this occupational risk of exposure in the long-term. Other efforts to reduce risk of exposure include the ongoing awareness raising initiatives for sound waste management for the general public (further detailed in Chapter 5 of this report).

## 4.2 Assessment of Potential Gender Dimensions related to the Management of Mercury

Gender mainstreaming is a strategy used to recognise the varying impacts of activities on different genders and to ensure that concerns or experiences of all genders are incorporated into the design, implementation, monitoring and evaluation of all policies and programs for the achievement of gender equality (ECOSOC, 1997).

As discussed in the previous section of this chapter, it is apparent that certain groups are more vulnerable to the effects posed by mercury and as such, mercury management strategies must be developed accordingly.

The development of future activities to continue research on the effects of mercury on the population must take into account the heightened vulnerability of women of childbearing age and pregnant women. Human biomonitoring activities to assess mercury concentrations are typically done via biomarkers such as hair, urine, blood, and umbilical cord blood (WHO, 2021b). It is noted that results of mercury assessments on maternal hair samples can act as a proxy for determining foetal mercury exposure to further inform the overall population's mercury exposure (WHO, 2021b).

Any development and dissemination of communication materials on mercury management should include measures to ensure that materials can be easily accessed by women. For example, in the Pacific, women tend to be the primary household caretakers (PRIF, 2016); and as such communication materials on fish consumption guidelines should be widely accessible by the overall population but especially by women who may be the primary preparers of meals in the household.

In terms of occupational exposure, further research is needed to inform the gender considerations that should be implemented.

Administratively, previous research in the region has indicated that women are poorly represented in government and private institutions resulting in women having less active participation in discussions, planning and monitoring of national programmes (PRIF, 2016). Ensuring that women are adequately represented in the committees responsible for making future decisions for mercury management in Kiribati, including in the development of communication strategies for mercury, is a key factor to be implemented for successful implementation. Efforts to ensure inclusion of other marginalised groups including, but not limited to, youths and disabled persons, should also be made.

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

Under Article 18 of the Minamata Convention on Mercury,

*"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…"*

In Kiribati, the risks associated with mercury releases are considered to be mainly from the use and disposal of consumer products such as CFLs and other mercury-added lighting devices; and the preparation, use and disposal of dental amalgam fillings. Other perceived mercury risks are related to the potential consumption of mercury-contaminated fish over a period of time.

Currently, the level of awareness on the risks associated with mercury amongst workers (such as dental professionals and waste disposal workers) and the general public is not considered to be high and measure should be adapted to educate these groups on the issue.

Under the MIA Project, a brief animated awareness raising video was developed for dissemination in Kiribati (Figure 13). The video aims to educate the general public on the potentially mercury-added household products that may be present, the need for the safe disposal and the promotion of mercury-free alternatives that are already popular on the local market.

It is recommended that the video be shared widely via social media by all key stakeholder organisations.

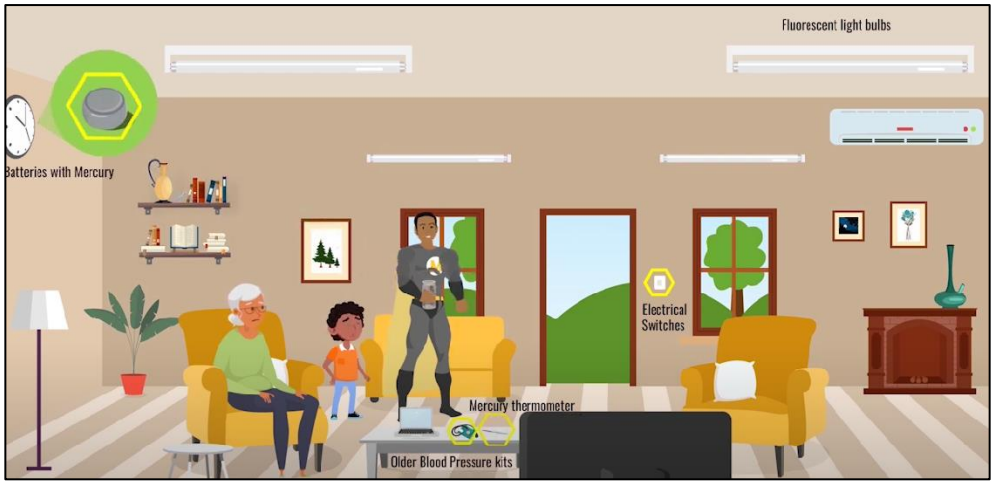



*Figure 13: Scene in the awareness raising video developed under the project.*

To educate key stakeholders on the estimated sources of mercury releases and recommendations for mercury management developed under the project, a technical briefing document that summarises the main findings of the MIA Project was also developed.

Further to the MIA Project, Kiribati is also participating in the GEF ISLANDS Programme that will include information dissemination, inclusive of gender considerations, on mercury related issues to inform stakeholders and change behaviours in the Pacific region via the Coordination, Communication and Knowledge Management (CCKM) activities.

Stakeholder outreach and school campaigns to educate persons on various environmental issues are common tools implemented by government bodies responsible for the environment. The materials developed under this project and the ongoing GEF ISLANDS project, can be utilised in future public education campaigns on environmental awareness.

In order to better inform the public on the potential risks associated with consumption of fish, further information on mercury concentrations in Kiribati and the Pacific region is being gathered by BRI in collaboration with MELAD.

Coordination with other relevant governmental, private and non-governmental organizations is recommended to further promote mercury management awareness.

# Chapter 6: Implementation Plan and Priorities for Action

Under Article 20 of the Minamata Convention on Mercury, Parties, "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, 2023). Further guidance on the development of an implementation plan can be obtained from the Minamata Convention Secretariat.

This Chapter serves to highlight some of the potential target areas that should be considered for the successful implementation of the Minamata Convention by the Government of Kiribati.

## Priorities for Action:

1. **Develop an Act or Regulation to formally recognise the obligations of the Minamata Convention and facilitate its implementation.**

   As discussed in further detail in Chapter 3, coordination between MELAD and other relevant stakeholders as needed, should be carried out to develop a standalone Act or (regulation under the Environment [Amendment] Act 2007), to formally recognise the obligations of the Minamata Convention on Mercury. A similar example that can be referenced is the Ozone Depleting Substances Regulation 2017.

   The proposed Act or regulation for the Minamata Convention should not only include measures to facilitate the monitoring of mercury releases from sources and prohibition of imports of mercury, mercury compounds and mercury added-products, but should also formally recognise the focal point or delegated authority's responsibility for implementing other administrative measures such as the facilitation of information exchange and reporting requirements. This can be further reflected in updated environmental and strategic national plans, along with other relevant environmental agreements.

   Further regulatory reforms and institutional considerations to prohibit imports of mercury-added products, manage mercury releases and enhance other measures for implementation of the Minamata Convention can be found in Chapter 3 of this report.

   It is key to note that through participation in the ongoing GEF ISLANDS Programme, Kiribati will also benefit from the development of draft model legislation to control mercury-added products for use by Pacific SIDS that can be tailored for adoption, and the provision of support for the sound repackaging, shipping, collection, and disposal of mercury waste.

2. **Establish a Coordinating Mechanism for Mercury Management**

   Under the GEF ISLANDS Project, a national steering committee is being formed to oversee the project's activities (which include mercury management activities). It is recommended that this committee or a sub-committee comprising of stakeholders from all relevant authorities identified in Chapter 3

of this report, continue to coordinate on the development of activities for mercury management. A mechanism for information exchange on mercury issues amongst these stakeholders should also be established. Gender considerations must also be factored into the makeup of the committee as well as for the implementation of management activities as women and children have been identified as the more vulnerable groups to the impacts of mercury on health.

**3. Implement measures to address identified sources of mercury releases.**

These measures may include:

**a. Promotion of the continued phase-out and phase down of mercury-added products.**

Mercury-added products (and other intentional products/process uses) have been identified as a main source of mercury releases in Kiribati. In addition to regulatory bans to phase out their importation, sensitisation of government agencies, the private and public sectors is needed to ensure the sound phase out of these products.

Mercury-free alternative products are increasingly available on the global and local markets and have been proven to be highly reliable replacements. A summarised list for some key mercury-added products and their readily available alternatives is provided in Table 22.

*Table 22: Summarised List of Key Mercury-added Products and their Mercury-free Alternatives*

| Mercury-added Product | Mercury-free Alternative |
|---|---|
| CFLs, LFLs, Mercury Vapour Lamps, some HIDLs | Light Emitting Diodes (LEDs), mercury-free HIDLs |
| Mercury thermometers | Digital thermometers, infra-red no-contact thermometers, alcohol thermometers |
| Mercury-added electrical switches, relays and thermostats such as, mercury wetted reed relays and mercury thermostats. | Mercury-free switches; mercury-free relays; electromechanical or digital thermostats *(over the past 20 years, mercury-free electrical switches, relays and thermostats have become the predominant type on the global market)* |
| Blood pressure medical measuring devices such as Mercury-added sphygmomanometers | Aneroid sphygmomanometers and several types of automated (electronic) blood pressure gauges. |
| Mercury-added batteries such as: Mercury Oxide/Mercury-Zinc Batteries, Zinc-air Button Cells, Alkaline Button Cells, Silver Oxide Button Cells, Alkaline, other than button. | Most of these types of alkaline and button cell batteries are now mercury-free on the global market. |
| Dental mercury amalgam (fillings) | Composite (resin) fillings |
| Mercury-added Skin Lightening Products | Global databases are currently under development and many existing databases are available online to guide on skin |

| | |
|---|---|
| | lightening products that should be avoided due to mercury contamination or other harmful ingredients. |

For dental amalgam, under Article 4, Annex A, Part II of the Convention, Parties are expected to phase down dental amalgam by taking at least 2 provisions specified. Some key provisions for consideration by stakeholders in Kiribati include:

- Promoting the use of cost-effective and clinically effective mercury-free alternatives for dental restoration;
- Encouraging representative professionals to educate and train dental professionals on the use of mercury-free dental restoration alternatives and on promoting best management practices;
- Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury compounds to water and land.

Furthermore, as of 2022, Parties shall, "exclude or not allow, by taking measures as appropriate, the use of mercury in bulk form by dental practitioners" and Parties are expected to, "take appropriate measures to prevent dental amalgam use for patients under 15 years of age, and of pregnant and breastfeeding women, except when considered necessary".

**b. Ensuring BAT/BEP implementation for monitoring and preventing mercury releases from sources such as landfills and waste incinerators.**

Close coordination amongst stakeholders across the government and private sector to build capacity and infrastructure for sound waste management is key to reducing mercury releases from major sources. The incorporation of mercury management under national waste strategies and training of relevant personnel in the subject is highly recommended.

**4. Public awareness and sensitisation of relevant stakeholders on mercury issues**

It is recommended that greater awareness and education of the general public and key stakeholders through existing outreach programmes be carried out. Further details on this priority are provided in Chapter 5 of this report.

**5. Strengthen understanding of mercury issues in Kiribati through monitoring programmes.**

To enhance the understanding of the risks posed by mercury locally, efforts to enhance strategies to identify potential mercury hotspots in the local environment through mapping and monitoring programmes can be coordinated. Partnering with regional and global organisations like SPREP, the UNEP Global Mercury Partnership and BRI, among others for the development of funded projects to enhance monitoring capabilities can be assessed. Currently global mercury monitoring activities are being conducted by organisations such as BRI for the collection and analysis of human hair samples, fish muscle tissue samples, blood, feather and egg samples from birds and blood or fur

samples from bats. Data generated will contribute to a global mercury database in coordination with UNEP.

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## Annex 1: UNEP TOOLKIT Calculation Spreadsheet

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

https://docs.google.com/spreadsheets/d/1U44r7D_iK114-69yP2tXBMPNQtwr263q/edit?usp=sharing&ouid=111368229179989433735&rtpof=true&sd=true