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Subject : **ENDORSEMENT OF THE PHILIPPINES' MINAMATA INITIAL ASSESSEMENT REPORT**

Dear Mr. Gutierrez:

As the national focal point of the.Philippines to the Minamata Convention on Mercury, the Environmental Management Bureau of the Department of Environment and Natural Resources would like to endorse the submission of the party's Minamata Initial Assessment (MIA) Report as required by the Convention.

The report includes a comprehensive analysis of the Philippines' readiness for the implementation of the convention as well as an outline of the country's legislative and institutional frameworks in place for addressing the various aspects of mercury use, emissions, and releases.

The Philippines acknowledges the significance of the Minamata Convention in promoting sustainable development while safeguarding human health and the environment. Through this report, we hope to express our dedication and continuous effort in minimizing the impact of mercury on the environment. We look forward to further collaboration with fellow parties to the Convention as we share our experiences, exchange best practices, and collectively strive for a mercury-free future.

We kindly request the Secretariat's acknowledgement of our submission. We remain committed to fulfilling our obligations under the Convention and are open to any further guidance or recommendations provided by the Secretariat.

Very truly yours,

GILBERT C. GONZALES, *CESO III*
Director and concurrent
Assistant Secretary for Field Operations

PHILIPPINE MINAMATA INITIAL ASSESSMENT

2019

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ENVIRONMENTAL MANAGEMENT BUREAU

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Message from the Secretary

Acknowledgment

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LIST OF ACRONYMS

ASEAN	Association of Southeast Asian Nations
ASGM	Artisanal and Small-scale Gold Mining
BAT / BEP	Best Available Technologies / Best Environmental Practices
CHED	Commission on Higher Education
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DENR – EMB	Environmental Management Bureau
DENR – MGB	Mines and Geosciences Bureau
DepEd	Department of Education
DOE	Department of Energy
DOE – ERTLS	Energy Research and Testing Laboratory Services
DOF	Department of Finance
DOF – BOC	Bureau of Customs
DOH	Department of Health
DOH – FDA	Food and Drug Administration
DOLE	Department of Labor and Employment
DOLE – OSHC	Occupational Safety and Health Center
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
DTI – BSP	Bureau of Product Standards
FGD	Focus Group Discussion
GEF	Global Environment Facility
IAOMT	International Association of Oral Medicine and Toxicology
ILO	International Labor Organization
INC	Inter-governmental Negotiating Committee
MAP	Mercury-added Products

MC	Minamata Convention
MIA	Minamata Initial Assessment
MSME	Micro, small, and medium enterprises
NAP – ASGM	National Action Plan for ASGM
NSS	National Spatial Strategy
OPAFSAM	Office of the Presidential Assistant on Food Security and Agricultural Modernization
OPAFSAM – FPA	Fertilizers and Pesticides Authority
PDP	Philippine Development Plan
PMRB	Provincial Mining Regulatory Board
PRC	Professional Regulatory Commission
UN	United Nations
UN Environment	United Nations Environment Programme
UNEP	United Nations Environment Programme
UNIDO	United nations Industrial Development Organization
WHO	World Health Organization

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EXECUTIVE SUMMARY

The Minamata Convention on Mercury is the latest multilateral treaty that aims to address the negative environmental impacts of a known chemical of global concern. The Philippines, back in 11 October 2013, signed this landmark globally – binding agreement together with 127 other nations, signifying the country's intention and willingness to reduce the negative effects to both health and the environment, brought about by the use and eventual exposure to mercury, a highly – toxic chemical that is not only persistent in ecosystems and the environment, but also travels extreme distances often across borders. As of the 22nd of November 2019, a total of 115 nations have successfully ratified the Minamata Convention that came into force on the 16th of August 2017.

Recognizing that potential health and environmental impacts brought about by mercury and mercury use may occur in all stages in the process of converting raw materials into end product, their subsequent use and eventual disposal may cause recognizes all stages in the process of converting raw materials into end product, their subsequent use and eventual disposal, the Minamata Convention has taken the life – cycle approach, covering various aspects described in 35 Convention articles and several annexes that contain agreed measures for mercury supply and trade, mercury – added products, mercury for use in industries, emissions and releases, mercury wastes, health aspects, research and development, effectiveness evaluation, and reporting, to name a few.

The Minamata Convention also recommends the preparation of relevant national action plans to address issues such as that of the Artisanal and Small – scale Gold Mining sector, and other areas as determined by each nation, as well as a Minamata Initial Assesssment as part of the activities supported by the Convention that will help enable countries prepare for ratification. The Minamata Initial Assessment, in particular, is intended to assist countries in strengthening national decision-making toward ratification of the Minamata Convention and in building national capacities toward implementation of future obligations. The 2019 Philippine Minamata Initial Assessment report provides recommendations on strategies, measures, and action steps the country needs to take to implement the Convention, taking into account local contexts anchored on baseline information of country readiness for Convention implementation in terms of regulatory and institutional capacities, known national activities concerning mercury both in the public and private sectors, mercury inventory, among others.

In this report, it will be shown that the current regulatory framework already provides a certain degree of control in the areas of mercury supply and trade, mercury in products and

equipment used by consumers, mercury in waste streams, and mercury use in industry. The provisions detailed in the country's chemical control order on mercury and mercury compounds (DAO 1997 – 38) have provided some measures relevant and specific to mercury and mercury compounds. However, these have to be updated to align with the provisions of the Minamata Convention on Mercury. The country's flagship legislation on toxic and hazardous wastes known as RA 6969 has likewise established a national framework supporting the sound management of toxic and hazardous wastes including mercury, consistent with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, an environmental treaty the Philippines has been a party to since 19 January 1994. Other allied national legislations also exist including the Philippine Clean Air Act (RA 8749), the Philippine Clean Water Act (RA 9275), the Ecological Solid Waste Management Act of the Philippines (RA 9003), The Consumer Act of the Philippines (RA 7394), and the People's Small-scale Mining Act (RA 7076).

From an institutional standpoint, there are a number of existing government offices that are already well – placed, on the basis of their mandates, to take on specific responsibilities in the implementation of the Minamata Convention. The Department of Environment and Natural Resources (DENR) is currently leading the country in the implementation of the provisions included in various multilateral environmental agreements (MEA) such as the Basel Convention on Hazardous Wastes, the Stockholm Convention on Persistent Organic Pollutants, and the Montreal Protocol on Ozone – Depleting Substances. Considering the agency's vast experience in leading the implementation of MEAs for the country, the DENR can also be once again mandated to take the lead responsibility in the implementation of the Minamata Convention, coordinating the work with the other relevant government agencies and offices. An inter-agency technical working group can also be established to help facilitate this coordination work.

The Minamata Initial Assessment report also includes information in relation to the mercury inventory in the country. The 2018 updated mercury inventory identifies the primary virgin metal production source category as the number one source of mercury output in the country at about 78% of total annual output. This is followed by mercury – added products at 13% of the total mercury output. Mercury emissions to air account for 57% of total output.

Importantly, the Minamata Initial assessment report identifies challenges and opportunities the country needs to take into account for the successful implementation of the Minamata Convention. It also contains discussions on suggested strategies and priority action that the country can consider moving forward.

At the national level, identified challenges include: (1) the country's national development plan does not clearly specify priorities in relation to the sound management of hazardous chemicals and wastes; (2) issues and concerns on mercury cut across multiple government agencies that can lead to increased complexity in coordination; (3) available data and information regarding mercury trade, usage, and storage is inadequate and unreliable; (4) weak enforcement of national environmental laws; and (5) penalties due to violation of environmental laws are not commensurate to the environmental costs incurred.

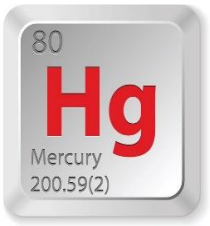
The successful implementation of the Minamata Convention on Mercury will require capacities to be in place at the national level, taking into account the specific needs in each relevant sector including the development of a comprehensive regulatory framework addressing mercury issues in its entire life cycle, and an institutional framework that is operational and can facilitate multi-agency and multi-sectorial coordination, data collection, knowledge sharing, and dealing with socio-economic implications. In addition, technical capabilities to ensure the effective discharge and implementation of (1) government regulatory functions in relation to mercury, (2) sector plans to phase-out the use of mercury and mercury compounds in products and processes, (3) specific industry monitoring activities, and (4) risk management strategies particularly when dealing with mercury contaminated sites will also need to be developed. Financial latitude to support strategies, programmes, projects, services, and awareness-raising activities for the mitigation or minimization of the negative socio-economic and environmental impacts of mercury use will be equally crucial.

At the sectorial level, on the other hand, issues and concerns in industries mainly revolve around controlling mercury emissions and releases, regulating the trade in mercury – added products, identifying cost-efficient alternative technologies and raw materials to replace mercury use, best available mercury treatment methods, and tools and technologies to support the phase out of mercury use in the ASGM sector.

Finally, national strategies along the lines of institutional strengthening, policy and regulatory framework, mercury trade, ASGM, mercury – added products, emissions and releases, mercury waste management, contaminated sites, and monitoring and reporting are also identified.

CHAPTER 1: INTRODUCTION

1.1 History of Mercury and its Uses



Credit: Andrei Marincas
www.shutterstock.com

Mercury is a naturally – occurring element found in the transition region of the Periodic Table of Elements. Its chemical symbol is derived from the Greek word "*hydrargyrum*" that translates to "liquid silver" owing to the element's shiny surface, silver color, and liquid form. Commonly known as "quicksilver", mercury is the only metal occurring in the liquid state at normal temperature and pressure. This characteristic, including its other physical and chemical properties, has made mercury unique and useful in many products and processes designed for the improvement of the quality and comfort of human life.

The earliest trace of mercury dates back to 1600 BC where it was found stored in a small glass container in an Egyptian tomb in Kuma[1]. Since then, recorded history has depicted the various usages of mercury and its ore by the ancient Egyptians, Greeks, Romans, Chinese, and the Hindus. In these earlier times, cultures believed that mercury possesses medicinal, spiritual, and magical qualities that bring good luck, ward off evil spirits, and cure ailments to the point of extending one's life[2].

Mercury rarely occurs uncombined in nature and is often found in cinnabar ores as mercury sulfide (HgS). Known mines in China, Spain, Italy, Yugoslavia, the United States, Algeria, Peru, Russia, and Kyrgyztan have been the source of global mercury supply for many generations[3]. Cinnabar, also known as vermillion, was used as a bright red pigment by the Paleolithic painters 30,000 years ago to decorate caves in Spain and France. Mercury can easily be derived from cinnabar by simply heating the compound. The ancients were also known to have used mercury on a large scale to extract alluvial gold from the sediment of rivers[4]. The amalgam[5] that is formed was later distilled to separate mercury, leaving a high – purity gold depending on the efficiency of the separation methods used.

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[1] Chemistry Explained. Retrieved from http://www.chemistryexplained.com/elements/L-P/Mercury.html on 16 October 2017

[2] Kail, T. M. Magico-Religious Groups and Ritualistic Activities: A Guide for First Responders

[3] USGS Mineral Commodity Summaries. 2015. Retrieved from https://minerals.usgs.gov/minerals/pubs/commodity/mercury/mcs-2015-mercu.pdf on 16 October 2017

[4] Royal Society of Chemistry. Retrieved from http://www.rsc.org/periodic-table/element/80/mercury on 16 October 2017

[5] "amalgam" is an alloy of mercury with another metal that is solid or liquid at room temperature. Merriam – Webster. Retrieved from https://www.merriam-webster.com on 16 October 2017

Until the early 20th century, mercury has been used as the primary treatment for syphilis[6] while inorganic mercury compounds such as mercuric chloride ($HgCl_2$) was used to disinfect wounds[7]. Similarly, calomel or mercurous chloride (Hg_2Cl_2) was known to have been used as an antiseptic to kill bacteria[8]. These, and various other inorganic compounds containing mercury, have been used for their antiseptic, bactericidal, fungicidal, diuretic, and/or cathartic properties in Europe, North America, and Australia[9]. In the 18th century, mercury nitrate ($HgNO_3$) was used to clean animal pelts before they were turned into garments.

More recently, in the modern industrial era, societies have been able to successfully further capitalize on the unique physical and chemical properties of mercury in realizing important technological advancements. Having a mass almost 14 times that of an equal volume of water, mercury was considered the most practical indicator fluid used in measuring devices such as thermometers, laboratory and industrial barometers, manometers, vacuum gauges, and various other scientific instruments[10]. Elemental mercury, with its high conductivity owing to its metallic nature, is also commonly used in industrial and commercial switches and relays such as those found in temperature, pressure, liquid level, and power supply controllers including certain types of time – activated alarms[11].

Mercury is also found as an integral component in lighting products such as fluorescent (both tube and compact types), mercury vapor, metal halides, neon, and high - pressure sodium vapor lamps[12]. Other products that may contain mercury that has been intentionally – added include cosmetics, dyes and pigments, pesticides and fungicides, pharmaceutical preservatives, cathode ray tubes, and batteries. Dental amalgam can contain as much as 50% mercury, the remaining being silver, tin, and copper[13].

As an industrial catalyst, mercury is used in the production of sodium hydroxide and chlorine via electrolysis in the chlor-alkali process, in the manufacture of acetaldehyde, and in the production of vinyl chloride monomers, polyurethanes, and sodium and potassium methylates and ethylates[14]. Other anthropogenic sources of mercury that cause elevated levels in the environment include emissions and releases from the handling of raw materials containing

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[6] Harvard University Library, Open Collections Program. Retrieved from http://ocp.hul.harvard.edu on 16 October 2017

[7] Live Science. Retrieved from https://www.livescience.com on 16 October 2017

[8] Jefferson Lab. Retrieved from https://education.jlab.org on 16 October 2017

[9] World Health Organization. 2003. Elemental mercury and inorganic mercury compounds: Human health aspects

[10] Ibid 7

[11] Northeast Waste Management Officials Association (NEWMOA). 2010. IMERC Factsheet: Mercury Use in Switches and Relays

[12] Northeast Waste Management Officials Association (NEWMOA). 2015. IMERC Factsheet: Mercury Use in Lighting

[13] United States Department of Health, Food and Drugs Administration (FDA). Retrieved from https://www.fda.gov on 16 October 2017

[14] Minamata Convention on Mercury, Annex B. 2013

mercury as impurities, weak management of wastes consisting, containing, and contaminated with mercury, and the re-mobilization of mercury through improperly designed clean-up and rehabilitation methodologies.

1.2 Mercury Pathways and Transformations in the Environment

Mercury naturally exists in the environment in various chemical forms that can be differentiated into three general classifications: elemental, inorganic, and organic. It moves freely in the environment in various combinations of transformation and transport mechanisms, creating a range of exposure and toxicity levels.

1.2.1 Mercury Exposure Pathways

Elemental or metallic mercury is a shiny, silver-white liquid metal expressed chemically as Hg^0, where the "0" denotes the oxidation state of the mercury atom as being uncharged (equal number of protons and electrons). It can evaporate or volatilize turning into colorless and odorless mercury vapor when it is exposed to air. It can also be dispersed at very low concentrations in soils, sediments, natural waters, and in plants and animals[15]. The inhalation of mercury vapor is the primary route of exposure to elemental mercury for humans. Once inside the body, elemental mercury can oxidize to the inorganic form and be retained in body tissues such as the brain and kidneys for long periods of time causing organ failure and other neurological disfunction.

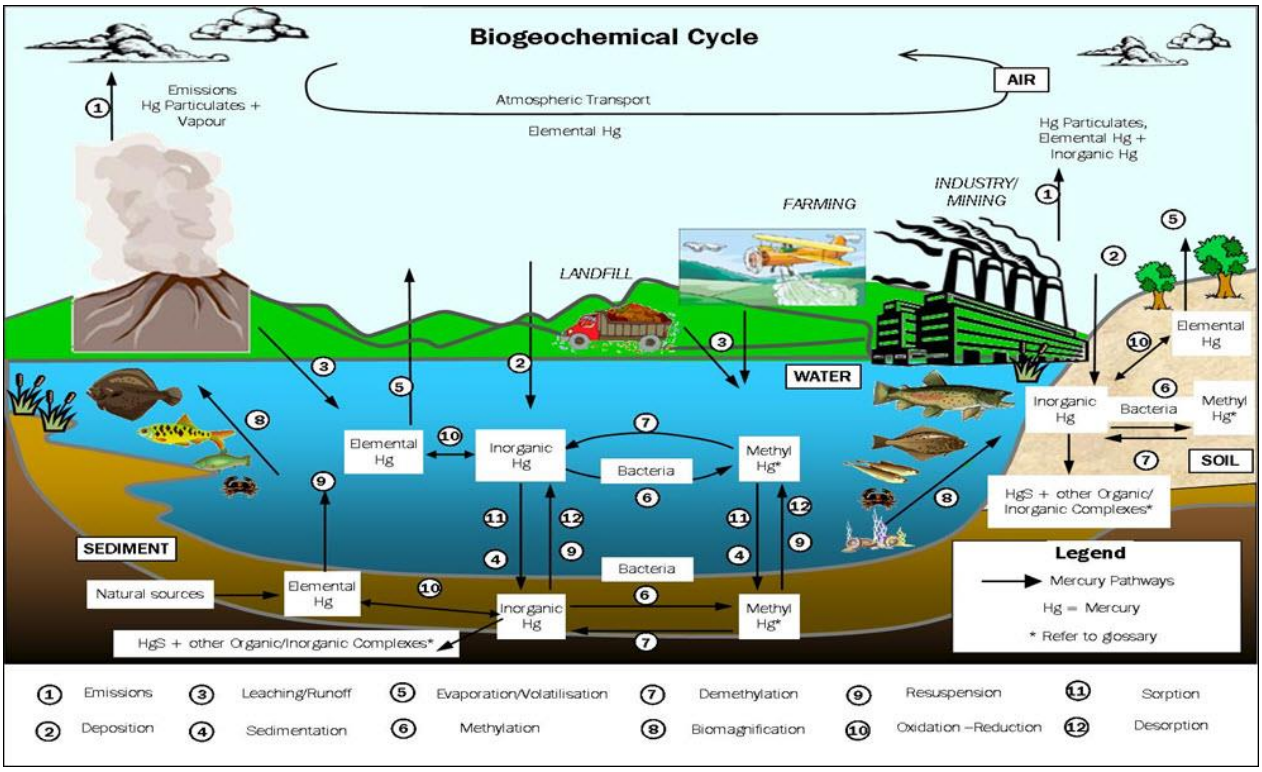
In nature, inorganic mercury compounds are more commonly found as compared to the elemental form. Being a natural component of the Earth's crust, mercury exists, at some level, in all rocks, soils and sediments, usually as an inorganic compound. Major sources of mercury in soils are the parent rocks and minerals that eventually become weathered to form the soil. Inorganic mercury compounds include mercuric oxide (HgO), mercuric chloride ($HgCl_2$), and mercuric sulfide (HgS), to name a few. Depending on the specific inorganic compound, they can be less efficiently absorbed into the human body compared to mercury vapor that is easily inhaled once in the atmosphere. Majority of inorganic compounds enter the body through the gastrointestinal tract from dietary sources. Infants are particularly vulnerable through their consumption of breast milk where mercury can be transferred from mother to child. Other exposures nay also be due to mercury dental amalgam, mercury – containing cosmetic products, mining activities, and mercury – containing fungicides.

[15] Ministry of Environment of New Zealand. Retrieved http://www.mfe.govt.nz

Organic mercury compounds are formed when mercury atoms are attached to a carbon – based molecule. The most common type of organic mercury, and the form with the most concern in terms of toxicity, is methylmercury. Organic mercury compounds are easily absorbed by marine organisms such as fish in the aquatic environment and is also easily transferred up the food chain, facilitated by the chmeiclas propensity to bio – acculmulate and bio – magnify. Out of all the forms of mercury, organic mercury poses the greatest risk to humans and anilmals because it is more readily absorbed through the gastrointestinal tract. Once inside, it can migrate through cell walls, blood – brain, and placental barriers which normally are non – permeable to most toxins.

1.2.2 Mercury Pathways in the Environment

The movement of mercury and its many transformations in the environment normally follows a natural biogeochemical cycle[16] as shown in Figure 1.0. While in transit through this cycle, the total amount of mercury in its various forms will remain the same since elements like mercury can neither be created nor destroyed. Anthropogenic activities can affect the general biogeochemical cycle of mercury but the nature of the transformations and the physical and chemical processes involved will not be greatly altered.



[16] University of Wisconsin. Retrieved at https://people.uwec.edu

Figure 1.0 Biogeochemical Cycle of Mercury[17]

1.2.2.1 Mercury Pathway in Air

Generally, elemental mercury mostly exists in the atmosphere while the inorganic and organic mercury compounds are mostly found in land and water environments. Mercury can enter the atmosphere through various natural and anthropogenic activities. Volcanic eruptions are one of the major natural sources of mercury emitted into the environment in the form of particulate mercury from mercury-containing minerals and salts, and elemental mercury vapor. Man – made activities in industry sectors and mining also emit various forms of mercury into the atmosphere. Once in the atmosphere, elemental mercury can either be circulated or oxidized to its inorganic form and vice versa.

The form mercury adopts in the atmosphere dictates its mobility and distribution potential[18]. According to research, roughly 80% of the total mercury in the atmosphere is in the form of elemental mercury vapor[19]. And due to its high volatility, elemental mercury can remain in the atmosphere for up to 2 years, allowing for long – range transport of mercury across national borders[20].

From the atmosphere, mercury can be deposited to land or water systems by either the "wet" or "dry" form of deposition. Wet deposition occurs when mercury is first dissolved into water droplets and returned to land or water by the process of precipitation. Dry deposition is where mercury is removed from the atmosphere through settling and absorption processes. Dry deposition is more likely to remove particulate and gaseous forms of mercury.

1.2.2.2 Mercury Pathway in Land

Mercury exists naturally in the mineral cinnabar (HgS) or as a trace component in sedimentary, igneous and metamorphic rocks. Mercury and mercury compounds found in the land and soil environment can also be a result of deposition from the atmosphere. Similar to its chemical behavior in air, mercury in the soil can likewise undergo oxidation – reduction reactions. These can then be followed by volatilization of elemental mercury, re-entering the atmosphere, or followed by leaching or runoff, where elemental mercury is transported to water environments.

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[17] Ibid 15

[18] Ibid 15

[19] Wang, Q, et. Al. 2004. Sources and remediation for mercury contamination in aquatic systems: A literature review. Environmental Pollution 131 pp 323-336

[20] Lin, Che-Jen Lin and Simo O. Pehkonen, 1999. The chemistry of atmospheric mercury: A review. Atmospheric Environment, 33, pp 2067-2079.

While in the soil environment, mercury can also form complexes with other compounds through a series of chemical reactions including methylation onto the organic form. The complexes that are formed can make the mercury less mobile, causing it to remain in the soil for long periods of time. On the other hand, mobility can be increased if mercury is attached to organic matter or soluble compounds that are subsequently washed into waterways by runoff[21]. In areas with high levels of mercury accumulation in the soil, mercury can continue to be released into other environments for long periods of time. The average residence time of mercury in soil has been estimated in the order of a thousand years[22] (NRC, 1979).

1.2.2.3 Mercury Pathway in Water

Mercury enters various water systems often through wet deposition from the atmosphere, runoff and erosion from the land surface, leaching from landfills, geothermal inputs, combustion and other industrial discharges. Once in the water environment, mercury can also undergo oxidation – reduction reactions, sorption – desorption processes on to mineral surfaces and organic matter, and methylation – demethylation reactions as well as they transform from one form to the other.

Elemental mercury can be evaporated back to the atmosphere directly from water through the process called evasion, or it can be oxidized to its inorganic form and vice versa. In many cases, mercury is transformed to the organic form methylmercury often through bacterial action. Inorganic mercury can form complexes with organic matter or be sorbed onto suspended particulate matter within the water environment. These complexes, which can be transported over very long distances, are believed to be the dominant form in which mercury is found in natural waters. Conversion to the organic form of mercury in the water environment is of significant concern due to the bioaccumulation of methylmercury in marine species. As a result, top-level predators acquire greater body burdens of mercury than the marine species they consume. Mercury concentrations in these predators can reach up to 10 million times higher than the environments in which they live.

Sediments at the bottom of water bodies can act as mercury sinks from which mercury can be re-distributed back into circulation for many years after initial deposition[23]. The

[21] United Nations Environment. 2013. Global Mercury Assessment

[22] National Research Council. 1979. An Assessment of Mercury in the Environment

[23] Ibid 21

residence time of mercury in the oceans can go up to 3,200 years, while the average residence time of mercury in oceanic sediments is in the order of 250 million years[24].

1.2.2.4 Athropogenic Sources of Mercury

According to United Nations Environment, the movement and transport of mercury in the environment can be grouped into four categories[25].

1. Natural sources - releases due to natural mobilization of naturally occurring mercury from the Earth's crust, such as volcanic activity and weathering of rocks;
2. Current anthropogenic releases from the mobilization of mercury impurities in raw materials such as fossil fuels – particularly coal, and to a lesser extent gas and oil – and other extracted, treated and recycled minerals;
3. Current anthropogenic releases resulting from mercury used intentionally in products and processes, due to releases during manufacturing, leaks, disposal or incineration of spent products or other releases;
4. Re-mobilization of historic anthropogenic mercury releases previously deposited in soils, sedi-ments, water bodies, landfills and waste/tailings piles.

The anthropogenic releases can further be classified into eleven recommended major source categories based on known man – made activities where there is high probability of mercury releases into the environment. Table 1.0 provides the list of major source categories according to the Toolkit for Identification and Quantification of Mercury Releases.

Table 1.0 Major Anthropogenic Source Categories for Mercury

No.	Source Category
1	Extraction and use of fuels/energy sources
2	Primary (virgin) metal production
3	Production of other minerals and materials with mercury impurities
4	Intentional use of mercury in industrial processes
5	Consumer products with intentional use of mercury
6	Other intentional products/process uses (i.e. dental amalgam, manometers, etc.)
7	Production of recycled metals ("secondary" metal production)
8	Waste incineration
9	Waste deposition/landfilling and waste water treatment

[24] Ibid 22

[25] Toolkit for Identification and Quantification of Mercury Releases: Guideline for Inventory Level 2, version 1.4. 2017

10	Crematoria and cemeteries
11	Identification of potential hot-spots

1.3 Health Impacts of Mercury

Mercury is a highly – toxic chemical that easily persists in the environment[26]. It is a potent bio-accumulating neurotoxin in its many forms and can cause neurological damage affecting behavior and cognitive faculties, mental disorder, infertility, kidney damage, and respiratory failure[27]. It is found in the environment as an element, as part of an inorganic compound, or attached to a carbon - based compound. Humans are normally exposed to mercury under different circumstances such as through their occupation or through their diets. According to research conducted by the World Health Organization (WHO), these various forms of mercury vary in their degree of toxicity and in the serious health effects they cause so much so that the organization has not been able to establish a safe level of mercury.

Elemental mercury is toxic to the central and peripheral nervous systems. Inhalation of mercury vapor can harm the nervous, digestive and immune systems, lungs and kidneys, and may also be fatal[28]. On the other hand, the inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested. In its organic form (methylmercury), it bio-magnifies up the food chain and ends up being stored in the fatty tissues of humans and animals causing neurological damage and impaired neurological development in infants and young children, causing damage even as early as during fetal development[29].

1.4 The Minamata Disease

Human exposure to methylmercury that led to a serious public health incident occurred in Japan between 1932 and 1968. In 1956, residents from Minamata City on the west coast of the southern Japanese island of Kyushu were admitted to hospitals with similar severe and baffling symptoms. They suffered from very high fever, convulsions, psychosis. Soon after, more patients were admitted from fishing villages near Minamata suffering the same symptoms. With increasing incidents occurring in such a short span of time, public health officials subsequently

[26] National Atmospheric Deposition Program, 2016, accessed from http://nadp.sws.uiuc.edu/MDN/why.aspx

[27] World Health Organization, 2016, accessed from http://www.who.int/mediacentre/factsheets/fs361/en/

[28] World Health Organization, 2017, accessed from http://www.who.int

[29] US Environmental Protection Agency, 2016, accessed from https://www.epa.gov/mercury/health-effects-exposures-mercury#methyl

reported the epidemic of an unknown disease of the central nervous system, marking the official discovery of Minamata Disease[30].

Later investigations showed that patients afflicted with the disease first complained about a loss of sensation and numbness in their hands and feet. Eventually, it became difficult for them to grasp small objects or fasten buttons and they found themselves unable to run or walk without stumbling. Some will also complain about difficulties in seeing, hearing, and swallowing. Symptoms generally deteriorated eventually leading to convulsions, coma, and death. Toward the end of 1956, a total of 40 patients had been discovered, 14 of which have already died.

Minamata Disease is an encephalopathy and peripheral neuropathy caused by daily intake of fish and shellfish highly contaminated by methylmercury[31]. Local wildlife as well as domesticated animals such as cats was also heavily – affected. The outbreak in Japan was caused by waste products containing mercury compounds dumped into Minamata Bay on a massive scale by a highly – influential chemicals manufacturing plant. The Chisso Minamata factory first started acetaldehyde production in 1932 and by 1951, production had jumped to 6,000 tons per year, comprising over 50% of the country's total output[32]. The chemical reaction used to produce the valuable chemical used mercury sulfate as a catalyst. A side reaction of the catalytic cycle led to the production of a small amount of the organic mercury compound, methylmercury. This highly toxic compound was released into Minamata Bay from the start of production in 1932 until 1968 when this production method was discontinued. It took 12 years from the first reported deaths before the Japanese govrnment finally admitting that the cause of contamination was from the irresponsible dumping of mercury – containing wastes into the Minamata Bay.

1.5 The Minamata Convention

Recognizing that mercury is indeed a chemical of global concern[33], owing to both its severe health and environmental impact, its long – range atmospheric transport, its persistence in the environment, and its ability to bio – accumulate in ecosystems, the first Inter-governmental Negotiating Committee (INC) began the campaign and negotiations during the 2010 meeting in Stockholm for the establishment of a global treaty on mercury to be completed by the twenty-seventh regular session of the Governing Council / Global Ministerial Environment Forum to be held in 2013.

[30] Boston University, 2017, accessed from http:// www.bu.edu

[31] National Institute for Minamata Disease. accessed from http://nimd.env.go.jp

[32] Ibid 19

[33] United Nations Environment. 2013. The Minamata Convention on Mercury

The Minamata Convention on Mercury (MC) is a global treaty created to protect human health and the environment from the adverse effects of mercury[34]. The Convention highlights the urgent need for the global community to control, and in some cases to prohibit the extraction, manufacture, use, trade, storage and disposal of mercury, mercury compounds, and products containing mercury in the attempt to minimize, if not eliminate, anthropogenic emissions and releases to various media, throughout the entire life cycle, that lead to environmental degradation and hazardous human exposure.

The Convention contains 35 articles containing both control and support measures and several annexes that list down recommendatory as well as legally-binding provisions surrounding globally – significant concerns pertaining to mercury such as the operations of existing mercury mines, mercury use in a number of products and processes, emissions to air, releases to land and water, and the informal sector of artisanal and small-scale gold mining (ASGM). It also talks about technical issues around interim storage of mercury for allowed use, waste management, treatment and disposal, sites contaminated by mercury, and other health-related matters. Refer to Annex 4 for a summary of the Convention articles.

The Convention was signed on 10 October 2013 by the Philippine government, together with one hundred and twenty – seven (127) other nations, at the Conference of Plenipotentiaries held in Kumamoto, Japan. The country's agreement to the Convention text ushered in renewed efforts to build national capacities, establish legal and policy frameworks, and promote information sharing and dissemination toward the future ratification of the Convention. The Convention entered into force on 16 August 2017 and, as of November 2019, one hundred and fifteen (115) states[35] have successfully deposited their respective instruments of ratification, acceptance, approval, and accession to the Minamata Secretariat. To date, along with Cambodia and Malaysia, the Philippines is one of the remaining ASEAN member countries that has yet to become a party to the Minamata Convention on Mercury.

1.6 The Minamata Initial Assessment

While the ratification of the Convention provides parties with global - best tools, technical and financial support to protect their people and the environment they live in from the negative impacts of mercury, mercury compounds, products containing mercury and mercury – containing wastes, being a party to the Convention also creates legal obligations for all parties

[34] The Minamata Convention. June 2017. UN Environment webpage, http://mercuryconvention.org
[35] The Minamata Convention. 2019. Accessed from http://www.minamataconvention.org

to comply with. The Minamata Initial Assessment (MIA) is an enabling activity financially – supported by the Global Environment Facility (GEF) to assist countries in:

1. strengthening national decision-making toward ratification of the Minamata Convention on Mercury; and
2. building national capacities toward implementation of future obligations[36].

Countries are encouraged to undertake an MIA project to help assess their readiness for being a party to the Minamata Convention as indicated in Article 20 of the Convention text. The needed government structures, coordination mechanisms, technical capacity, and financial implications has to be fully understood. According to the GEF, the MIA should also be able to provide basic and essential level of information to (1) enable policy and strategic decisions to be made and (2) assist in plans that identify priority activities within a country. The MIA project allows countries to undertake a mercury inventory, determine and agree upon the measures it will take to implement the Convention, estimate associated costs, and communicate this information in a concise and clear manner, among other requirements stipulated in the "Initial Guidelines for Enabling Activities for the Minamata Convention on Mercury" published in 2013 by the GEF.

In July of 2017, the Philippines officially embarked on its MIA project led by the Department of Environment and Natural Resources and managed by the Environmental Management Bureau (DENR – EMB).

[36] UNDP MIA Report. February 2017

CHAPTER 2: NATIONAL BACKGROUND INFORMATION

2.1 Geography

The Philippines is an archipelago in Southeast Asia (Figure 2.0) consisting of more than 7,000 islands of which approximately 3,000 are named and more than 2,000 are inhabited. It is about 1,850 kilometers from north to south and about 1,100 kilometers from east to west with a total land area of roughly 298,170 sq. km. 41.7% (124,400 sq. km) of which is agricultural land[37] and 27.8% (82,891 sq. km) accounts for forest cover. The 11 largest islands account for more than 90 percent of the total land area.



Figure 2.0 Map of the Philippines

The country has a total coastline of 36,289 km. and is bordered by the South China Sea to the northwest, the Sulu Sea to the southwest, the Celebes Sea to the south, the Philippine Sea to the east, and the Luzon Strait to the north. The Philippines has no land boundaries, with Taiwan as its nearest country to the north, Brunei and Malaysia to the southwest, Indonesia to the south, Vietnam to the west, and China to the northwest.

The Philippines' territorial sea claims extend 100 nautical miles off the coastline all around the country under the 1898 Treaty of Paris. A 1978 presidential decree increased the claim to 285 nautical miles into the South China Sea, encompassing the disputed Spratly Islands, known as the Kalayaan (Freedom) Islands in the Philippines. The Philippines also claims sovereignty over its continental shelf, extending 200 nautical miles from its coastline, under the United Nations (UN) Convention on the Law of the Sea. The Philippines also claims Malaysia's Sabah State.

[37] World Bank. 2016. World Data Atlas

The Philippines is divided into three regions: the northern islands of Luzon and Mindoro, the central Visayan and Palawan Islands, and the southern islands of Mindanao and the Sulu Archipelago. More than 70 percent of the population resides on the two largest islands, Luzon and Mindanao, which together comprise more than 70 percent of the land area.

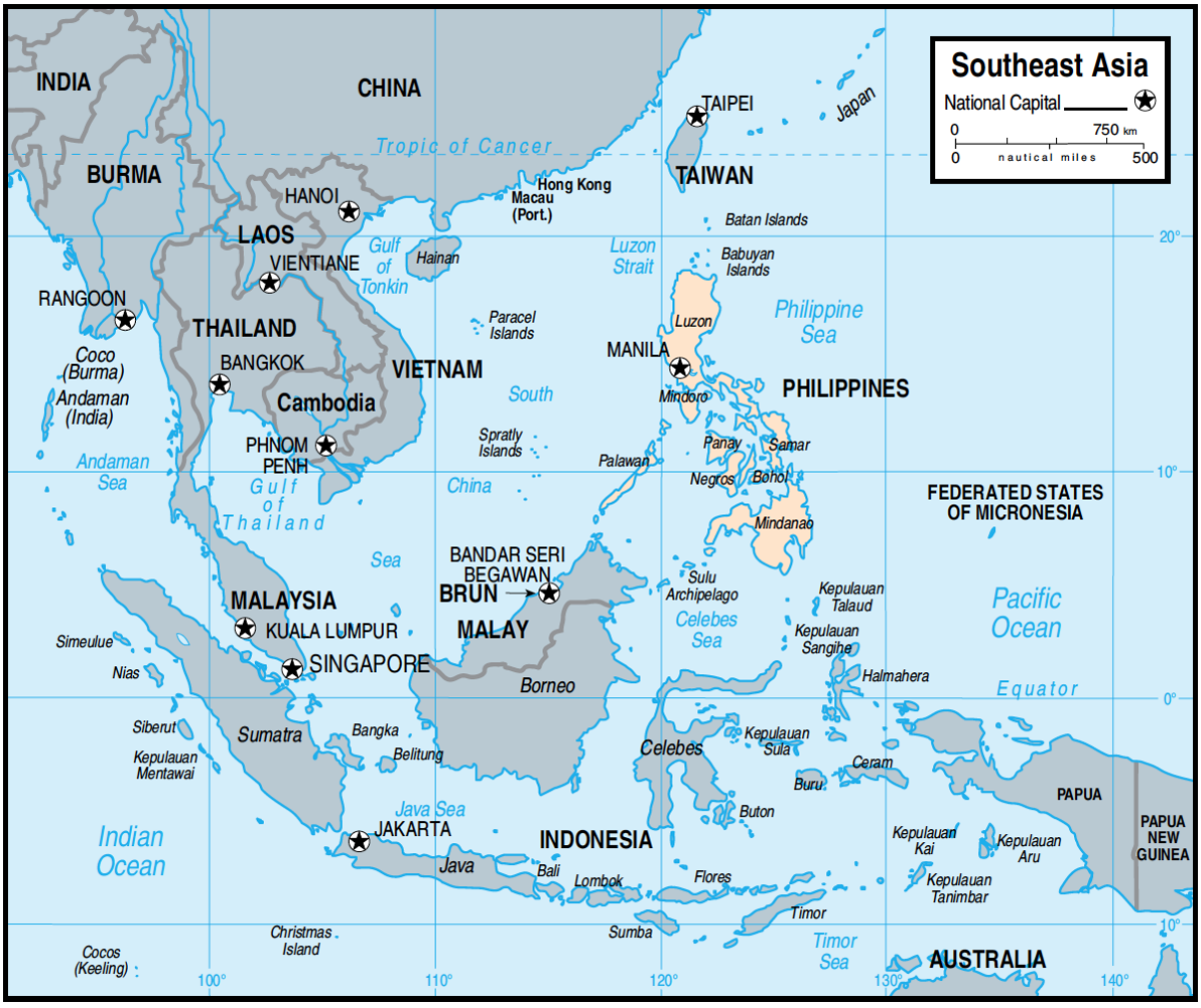


Figure 3.0 Map of the Philippines and Southeast Asia

The coastlines of many islands are irregular, with numerous bays, gulfs, and inlets. Manila Bay is the most commercially important because of its naturally sheltered harbor. The two largest gulfs, Leyte and Panay, are located in the Visayan Islands. The country's large rivers are generally not navigable, except for short portions. Streams are subject to typhoons and flooding during the monsoon season. The longest river is the Cagayan River in North Central Luzon that flows northward to the sea. Other rivers in Luzon with substantial length are the Agno and the Pampanga rivers that cross the Central Luzon Valley. The Chico River flows

through the Cordillera Central in Northern Luzon and irrigates the mountainsides. The Pasig River, one of Luzon's shortest rivers, flows through Manila giving it commercial significance. It originates in the Luzon's largest lake, Laguna de Bay, and empties into Manila Bay. Mindanao has two main rivers. The Rio Grande de Mindanao receives the waters of the Pulangi and the Agusan River flows north into the Bohol Sea.

The largest lake in the Philippines is Laguna de Bay, a freshwater lake 13 km long southeast of Manila. Its surface area is about 922 sq. km. Sewage and toxic waste from the surrounding urban areas contaminate its waters. Taal Lake, 56 km south of Manila, occupies a huge volcanic crater and contains an active volcano. Lake Lanao, with an area of about 347 sq. km, is the largest lake in Mindanao and the source of the Agusan River, which exits the lake at the Maria Christina Falls.

Natural vegetation in the Philippines consists of tropical rainforests on the eastern side of the archipelago and Palawan and monsoon forests on the western side. The vegetation in the tropical rainforests consists of tropical hardwoods from 40 to 70 meters high and many varieties of ferns and flowering plants, such as orchids. The mountains of northern Luzon have pine trees. Mangrove forests grow in some coastal bays. Montane forests grow on older volcanoes and along the main mountain chains. Tropical pine forests grow at higher elevations on Luzon and Mindoro and freshwater swamps are found at lower locations in Luzon and Mindanao. Lowland forests on the eastern seaboard are regularly raked by cyclones, and these forests are characterized by being lower and denser than the unaffected ones. Originally, forests used to cover more than 90 percent of the Philippines. Today, that number has shrunk significantly, due largely to agricultural policies and methods.

2.2 Climate

The Philippines has a tropical climate, remaining hot and humid throughout the year. Monsoons, rain-bearing winds, strongly affect the islands. The monsoons blow from the southwest from about May to October and from the northeast from November to February. Temperatures stay constant from north to south during the year, and seasons consist of wet and dry periods. The western part of the country has two seasons. Summer, the rainy season, begins in May and ends in November. Winter, the dry season in most of the Philippines, begins in December and ends in May. December through February is cool and dry, but March through May is hot and dry. The tropical storm season lasts from June to October with most of the storms coming from the southeast.

The Philippines is located in the Ring of Fire, an area prone to earthquakes and volcanic activity. To the east of the islands is the 10,539 meter deep Philippine Trench, where one tectonic plate is gradually being forced beneath another, which causes frequent earthquakes in the Philippines. Noticeable earthquake activity occurs somewhere in the Philippines every 2 days. Large submarine earthquakes may cause tsunamis, or large tidal waves, which can strike the coasts. The Philippines includes about 20 active volcanoes and many inactive volcanoes. The Mayon Volcano on Luzon is the most active, and it erupted in 1993, 2000, and 2001. Mount Pinatubo erupted in 1991 after lying dormant for about 600 years, causing widespread damage on the island of Luzon. Mount Apo, the highest mountain, is an active volcano on Mindanao with three peaks.

Rainfall averages about 203 cm per year with more precipitation in the coastal plains than in the inland valleys. In the western Philippines, most of the rain falls during the summer monsoon, from May to November, when the wind blows from the southwest. Winter, when the wind blows from the northeast, is the dry season, which lasts from December to April. Typhoons typically strike the Philippines between the months of June and October. The typhoons develop in the western Pacific Ocean and have heavy rains and winds in excess of 160 km per hour. Typhoons are heaviest in Samar, Leyte, the eastern Quezon province, and the Batan Islands. Mindanao is generally free from typhoons but recent times have also seen major weather disturbances in the country's southernmost island.

The eastern islands receive the most rainfall during the winter monsoon and have no true dry season. During the wet season, rainfall is heavy in all parts of the Philippines except for an area that extends southward through the center of the Visayan group to central Mindanao and through the Sulu Archipelago. Rain is heaviest along the eastern shores.

2.3 Socio-economic Profile

The population of the Philippines was reported at 100.98 million individuals in 2015[38], 50.6% of which were male and 59.6% below the age of 30 years. 44.37% of the total population resided in urban areas. Employment rate in 2017 was at 94.3% while youth unemployment during the same year was 14.4%.

The economy grew by 6.7% in 2017 led by the industry sector at 7.2% growth with manufacturing accounting for 69% of the total industry gross value added (GVA). Other notable contributions were seen from basic metals, non-metallic mineral products, fabricated metal

[38] Philippine Statistics Authority 2018. 2015 Census of Population

products, and electronics subsectors. The service sector grew by 6.7% while the agriculture sector grew by 3.4% during the same period. More details found in Table 2.0.

Table 2.0 Philippine Socio-economic Snapshot

Population	100.98 million[39] (2015) Sex Male: 50.6% Female: 49.4% Age Group Under 1 – 14 31.85% 15 – 29 27.75% 30 – 44 19.74% 45 – 59 13.19% 60 – 79 6.69% Over 80 0.79% Urbanization Urban: 44.37% Rural: 55.63%	**Main Natural Resources**	Metallic minerals (Au, Cu, Ni, Cr, Fe) Nonmetallic minerals (limestone, silica, clay, sulfur) crops (banana, coconut, sugarcane, pineapple, mango, cassava, rubber, coffee, palay, corn) livestock (hog, carabao, goat) aquatic resources (milkfish, tilapia, tuna, seaweed)
GDP per capita	$3,918 M (Q1 2018)[40] Agriculture: 10.14% Industry: 31.25% Services: 58.62%	**Main Production**	Top contributors to value added in 2015[41] electronic components, tobacco, motor vehicles, beverages, other food products
Economic Growth	6.9% (2016) 6.7% (2017)	**Main Trading Partners**	Top trading partners[42] (2016) Exports: Japan, USA, HK Imports: PRC, Japan, USA
Competitiveness Index	4.35[43] (2017)	**Trade**	Exports: $58.827 billion[44] (2015) Imports: $71.067 billion[45] (2015)
Employment rate **Youth Unemployment**	94.3% (2017)[46] 14.4% (2017)[47]		
Underemployment	16.1% (2017)[48]		

2.4 Major Environmental Challenges

The Philippines faces many environmental problems including loss of farmland, deforestation, soil erosion, water and air pollution, waste treatment, coastal pollution,

[39] Philippine Statistics Authority 2018. 2015 Census of Population
[40] Philippine Statistics Authority. 2018. Gross National Income and Gross Domestic Product By Expenditure Shares
[41] Philippine Statistics Authority. 2015. 2015 Annual Survey of Philippine Business and Industry – Manufacturing Sector
[42] Philippine Statistics Authority. 2016. 2016 Foreign Trade Statistics
[43] World Economic Forum. 2017. 2017 Competitiveness Report
[44] Philippine Statistics Authority. 2015. 2015 Foreign Trade Statistics of the Philippines, Volume II
[45] Philippine Statistics Authority. 2015. 2015 Foreign Trade Statistics of the Philippines, Volume I
[46] Philippine Statistics Authority. 2017. 2017 Annual labor Force Survey
[47] NEDA. 2018. Philippine Socioeconomic Report
[48] Ibid. 12

biodiversity loss. Poor resource management, land use changes, and population growth are significant factors in the environmental decline.

In more recent times, water quality has deteriorated while more than half of the country's local government units are still struggling to implement a proper and sound solid waste management system. While part of the solution includes the improvement of industrial water and waste discharges, industries would also in turn require better services (i.e. reliable supply of water fit for industrial consumption, and, resilient solid waste management logistics and infrastructure) from host local governments. It was also determined that the enforcement of environmental laws has been weak while efforts toward climate change adaptation and disaster risk reduction has been inadequate.

CHAPTER 3: MERCURY INVENTORY AND CONTAMINATED SITES

A mercury inventory is an essential part of any Minamata Initial Assessment. It constitutes one of the important decision – making tools toward mitigating environmental impacts brought about by toxic pollutants such as mercury. Once a country has decided that mercury pollution is a priority problem that needs to be evaluated further, it will need to estimate both the relative and the absolute contributions to mercury releases from the different sources present in the country. This information can be used to determine which release source types are significant and which sources should be addressed through release reduction initiatives[49].

Mercury inventories, coupled with additional country – based knowledge, play an important role in identifying the most cost – effective reduction measures for decision – making. These inventories are also vital in the communication with stakeholders such as industry, trade and the public. Importantly, baseline inventories and subsequent updates can be used to plan, set goals, identify priorities, and monitor progress.

3.1 Level 2 Toolkit for the Identification and Quantification of Mercury Releases, ver. 1.4

In the preparation of a mercury inventory, the Level 2 Toolkit for the Identification and Quantification of Mercury Releases is recommended. This Toolkit primarily aims to assist countries in developing a mercury inventory to estimate the releases of mercury within their borders, also leading them through the process of enhancing and refining these inventories. The goal is to guide the preparation of the inventory by walking through the different techniques and stages of the inventory development, providing a methodology, a series of illustrative examples, and extensive information on mercury release sources. The Toolkit facilitates and reduces the workload in the creation of national or regional mercury inventories.

The Toolkit comprises a UN Environment – recommended procedure and database for the effective compilation of source and release inventories of mercury. Comparable sets of mercury source release data enhance international cooperation, discussion, goal – definition and assistance. It is designed to be adaptable and should be used as a screen toward ensuring the positive identification of the bulk of significant sources and not as an exhaustive registry. Speed and ease of use have been deemed more relevant for the users of this Toolkit than the unattainable goal of perfect accuracy.

[49] Ibid 25

The Toolkit also provides links to other information sources around the globe pertaining to mercury releases.

3.2 The Life – Cycle Approach

According to the Level 2 Toolkit for the Identification and Quantification of Mercury Releases, the life-cycle concept is a "cradle to grave" approach that recognizes all stages in the process of converting raw materials into end product, their subsequent use and eventual disposal (i.e., extracting and processing raw materials, manufacturing, transportation and distribution, use/reuse, recycling and waste disposal) may cause potential environmental impacts brought about by mercury and mercury use.

Mercury releases may occur at all stages of the life cycle of a product or process. To effectively illustrate the nature of mercury flows and account for the mercury releases to the environment, the life-cycle concept can be of use during data gathering and development of an inventory and for ranking the environmental burdens of products, processes and services. As mercury is an element and therefore neither formed nor destroyed during any life cycle, the total inputs of mercury will equal the total outputs. Mercury releases from a particular activity, therefore, can be viewed as the consecutive distribution of the original mercury input to various media or release pathways during various stages of the life cycle of the product or process as illustrated in Figure 4.0.

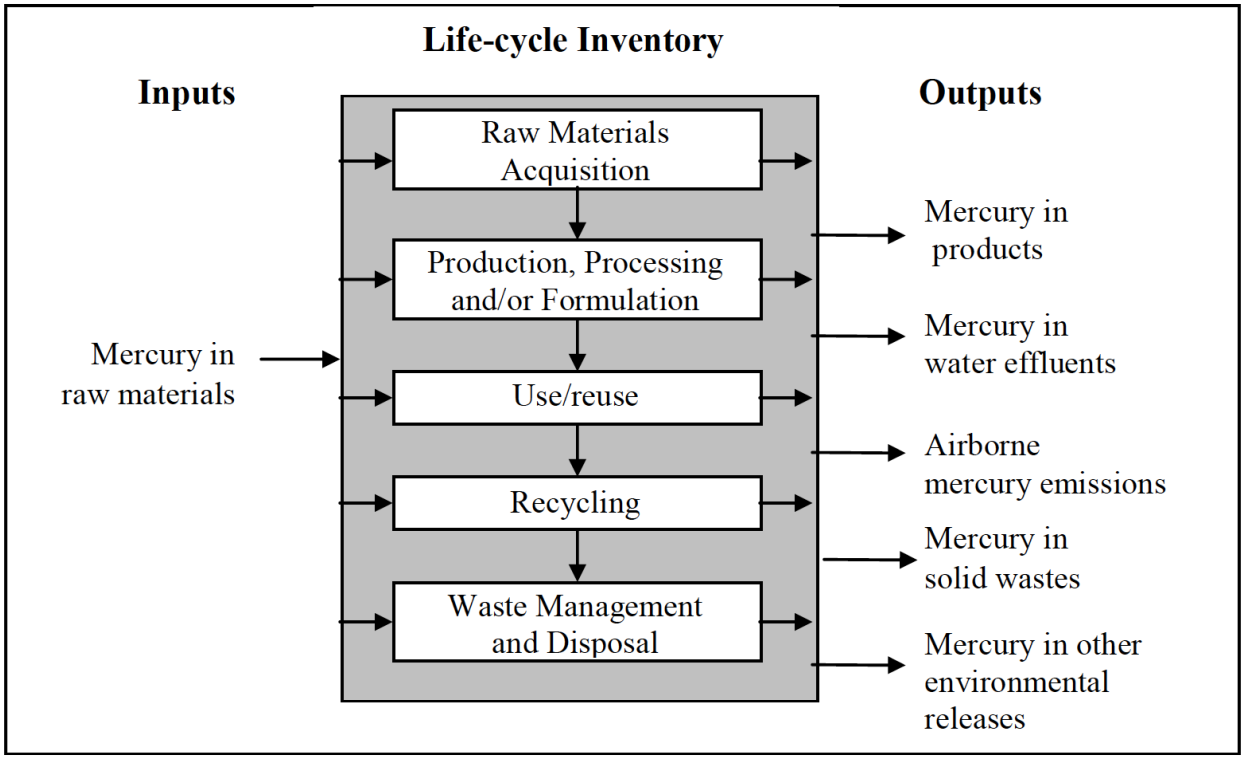


Figure 4.0 A life-cycle inventory broken down into inputs and outputs for material as well as environmental releases (Level 2 Toolkit)

3.3 Mercury Source Categories

In developing a standard mercury inventory, the first step is to identify the main source categories present in the country. The Level 2 Toolkit for the Identification and Quantification of Mercury Releases provides a list of main source categories that a country may want to consider in the conduct of preliminary evaluation activities as shown in Table 1.0. Other sources not in the list may also be included as relevantly applicable. A Main Source Category Screening Matrix such as the one shown in Table 3.0 may be prepared to facilitate evaluation. Sources from industries, product uses, domestic activities, etc. that can potentially release mercury to one or more of the output pathways may be confirmed using the screening matrix.

Table 3.0 Mercury Main Source Category Screening Matrix

No.	Main Source Category	Air	Water	Land	Products	Wastes / Residue
1	Extraction and use of fuels/energy sources					
2	Primary (virgin) metal production					
3	Production of other minerals and materials with mercury impurities					
4	Intentional use of mercury in industrial processes					
5	Consumer products with intentional use of mercury					
6	Other intentional products/process uses (i.e. dental amalgam, manometers, etc.)					
7	Production of recycled metals ("secondary" metal production)					
8	Waste incineration					
9	Waste deposition/landfilling and waste water treatment					
10	Crematoria and cemeteries					
11	Identification of potential hot-spots	For consideration in the future, and may also be a potential mercury contaminated site				

Note: - strong presence ● - minor presence x - no presence

Following the identification of main source categories and completion of the Mercury Main Source Category Screening Matrix, processes or sub-categories within each main source category that are present in the country are then identified and evaluated for the potential presence of mercury. Each of the ten main source categories can be divided into a series of sub-categories that are described in ANNEX 2.

For each of the subcategories, a table such as the one shown in Table 4.0, indicating the main release pathways can also be prepared to facilitate investigation and evaluation. Apart

from the columns representing the various release pathways, another column is included to allow for the identification of data gathering strategies that can utilize either a point source approach (PS) or an overview approach (OW) whichever is considered to be most relevant.

Table 4.0 Sample Matrix for Mercury Source Sub-category

Source Category: 1 - Extraction and use of fuels/energy sources

No.	Source Sub-category	Air	Water	Land	Products	Wastes / Residue	Inventory Approach*
1.1	Coal combustion in large power plants						
1.2	Other coal combustion						
1.3	Extraction, refining and use of mineral oil						
1.4	Extraction, refining and use of natural gas						
1.5	Extraction and use of other fossil fuels						
1.6	Biomass fired power and heat production						
1.7	Geothermal power production						

Note: - strong presence ● - minor presence x - no presence

* PS = point source ; OW = overview

In certain sub-categories, the actual sources may be a limited number of well-defined point sources. In such cases, the point source approach is applied to estimate the total national releases from this category by calculating the sum of the mercury releases for each individual point source investigated. Settings where a point source approach may be the better option include coal fired power plants, municipal waste incinerators, chlor-alkali production and cement production, among others.

A point source approach is not always relevant, might be difficult to implement, or not appropriate for the given situation. In these cases, an overview approach can be applied instead. This approach can be used in settings where (1) releases are not confined to a specific geographical position; (2) sources where the available data are inadequate to perform an inventory with the point source approach; or (3) when the point sources are operated under very similar conditions. In the overview approach, the total national releases from the sub-category may be calculated using national activity rate numbers combined with an average mercury input factor and output distribution factors, or by extrapolating releases from a few well-documented point sources.

3.4 The 2018 Philippine Mercury Inventory

In 2015, the Philippines reported a mercury inventory that was prepared using the then prescribed Toolkit Level 1. In this update, the 2018 Philippine Mercury Inventory was prepared using the level 2 toolkit.

This updated inventory provides the annual distribution of mercury from anthropogenic sources in the Philippines for the base year 2018. The updated mercury output inventory and distribution is shown below. Primary metal production has the greatest estimated output of mercury among the source categories due to the rampant use of mercury for gold extraction by small-scale gold miners. There is also a significant output from consumer products that contain mercury. Unregulated whitening and skin products found and sold in the country contain mercury levels that are way beyond the regulation limits.

Source Category	**Mercury Output, kg/yr**						**Total releases by source category**
	Air	**Water**	**Land**	**By-pro-ducts and Impurities**	**General Waste**	**Sector specific treatment**	
Extraction and use of fuels/energy sources	2,442.9	604.1	33.8	1,028.5	6.0	332.8	**4,448 (1.62%)**
Primary (virgin) metal production	148,678.7	3,395.4	49,090.8	803.4	-	11,003.6	**212,972 (77.94%)**
Production of other minerals and materials with mercury impurities	1,003.9	-	-	478.4	5.2	956.7	**2,444 (0.89%)**
Intentional use of mercury in industrial processes	-	-	-	-	-	-	**-**
Consumer products with intentional use of mercury	753.1	30,932.6	2,516.8	-	1,675.8	26.6	**35,905 (13.14%)**
Other intentional product/process use	869.9	2,157.1	837.2	1,735.5	2,125.1	373.4	**8,098 (2.96%)**
Production of recycled metals	5.2	0.0	5.3	-	5.2	0.1	**16 (0.01%)**
Waste incineration and burning	-	-	-	-	-	-	**-**
Waste deposition/landfilling and waste water treatment	45.7	3,842.4	365.3	-	2,278.0	1,526.1	**8,057 (2.95%)**
Crematoria and cemeteries	145.1	-	1,178.8	-	-	-	**1,324 (0.48%)**
Total	**153,944**	**37,135**	**53,959**	**4,046**	**6,095**	**14,219**	**273,264**

The Philippines conducted an initial mercury inventory back in 2008 and recently in 2015. As part of the Minamata Initial Assessment, the project updated the country's mercury inventory in accordance and guidance using UNEP Toolkit for Identification and Quantification of Mercury Releases[50] as the basis for the framework. The general methodology for the inventory involves identification and data collection of activity rates of the wide-range possible mercury sources, coupled with calculations determining mercury quantities mobilized and entered the country

[50] UNEP Toolkit 2.0 ver. 1.4 (UNEP, 2017)

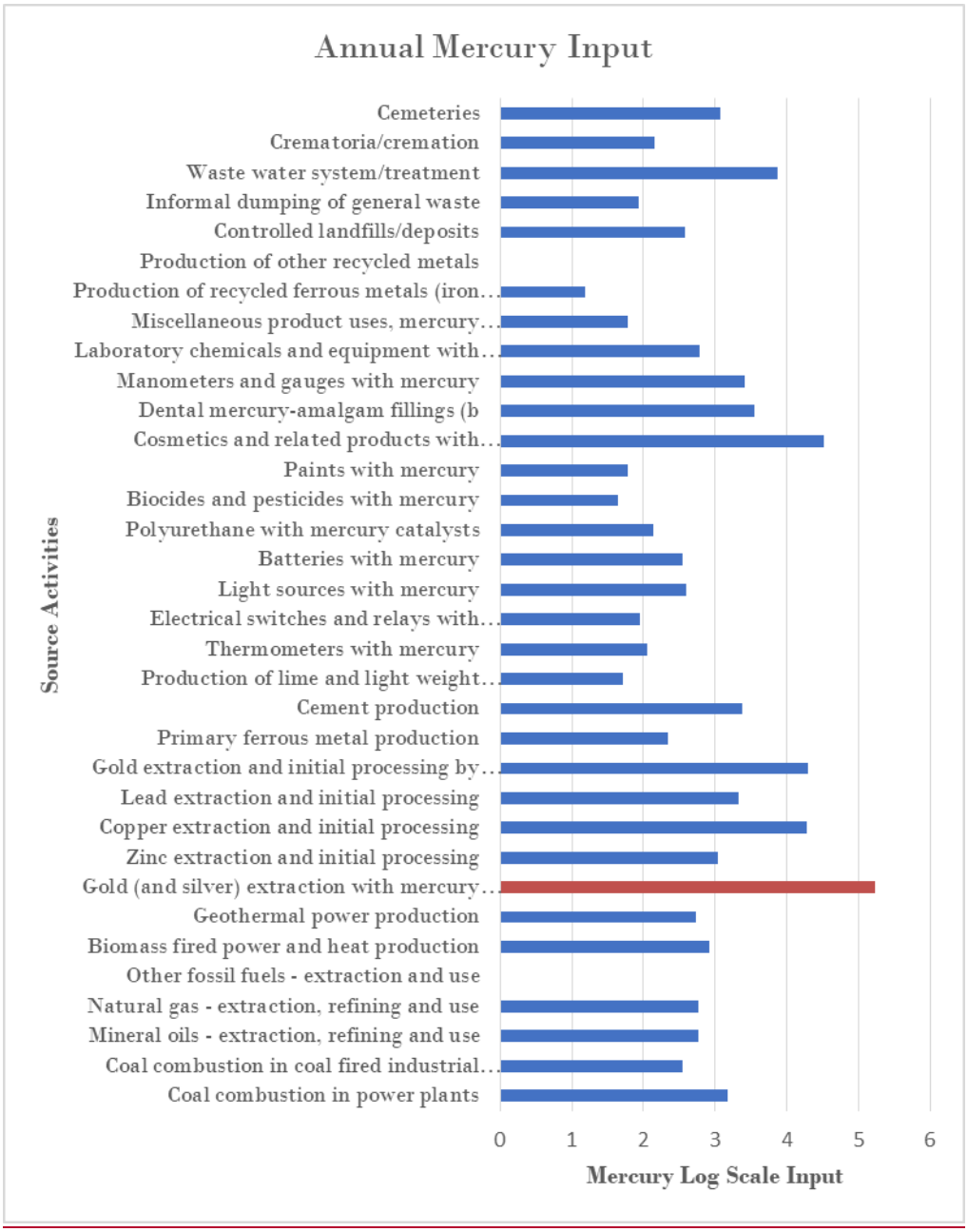
(Inputs) and the rate of mercury released into the different emissions to the environment such as iin air, land, water, as waste and in products (Output). Compared to its predecessors, the current inventory makes use of updated input and output factors from the local or regional mercury studies and UNEP Toolkit framework that enhanced the reports certainty. Moreover, the major gaps from the previous inventory that were addressed by this report from the previous inventory are the following: (1) using an input and output mercury factor for ASGM from a local published study, (2) Consideration of the impact of the mercury-containing cosmetic product in the local market; (3) activity rates that are based on population or general assumption are calculated incorporating local assumptions to increase certainty. In general, the inventory considered wider range of mercury emission sources and increased estimate certainties.

Estimated Inputs and Percentage Output Distribution

The relative annual mercury input from individual sources identified in the inventory, relative to the highest input (ASGM) is illustrated in the figure below using a log scale axis.

As shown, the source category that poses the greatest quantity of mercury release is the primary (virgin) metal production, specifically the use of mercury in artisanal small-scale gold mining (ASGM). Although there is already a ban on the use of mercury on the gold mining in the country, the extensive use mercury in recovery of gold prevails due to its cheap availability on the underground market and also due to the fact that the industry is a major subsistence source of income for the people who are living on and near mining areas. Apart from the artisanal gold-mining sector, another source stream that has a significant bulk of emission is associated with the extraction of very large volume of ore in gold mining. These ores contain a trace amount of mercury which is released to land through the mine tailings.

It is also important to highlight that there are significant and notable amount of mercury, in other consumer products/use such as mercury-containing consumer products. The prevalence of the mercury-laden cosmetic products in informal and underground market and increases the release of mercury through domestic public usage. Although there is a decrease in the sales of mercury-containing devices, significant quantity of mercury from these obsolete devices are still in stock and needs to be properly disposed. These mercury in stock are not mobilized into the environment, however there is still a chance of mercury release to the environment when breakage occurs.



The emission or output percentage profile of the mercury in the country is summarized in the figure below. Predominantly, mercury from anthropogenic processes is being released to the environment through the air and land. The inventory output key points are as follows:

- The outputs to air are dominated by the primary virgin metal production, especially the ASGM. Other notable contributors are by fuel and energy sources and production of mineral material.

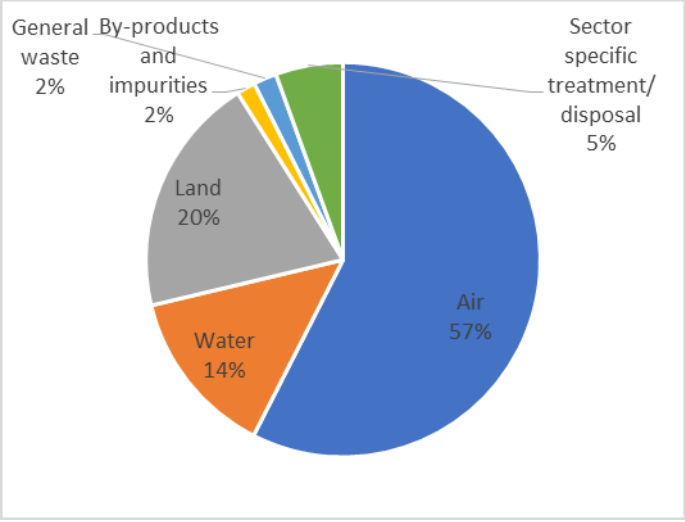
- Consumer products containing mercury makes almost half of the mercury output to water. Primary metal production, and waste deposition and water treatment contribute the other half of the emission.
- Emission on land is heavily dominated by the primary virgin metal production. Lack of mine tailing proper treatment and disposal deposits the used mercury directly on land.
- The outputs via product are mostly from the use of dental amalgam but with significant contribution from fuel/energy use and production of other minerals.
- The output to general waste is mostly from waste deposition and water treatment, and other product/process use category.

Many of estimates for 2018 report show changes from that of the 2015 report. Some of these changes are due to variation in local commercial or industrial activities, population, and policies that have taken place that could affect the use of mercury and mercury-containing products. However, there are notable specific changes that can be heavily attributed to these changes. These are:

- Changes in Energy Production and Use: The increase in use of renewable energy such as solar and wind energy to the country's energy and electricity production lowers the dependence of some region to coal power plants. As of 2017, 15% of the annual electricity consumed in the country is from renewable sources. Moreover, the decrease in operation of the country's sole natural gas production from 2016, also significantly lowers the mercury input on this source category
- Availability of Mercury-use Studies in ASGM: there have been numerous local studies of mercury use to artisanal gold mining which deals with quantification of mercury use and estimation of releases to the environment in major mining areas. This availability of local data and estimates were used in the 2018 report, increasing the certainty for this major source of mercury emission in the country compared to previous estimates.
- Inclusion of Estimates of Consumer Goods from Informal Markets: Although, there is a major phase-out of mercury-containing health devices, which is noted as the top consumer product with mercury, the current report considered the presence of smuggled cosmetic products that contains severely high concentration of mercury in its formulation. these products enter to the country in significant volume and can be easily accessed due to its cheap price and loose regulation.
- Reduction in Mercury Use in Lighting: Through government intervention, there has been a significant switch from highly mercury-based Fluorescent lights to CFL's. This switch

marked down the contribution of mercury output from this particular source, however stocks of mercury from obsolete Fluorescent lights is still significant.

- Increase of alternative burial options: There are now numerous crematoria in the Philippines which makes the option more available to the public. The increase in landscape for burial also alters the emission pathway of mercury by significantly increasing the emission on this category through air.



3.5 Mercury-Contaminated Sites

While the country's mercury inventory can provide information in terms of the volume of mercury released from various major sources and where they eventually end up in, an inventory of sites contaminated with mercury is equally useful to determine risk areas that may also require immediate action based on health and environmental assessments.

Article 12 of the Minamata Convention calls on all parties to endeavor to develop appropriate strategies and actions in identifying and assessing mercury contaminated sites. Future action plans to reduce the risks from these identified sites arising from these assessments should be done in an environmentally-sound manner, taking into account future guidance documents developed by the Minamata Convention Conference of Parties (COP) which will include various aspects pertaining to the management of mercury contaminated sites such as, but not limited to (1) site identification and characterization, (2) human health and environmental risk assessments, (3) risk management options, and (4) benefit cost analyses, among others.

During the Second Conference of Parties (COP2) meeting of the Minamata Convention held in Geneva, Switzerland on 19 – 23 November 2018, a draft guidance doumnet on Contaminated Sites was presented for consideration and further inputs from parties and stakeholders. Document UNEP/MC/COP.2/7 contains guidance on the main elements of the identification and management of contaminated sites for the reference of parties who take action to manage such sites. It provides basic information on the effects of mercury, as well as guidance on managing sites, from site identification and detailed site investigation to the decision process for site management and, where appropriate, remediation.

At present, the country has existing standard procedures in dealing with mercury spills and related accidents when they occur. The Bureau of Fire Protection mostly handles these episodes in coordination with the Department of Environment and Natural Resources (DENR). However, there is still some work to be done as far as developing standard operating procedures in identifying and assessing mercury contaminated sites to inform risk management options and other priority actions that are required. Philippine laws do not even currently provide a definition for contaminated sites.

Nevertheless, based on consultations conducted in the different regions during the course of the Philippine MIA project, various suspected contaminated sites were identified, some of which were already confirmed to have elevated levels of mercury. Table 5.0 provides an initial non – exhaustive list.

Table 5.0 List of Suspected Mercury Contaminated Sites (Hotspots)

Region		Mercury Contaminated Site
3	Central Luzon	Meycauayan River
NCR	National Capital Region	Manila Bay
4B	Southwestern Tagalog	Palawan Quicksilver Mines (confirmed)
5	Bicol	Mambulao River (confirmed) Mining sites and gold processing sites in Camarines Norte and Masbate
7	Central Visayas	Major landfills sites: 1) Brgy. Inayawan Landfill, and 2) Municipality of Consolacion Landfill
10	Northern Mindanao	Mabuhay Vinyl (confirmed)
11	Davao	Lumanggang Creek (confirmed) , Naboc River
12	Soccsksargen	T'boli, Soth Cotabato
13	Caraga	Agusan del Sur
NIR	Negros Island	Philex Gold's Bulawan Sipalay and Hinoban municipality
CAR	Cordillera Administrative Region	Dalicno, Itogon, Benguet and Licuan-Baay, Abra

In addition, the International Association of Oral Medicine and Toxicology (IAOMT) in the Philippines has also reported that dental colleges and universities also need to be assessed for elevated levels of mercury in their laboratory clinics where dental students constantly conduct dental restorative procedures using mercury amalgam as part of the requirements in their curriculum.

CHAPTER 4: ASSESSMENT OF POLICY, REGULATORY, AND INSTITUTIONAL FRAMEWORK

4.1 National Framework for the Minamata Convention on Mercury

Ratification of the Minamata Convention on Mercury by a country legally binds that country to the Convention's obligations. Therefore, it is important that a national situation analysis is carried out that identifes existing relevant domestic legislation, policies, and regulations, including current institutional structures and mechanisms. This will greatly help in the determination of potential legal and administrative actions that may be required to facilitate future implementation of the Convention. In the Philippines, the Office of the President has the mandate and responsibility to ratify all international treaties including multilateral environmental agreements such as the Minamata Convention upon concurrence of the Philippine Senate[51]. No treaty or international agreement shall be valid unless concurred by two-thirds of all the members of the Senate.

The responsibility for the implementation of the Convention, once ratified, will mostly fall upon various agencies in the Executive branch of government. These agencies, with their specific mandates and competencies, will be tasked to regulate country activities according to the agreed provisions stipulated in the Minamata Convention text which encompass a range of obligations that can be classified as control measures and support mechanisms. Important, therefore, that these agencies are institutionally capacitated and sufficiently – organized to be able to comply with the responsibilities of Convention implementation.

In support, the Legislative branch of government will strengthen the basis for implementation by promulgating national laws aligned with the country obligations in the Minamata Convention for Mercury while other relevant offices and government units may also develop and institute policies and regulations both at the national and local levels.

4.2 Policy and Regulatory Framework

In order for the country to be able to comply with the legally-binding provisions of the Minamata Convention on Mercury, relevant legislations and policies need to be in place that will support and facilitate regulatory, monitoring, and adjudicating actions implemented by the relevant government agencies. Overall, the country's regulatory framework pertaining to the protection of human health and the environment from the negative impacts of exposure to

[51] 1987 Philippine Constitution, Sec.21, Art. VII and Sec.25, Art. XVIII

chemicals and wastes is in place. At the moment it is adequate to support government efforts to comply with MEA obligations. However, nuances associated with the Minamata Convention needs to be taken into account as part of the baseline information included in the Minamata Initial Assessment (MIA) to also help assess the country's readiness for ratification and implementation. It will be noted that the information reported herein will be useful for the country in dealing with mercury concerns regardless whether the Minamata Convention is ratified or not.

According to a World Bank report in 2009[52], the Philippines, in general, has sound and comprehensive environmental laws and policies but suffers from weak implementation because of inadequate capacity and financial constraints both at the national and local levels. Several laws and regulations are already in place that deal with chemicals and other pollutants taking into account their transport and mobility in the general environment. Allied to these environmental laws are other laws that also involve some level of regulation with regard to mercury and mercury compounds.

4.2.1 Philippine Development Plan 2017 – 2022

In 2017, the Philippine Development Plan (PDP) 2017 – 2022 was developed with the main purpose of laying a stronger foundation for inclusive growth, a high-trust society, and a globally-competitive economy toward realizing, by 2040, the long-term vision described in "AmBisyon Natin". It takes off from the administration's 0 to 10 – point socioeconomic agenda on which the country's economic growth will be based. The agenda primarily focuses on creating the right environment to promote growth while investing on human capital, innovation, productivity, and resilience.

According to the country's vision embodied in "AmBisyon Natin", the Philippines by 2040 is a country that has a prosperous middle-class society where no one is poor. People live long and healthy lives and are smart and innovative. The Philippines is a high-trust society where families thrive in vibrant, culturally diverse, and resilient communities. The current PDP and the three succeeding ones will all be anchored on the common vision of a country where no one is poor, where everyone is able to live long and healthy lives, thriving in vibrant communities[53].

The ultimate goal of the PDP 2017 – 2022 is to reduce poverty incidence particularly in the agricultural sector and regions that are lagging and with high levels of inequality. At the same time, unemployment will be reduced and there will be greater trust in government and the society. It also aims to make individuals and communities more resilient against natural and

[52] The Philippines: Country Environmental Analysis. 2009. Sustainable Development Department, East Asia and Pacific Region, World Bank
[53] National Economic and Development Authority. 2017. Philippine Development Plan 2017 - 2022

human-induced risks. Innovation will likewise be encouraged to prepare the country as it moves toward a knowledge economy in order to accelerate future growth.

The specific strategies and plans outlined in the PDP 2017 – 2022 fall under three major pillars and two sets of crosscutting strategies outlined in Table 6.0.

Pillar 1: "Malasakit" – Enhancing the social fabric

Pillar 2: "Pagbabago" – Reducing inequality

Pillar 3: "Patuloy na Pag-unlad" – Increasing Growth Potential

Table 6.0 PDP Crosscutting Strategies	
Enabling and Supportive Economic Environment	**Foundations for Sustainable Development**
1. Ensuring Sound Macroeconomic Policy 2. Leveling the Playing Field through a National Competition Policy	1. Attaining Just and Lasting Peace 2. Ensuring Security, Public Order, and Safety 3. Accelerating Infrastructure Development 4. Ensuring Ecological Integrity, Clean and Healthy Environment

4.2.1.1 "Malasakit" – Enhancing the social fabric

Under this pillar, the aim is to regain peoples' trust in public institutions and cultivate trust in fellow Filipinos. Public offices will be characterized as people-centered, efficient, and clean. The administration of justice will be perceived as swift and fair. And Filipinos will have increased awareness of and will learn to value the country's cultural diversity and shared heritage.

4.2.1.2 "Pagbabago" – Reducing inequality

This pillar will focus on achieving inequality – reducing transformations especially for ordinary Filipinos. There will be more opportunities for growth in both output and income for all economic sectors, particularly those that used to lag behind such as small farmers, fisherfolk, and micro, small, and medium size enterprises (MSMEs). Individuals and people groups will be provided with more options to develop their full potential. Vulnerability of individuals will be reduced and communities will become more resilient.

4.2.1.3 "Patuloy na Pag-unlad" – Increasing Growth Potential

The PDP 2017 – 2022 is also anchored on the imperative that economic growth should be accelerated and sustained by taking advantage of the full harvest of the demographic

dividend and graduating to a knowledge economy through the advancement of science, technology, and innovation.

National Spatial Strategy

Overall implementation of the PDP will take the approach defined by the National Spatial Strategy (NSS) intended to take advantage of the country's unique geographical opportunities in terms of population and economic growth while taking into consideration the geographical developmental challenges. The NSS recognizes the comparative advantages of cities and municipalities and seeks to address spatial and socioeconomic inequalities by linking lagging regions with leading ones.

4.2.2 National Environmental Laws

In support of the PDP 2017 – 2022, particularly on the cross-cutting priorities for supporting sustainable development by ensuring ecological integrity, clean and healthy environment, listed are the various environmental laws pertinent to mercury and the Minamata Convention.

4.2.2.1 Republic Act 6969 – "An Act to Control Toxic Substances and Hazardous and Nuclear Wastes, Providing Penalties for Violations Thereof, and for other Purposes"

The short title of this major Philippine environmental law is the "Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990". The law anchors on the state policy to (1) regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment; and to (2) prohibit the entry, even in transit, of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose; and to provide advancement and facilitate research and studies on toxic chemicals.

Also known as RA 6969, this act specifically aims to:

1. keep an inventory of chemicals that are presently being imported, manufactured, or used, indicating, among others, their existing and possible uses, test data, names of firms manufacturing or using them, and such other information as may be considered relevant to the protection of health and the environment;
2. monitor and regulate the importation, manufacture, processing, handling, storage, transportation, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk or injury to health or to the environment in accordance with national policies and international commitments;

3. inform and educate the populace regarding the hazards and risks attendant to the manufacture, handling, storage, transportation, processing, distribution, use and disposal of toxic chemicals and other substances and mixtures; and prevent the entry, even in transit, as well as the keeping or storage and disposal of hazardous and nuclear wastes into the country for whatever purpose.

The main implementing arm of this act is the Department of Environment and Natural Resources (DENR), taking guidance and direction from an Inter-agency Technical Advisory Council composed of the Cabinet Secretaries from various Departments, a designated official from a member government agency, and the private sector including the Department of Health (DOH), the Department of Trade and Industry (DTI), the Department of Science and Technology (DOST), the Department of National Defense (DND), the Department of Foreign Affairs (DFA), the Department of Labor and Employment (DOLE), the Department of Finance (DOF), the Department of Agriculture (DA), the Philippine Nuclear Research Institute (PNRI), and a Civil Society Organization chosen by the President every 3 years. The Chair of the IATAC is the Secretary of DENR.

Implementing Rules and Regulations of RA 6969 (DAO 1992 – 29 ; revised by DAO 2013 - 22)

DENR Administrative Order No. 29 (DAO 1992 – 29) entitled the "Implementing Rules and Regulations for RA 6969" provides further detailed articulation regarding the specific rules and regulations to be followed in the implementation of RA 6969.

I. Powers and Functions of the DENR

- keep an updated inventory of chemicals that are presently being manufactured or used, indicating among others, their existing and possible uses, quantity, test data, names of firms manufacturing or using them, and such other information as the Secretary may consider relevant to the protection of health and the environment;
- require chemical substances and mixtures that present unreasonable risk or injury to health or to the environment to be tested before they are manufactured or imported for the first time;
- require chemical substances and mixtures which are presently being manufactured or processed to be tested if there is reason to believe that they pose unreasonable risk or injury to health and the environment;
- evaluate the characteristics of chemicals that have been tested to determine their toxicity and the extent of their effects on health and the environment;

- enter into contracts and make grants for research, development and monitoring of chemical substances and mixtures;
- conduct inspection of any establishment in which chemicals are manufactured, processed, stored or held before or after their commercial distribution and to make recommendations to the proper authorities concerned;
- confiscate or impound chemicals found not falling within the standards set by these Rules and Regulations and the said acts cannot be enjoined except after the chemicals have been impounded;
- monitor and prevent the entry, even in transit, of hazardous and nuclear wastes and their disposal into the country;
- subpoena witnesses and documents and to require other information if necessary to carry out the provisions of this Act;
- call on any department, bureau, office, agency, state university or college, and other instrumentalities of the Government for assistance in the form of personnel, facilities and other resources as the need arises in the discharge of its functions;
- disseminate information and conduct educational awareness campaign on the effects of chemical substances, mixtures and wastes on health and environment; and
- exercise such powers and perform such other functions as may be necessary to carry out its duties and responsibilities under RA 6969.
- issue summons informing respondent/s of the nature of charges against him and requiring the said respondent or respondents to appear before the Secretary or his duly designated representative for a conference for the purpose of determining whether an order for confiscation or impoundment or fine should be issued
- issue an Ex-Parte Order of confiscation or impoundment

II. Inventory of Chemical Substances

- The Secretary or his duly authorized representative shall cause the keeping, updating, compilation and maintenance of an inventory of chemical substances which are stored, imported, exported, used, processed, manufactured or transported.
- The inventory shall contain such information that the Secretary or his duly authorized representative considers to be relevant to the protection of health and the environment.

- The Secretary or his duly authorized representative shall cause the release of an updated listing of the inventory comprising the chemical substance's name and its CAS number
- Until 31 December 1993, a person shall submit to the Department for inclusion in the Philippine Inventory of Chemicals and Chemical Substances, a list of chemical substances which are currently used, sold, distributed, imported, processed, manufactured, stored, exported or transported in the Philippines in a form as may be provided by the Department.
- The person who nominates a chemical substance shall provide as much information as possible with the following minimum data:
  - chemical name
  - trade name or names chemical structure
  - CAS number
  - anticipated volume in cubic meters, or weight in tones per annum of chemicals being nominated
  - name and address of nominating person
- Chemical substances in the chemical inventory shall be regarded by the Department as existing chemical substances and, therefore, exempted from pre-manufacture and pre-importation requirements. After 31 December 1993, a chemical substance which is not included in the chemical inventory shall be considered as new chemical substance, subject to pre-manufacture and pre-importation requirements.
- Any person who falsifies information on a chemical substance while nominating an existing or new chemical substance shall be criminally liable.

III. Priority Chemical List (PCL)

- The Department shall compile and may amend from time to time a list to be known as the Priority Chemicals List.
- The Department may determine which chemical substance from the chemical inventory should be included, deleted, or excluded from the Priority Chemicals List.
- The Department shall publish in the Official Gazette or newspaper of general circulation the Priority Chemicals List and any amendments and deletions to the PCL.

- The Department may require information from any person for the purpose of assessing the public and environmental risk posed by the use, storage, manufacture, import, process or transport of the priority chemicals.

IV. Chemical Control Order (CCO)

- If the Department has determined that the use, storage, transport, process, manufacture, import or export of any new substance or a priority chemical poses an unreasonable risk or hazard to public health or the environment, the Department, may, by order published in the Official Gazette or any newspaper or general circulation a CCO to:
  - prohibit the use, manufacture, import, export, transport, process, storage, possession or sale of the chemical substance;
  - limit the use, manufacture, import, export, transport, process, storage, possession or sale of the chemical substances; or
  - place such controls or conditions on the use, manufacture, import, export, transport, process, storage, possession or sale of the chemical substance to abate or minimize risks or hazards posed by the chemical substances on public health and environment.

V. Hazardous Wastes

DAO 2013 – 22 revised the previous versions in terms of the Hazardous Wastes provisions. The revised DAO provides a detailed classification of various hazardous wastes, rules and regulations for transporters, waste treaters, storage, and disposal facilities, guidelines for storage and labeling, provisions for personnel training, importation rules of recyclable materials containing hazardous substances, export rules, monitoring mechanisms, and prohibited acts including penalties. This revision also takes into account the requirements agreed upon in the Basel Convention which the country is a party to.

Chemical Control Order for Mercury and Mercury Compounds (DAO 1997 – 38)

This CCO applies to the importation, manufacture, processing, use and distribution of mercury and mercury compounds. It also addresses the treatment, storage and disposal of mercury-bearing or mercury contaminated wastes in the Philippines, covering the following: (1) Importers and distributors, (2) manufacturers, processors and industrial users, (3) transporters, (4) treaters and disposers. The objectives of the CCO include:

- Reduce hazards to health and the environment from the use, handling, management, transport and disposal, and subsequent release and exposure to mercury.
- Establish requirements and procedures for importation (for use in commerce), transport, manufacturing, labeling, re-labeling, spill handling, emergency procedures, and proper treatment, storage, and disposal of mercury and mercury compounds as well as mercury-contaminated containers and mercury-bearing or mercury-contaminated wastes.
- Establish limitation of use of certain mercury and mercury containing substances.
- Control and regulate the disposal of mercury contaminated wastes and establish requirements so that access to, use and disposal of any mercury and mercury - containing materials will be limited to persons who have the expertise and facilities to handle these substances with minimum discharge to the environment.
- Establish a registration, monitoring and compliance program to enforce the tenets and covenants of this Order.

Other pertinent points:

- The use of mercury and mercury compounds shall be strictly limited to the following end-users and those exempted under Section VI of the CCO: Chlor-alkali plants Mining and metallurgical industries Electrical apparatus (lamps, are rectifiers, battery cells and others) Industrial and control instruments Pharmaceutical Paint manufacturing Pulp and paper manufacturing Dental amalgam Industrial catalyst Pesticides (fungicide) production or formulation
- Exempt all premises and entities which handle substances and mixtures exempt under Title II of DAO 29, Series of 1992 and industries and other users with approved exemption claims by the Department of the time period identified in the Department’s approval.
- Requirements and procedures for importers and industrial users of mercury and mercury compounds and treaters and disposers of mercury-bearing or mercury-contaminated waste.
- Disclose information immediately in cases of emergency to the Department through the Environmental Management Bureau and the concerned Department’s Regional Offices.

- Review, revise, modify, update and supplement the requirements and standards applicable to this CCO by the Department from time to time
- Promote public awareness on the beneficial use of mercury and mercury compounds accompanying hazards and risks involved in their usage and the environmental and health risks of mercury containing wastes, as well as, their proper and safe disposal.
- Regular monitoring of compliance with the requirements established in this CCO by the Department through review of reports and on-site inspection by authorized personnel of the Department.
- Any violators of the requirements specified in this CCO will be subject to administrative and criminal penalties and liabilities as specified under Title V, Chapter XI, Sections 43 and 44 of DAO 29 series of 1992 pursuant to Section 13, 14, and 15 of RA 6969.
- Provision of requirements and conditions for storage areas for mercury and mercury compounds or mercury-bearing or mercury-contaminated waste items.

4.2.2.2 Republic Act 8749 – "An Act Providing for a Comprehensive Air Pollution Control Policy and for Other Purposes (Clean Air Act of 1999)"

This legislation takes into account the role of the State to pursue a policy that balances development and environmental protection while recognizing the inherent rights of citizens to enjoy the benefits of a healthy environment. According to this law, it shall be the policy of the state to:

- Formulate a holistic national program of air pollution management that shall be implemented by the government through proper delegation and effective coordination of functions and activities;
- Encourage cooperation and self-regulation among citizens and industries though the application of market-based instruments;
- Focus primarily on pollution prevention rather than on control and provide for a comprehensive management program for air pollution;
- Promote public information and education to encourage the participation of an informed and active public in air quality planning and monitoring; and
- Formulate and enforce a system of accountability for both short and long-term adverse environmental impacts brought about by a project, program or activity, including the

setting up of a funding or guarantee mechanism for clean-up and environmental rehabilitation and compensation for personal damages.

The law also provides for the creation of an air quality management system that includes (1) an Air Quality Monitoring and Information Network, (2) Integrated Air Quality Improvement Framework, (3) Air Quality Control Action Plan, (4) Ambient Air Quality Guideline Values and Standards, (5) Emission Charge System, (6) Air Quality Management Fund, (7) Clearances and Permits for both Stationary and Mobile Sources, (8) ban on incineration, and (9) Fuels, Additives, Substances, and Pollutants.

Implementing Rules and Regulations of RA 8749 (DAO 2000 – 81)

These rules and regulations provide the guidelines for the operationalization of the Philippine Clean Air Act of 1999 or RA 8749. They are anchored on the policy of the State to maintain a quality of air that protects human health and welfare. The IRR also lays down the rights and obligations of stakeholders and the rights and duties of the people with respect to the Air Quality Management and Control Program.

Importantly, the IRR contains the country's National Ambient Air Quality Guideline Values, policies around the determination of attainment areas based on this national guideline, and regulations pertaining to the compliance with National Emission Standards. An Air Quality Management Fund, created as a special account in the National Treasury and administered by the Department of Environment and Natural Resources, is established for the following purposes:

- to finance containment, removal, and clean-up operations of the government in air pollution cases;
- guarantee the restoration of ecosystems and rehabilitate areas affected by the acts of violators of this Act;
- to support research, enforcement and monitoring activities and capabilities of the relevant agencies, as well as to provide technical assistance to the relevant agencies; and
- to fund undertakings in support of airsheds which may include:
  - purchase of equipment related to air quality monitoring, reporting or
  - management;
  - running costs for special campaigns, monitoring, enforcement or public
  - awareness raising;

- costs for special events related to air quality monitoring, enforcement etc.
- funding of temporary staff positions in accredited organizations, of persons
- who have a TOR directly related to implementation of the airshed's Air Quality Action Plans (AQAP);
- research on air related issues; and
- running costs of airshed Governing Boards and their Technical Secretariats

Permit regulations and air pollution clearances for stationary sources described in DAO 2000 – 81 state that all stationary sources of air pollution subject to the IRR must have a valid Permit to Operate issued by the Director of the Environmental Management Bureau (DENR – EMB) while new or modified sources must first obtain an Authority to Construct, likewise issued by the Director. DAO 2000 – 81 also provides for the financial liability for environmental rehabilitation through financial guarantee mechanisms outlined in the Environmental Impact Statement (EIS) system described in DAO 2003 – 30.

4.2.2.3 Republic Act 9275 – "An Act Providing for a Comprehensive Water Quality Management and for other Purposes (Philippine Clean Water Act of 2004)"

RA 9275 or the Philippine Clean Water Act of 2004 explains that the State shall pursue a policy of economic growth in a manner that is consistent with the protection, preservation and revival of the quality of our fresh, brackish and marine waters. In its capacity, government will pursue a development and regulatory framework in order to:

- streamline processes and procedures in the prevention, control and abatement of pollution of the country's water resources;
- promote environmental strategies, use of appropriate economic instruments and of control mechanisms for the protection of water resources;
- formulate a holistic national program of water quality management that recognizes that water quality management issues cannot be separated from concerns about water sources and ecological protection, water supply, public health and quality of life;
- formulate an integrated water quality management framework through proper delegation and effective coordination of functions and activities;
- promote commercial and industrial processes and products that are environment friendly and energy efficient;
- encourage cooperation and self-regulation among citizens and industries through the application of incentives and market-based instruments and to promote the role of

private industrial enterprises in shaping its regulatory profile within the acceptable boundaries of public health and environment;

- provide for a comprehensive management program for water pollution focusing on pollution prevention;
- promote public information and education and to encourage the participation of an informed and active public in water quality management and monitoring;
- formulate and enforce a system of accountability for short and long-term adverse environmental impact of a project, program or activity; and
- encourage civil society and other sectors, particularly labor, the academe and business undertaking environment-related activities in their efforts to organize, educate and motivate the people in addressing pertinent environmental issues and problems at the local and national levels.

The law provides for the creation of a water quality management system that includes (1) the identification of Water Quality Management Areas, (2) a National Sewerage and Septage Management Program, and (3) Domestic Sewage Collection, Treatment and Disposal Systems.

Implementing Rules and Regulations of RA 9275 (DAO 2005 – 10)

DAO 2005 – 10 is the IRR for RA 9275 and applies to water quality management in all water bodies for the primary purpose of abating and controlling pollution from land-based sources. This IRR also covers the disposal of effluents, sewage, and septage offsite including the disposal of industrial wastewater on land and offshore.

In efforts to operationalize RA 9275 particularly in relation to the water quality management system, the DENR, in coordination with the National Water Resources Board (NWRB), will identify specific areas as watersheds, river basins, or water resources regions taking into consideration the prevailing hydrological, hydrogeological, meteorological, and geographic conditions. Management of these areas will be done through a Governing Board composed of representatives of governors and mayors form the involved local government units (LGUs), the representatives from the relevant national government agencies, duly-registered non-governmental organizations, and the representatives from the water utility and business sectors. The National Sewerage and Septage Management Programme, on the other hand, will be implemented by the Department of Public Works and Highways (DPWH) in collaboration with the DENR, relevant LGUs, and other government agencies as needed.

A National Water Quality Management Fund is created and will be administered by the DENR in coordination with other government agencies for the purpose of financing:

- containment and clean-up operations
- restoration of ecosystems and rehabilitation of affected areas
- research, enforcement, and monitoring activities
- technical assistance to implementing agencies
- rewards and incentives
- information and educational campaign
- other disbursements made solely for the prevention, control, and abatement of water pollution and the administration of management areas

Part of the fund will be composed of fines and damages awarded to the government by the Pollution Adjudication Board (PAB), proceeds from the permitting and licensing system, donations, endowments, grants, and other contributions.

Separately, the Area Water Quality Management Fund is established for the maintenance and upkeep of water bodies included inside the identified water quality management areas. This fund will be used of the purpose of (1) granting rewards and incentives for effluent discharges whose quality is better than the water quality criteria set for the target receiving body of water, (2) loans for acquisitions, (3) repairs of facilities designed to reduce the quantity and improve the quality of wastewater discharges, (4) the regular maintenance of water bodies, and the (5) operational expenses of the Governing Board, its Secretariat, and the water quality surveillance and monitoring network.

The fees collected under the wastewater charge system, including the donations, endowment, and grants for water quality management areas will form the Area Water Quality Management Fund. The IRR provides for the implementation of the wastewater charge system in all management areas allowing for payments to be made to government for the discharge of wastewater into water bodies.

4.2.2.4 Republic Act 9003 – "An Act Providing for an Ecological Solid Waste Management Program, Creating the Necessary Institutional Mechanisms and Incentives, Declaring Certain Acts Prohibited and Providing Penalties, Appropriating Funds Therefor, and for Other Purposes (Ecological Solid Waste Management Act of 2000)"

The Ecological Solid Waste Management Act of 2000 or otherwise known as RA 9003 is anchored on the State policy that strives to adopt a systematic, comprehensive and ecological solid waste management programme, aiming to:

- ensure the protection of public health and environment;
- utilize environmentally-sound methods that maximize the utilization of valuable resources and encourage resource conservation and recovery;
- set guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures;
- ensure the proper segregation, collection, transport, storage, treatment and disposal of solid waste, implementing best environmental practices excluding incineration;
- promote research and development for improved solid waste management and resource conservation techniques;
- encourage greater private sector participation in solid waste management;
- retain primary enforcement and responsibility of solid waste management with local government units while establishing a cooperative effort with the national government and other relevant organizations;
- encourage cooperation and self-regulation among waste generators through the application of market-based instruments;
- institutionalize public participation in the development and implementation of national and local integrated, comprehensive and ecological waste management programs; and
- strengthen the integration of ecological solid waste management and resource conservation and recovery topics into the academic curricula of formal and non-formal education.

RA 9003 calls for the establishment of a national, provincial, and city / municipality level solid waste management plans under a national solid waste management framework. The framework also includes the creation of the National Solid Waste Management Commission, the Provincial Solid Waste Management Board, the City / Municipality Solid Waste Management Board, the National Ecology Center, and the Solid Waste Management Fund.

Implementing Rules and Regulations of RA 9003 (DAO 2001 – 34)

For the implementation of RA 9003, a National Solid Waste Management Commission (NSWMC) under the Office of the President is created and composed of fourteen (14) members from the government and three (3) members from the private sector including, among others, the Department of Environment and Natural Resources (DENR), the Department of Interior and Local Government (DILG), the Department of Science and Technology (DOST), the Department of Health (DOH), the Department of Trade and Industry (DTI), the Metro Manila Development Authority (MMDA), various leagues of Local Government Units (LGU), a representative from nongovernment organizations (NGO), a representative from the recycling industry, and a representative from the manufacturing or packaging industry. The main function of the Commission is to oversee the implementation of solid waste management plans and prescribe policies to achieve the objectives of RA 9003.

In order to facilitate training and education in integrated ecological solid waste management and establish and manage a solid waste management information data base, a National Ecology Center (NEC) under the NSWMC is created. The NEC will also be responsible for promoting the development of a recycling market and provide for expert assistance in pilot modeling of solid waste management facilities. On the other hand, to assist LGUs is performing their roles as the main implementer of RA 9003 within their areas of jurisdiction as pursuant to the relevant provisions of the Local Government Code of the Philippines or RA 7160, a Provincial Solid Waste Management Board (PSWMB) and a City/Municipal Solid Waste Management Board are established in each province and city / municipality to develop and oversee the implementation of a provincial and city / municipality solid waste management plans.

A Solid Waste Management Fund is also created under RA 9003 to be administered by the NSWMB. This fund is sourced from fines and penalties imposed, proceeds of permits and licenses issued by the DENR as per RA 9003, donations, endowments, grants and contributions from domestic and foreign sources and amounts specifically appropriated under the annual General Appropriations Act (GAA). The Fund shall be used to finance products, facilities, technologies and processes to enhance proper solid waste management, awards and incentives, research programs, and information, education, communication and monitoring activities, among others.

DAO 2001 – 34 also contains guidelines for the creation and implementation of a comprehensive solid waste management system, waste segregation, collection, transport

and handling of solid wastes, materials recovery facilities and composting, recycling program, operations of controlled dumpsites, operations of sanitary landfills, and financing of solid waste management initiatives.

4.2.2.5 PD 1586 – "Establishing an Environmental Impact Statement System (EIS) Including Other Environmental Management Related Measures and for Other Purposes (EIS System of 1978)"

This Presidential Decree established the EIS System based on the State policy of attaining and maintaining a rational and orderly balance between socio-economic growth and environmental protection. It provides for the declaration of environmentally – critical projects and areas upon the recommendation of the then National Environmental Protection Council (NEPC). According to the decree, no person, partnership or corporation shall undertake or operate any such declared environmentally critical project or area without first securing an Environmental Compliance Certificate issued by the President or his duly authorized representative.

Recent articulation of the EIS System places it as being primarily concerned with assessing a project's direct and indirect impacts on the biophysical and human environment, ensuring that these are addressed through appropriate measures that promote environmental protection and enhancement. Through the EIS System, project proponents are guided in incorporating environmental considerations in planning for their projects.

Proceeds from the penalties imposed under this decree and other penalties imposed by the NEPC are automatically appropriated into an Environment Revolving Fund (ERF), used exclusively for the operations of the NEPC and the National Pollution Control Commission (NPCC) for the implementation of this decree.

4.2.2.6 Presidential Proclamation 2146 – "Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of the Environmental Impact Statement System Established Under PD 1586"

Following are the guidelines under PD 2146:

A. Environmentally Critical Projects

I. Heavy Industries

a. Non-ferrous metal industries

b. Iron and steel mills

c. Petroleum and petro-chemical industries including oil and gas

d. Smelting plants

II. Resource Extractive Industries

a. Major mining and quarrying projects

b. Forestry projects

1. Logging

2. Major wood processing projects

3. Introduction of fauna (exotic-animals) in public/private forests

4. Forest occupancy

5. Extraction of mangrove products

6. Grazing

c. Fishery Projects

1. Dikes for/and fishpond development projects

III. Infrastructure Projects

a. Major dams

b. Major power plants (fossil-fueled, nuclear fueled, hydroelectric or geothermal)

c. Major reclamation projects

d. Major roads and bridges

B. Environmentally Critical Areas

1. All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries;
2. Areas set aside as aesthetic potential tourist spots;
3. Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine Wildlife (flora and fauna);
4. Areas of unique historic, archaeological, or scientific interests;
5. Areas which are traditionally occupied by cultural communities or tribes;
6. Areas frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.);
7. Areas with critical slopes;
8. Areas classified as prime agricultural lands;
9. Recharged areas of aquifers;
10. Water bodies characterized by one or any combination of the following conditions;

a. tapped for domestic purposes

b. within the controlled and/or protected areas declared by appropriate authorities

c. which support wildlife and fishery activities

11. Mangrove areas characterized by one or any combination of the following conditions:

a. with primary pristine and dense young growth;

b. adjoining mouth of major river systems;

c. near or adjacent to traditional productive fry or fishing grounds;

d. which act as natural buffers against shore erosion, strong winds and storm floods;

e. on which people are dependent for their livelihood.

12. Coral reefs characterized by one or any combinations of the following conditions:

a. With 50% and above live coralline cover;

b. Spawning and nursery grounds for fish;

c. which act as natural breakwater of coastlines.

4.2.2.7 Administrative Order 42 of 2002 – "Rationalizing the Implementation of the Philippine EIS system and Giving Authority to the Secretary of DENR, to the Directors and Regional Directors of the Environmental Management Bureau (DENR – EMB) to Grant or Deny the Issuance of Environmental Compliance Certificates (ECC)"

AO 42 further simplifies the requirements and streamlines the processing of ECC applications within the Philippine EIS System. It also officially authorizes the Secretary of DENR and the Directors and Regional Directors of the Environmental Management Bureau (DENR – EMB) to grant or deny the issuance of ECCs according to the Table 7.0.

Table 7.0 Environmental Compliance Certificate Approval Matrix

Type of Project	Endorsing Official	Approving Official	Maximum Allowed Processing Time
Environmentally – critical project	DENR – EMB Director (Central Office)	DENR Secretary	120 working days
Non-environmentally – critical projects located in environmentally – critical areas	EIA Division Chief (Central or Regional Offices)	EMB Director / Regional Director	60 working days

Not covered by the EIS System	EIA Division Chief (Central or Regional Offices)	EMB Director / Regional Director	15 working days

Implementing Rules and Regulations for PD 1586, Proclamation 2146, and AO 42 (DAO 2003 – 30)

DAO 2003 – 30 was developed to facilitate the implementation of a systems-oriented and integrated approach to the EIS system which has evolved since it was first introduced in 1978 through PD 1586. This effort was meant to ensure a rational balance between socio-economic development and environmental protection consistent with the principles of sustainable development as originally articulated in the creation of the EIS system.

The main objective of DAO 2003 - 30 is to rationalize and streamline the EIS System, making it more responsive to the demands and needs of the project proponents and the various stakeholders by having an effective project planning and management tool that is aligned with the State policy of pursuing socio-economic development while protecting the environment for future generations. The DAO clarifies the coverage of the EIS System, updating it to take into consideration industrial and technological innovations and trends. It also standardizes the requirements while simplifying procedures for processing of ECC applications, establishing measures to ensure adherence to ECC conditions.

According to DAO 2003 – 30, projects that can potentially pose significant impacts to the environment shall be required to secure Environmental Compliance Certificates (ECC) from the Department of Environment and Natural Resources. In assessing if a project falls within the scope of the EIS System, two factors are considered: (1) the nature of the project and its potential to cause significant negative environmental impacts, and (2) the sensitivity or vulnerability of environmental resources in the project area. Specifically, projects will be assessed through the following criteria.

1. Characteristics of the project or undertaking
    - Size of the project
    - Cumulative nature of impacts vis-à-vis other projects
    - Use of natural resources
    - Generation of waste and environment-related nuisance
    - Environment-related hazards and risk of accidents
2. Location of the Project

- Vulnerability of the project area to disturbances due to its ecological importance, endangered or protected status
- Conformity of the proposed project to existing land use, based on approved zoning or on national laws and regulations
- Relative abundance, quality and regenerative capacity of natural resources in the area, including the impact absorptive capacity of the environment

3. Nature of the potential impact

- Geographic extent of the impact and size of affected population
- Magnitude and complexity of the impact
- Likelihood, duration, frequency, and reversibility of the impact

Categories of projects/undertakings under the EIS system:

Category A: Environmentally Critical Projects (ECP) with significant potential to cause negative environmental impacts

Category B: Projects that are not categorized as ECPs, but which may cause negative environmental impacts because they are located in Environmentally Critical Areas (ECA)

Category C: Projects intended to directly enhance environmental quality or address existing environmental problems not falling under Category A or B.

Category D: Projects unlikely to cause adverse environmental impacts.

The DAO also provides clear guidelines on securing Environmental Compliance Certificates (ECC) and Certificates of Non-Coverage (CNC), contents of EIA Study Reports and other documents required under the EIS System, preparation of the Project Description, Environmental Impact Statement (EIS), the Programmatic Environmental Impact Statement (PEIS), and the Initial Environmental Examination (IEE) Report, as well as the Environmental Performance Report and Management Plan (EPRMP), among others.

Guidelines on monitoring projects with ECCs are likewise provided in DAO 2003 – 30 including requirements for the creation of a Multipartite Monitoring Team (MMT) especially for projects classified under Category A, self-monitoring, and third-party audits. The creation of an Environmental Guarantee Fund (EGF) is required for all co-located or single projects that have been determined by DENR to pose a significant public risk or where the project requires

rehabilitation or restoration. An EGF Committee composed of representatives from the EMB Central Office, EMB Regional Office, affected communities, concerned LGU's, and relevant government agencies identified by EMB shall be formed to manage the fund, defined by an integrated Memorandum of Agreement (MOA) among all parties involved.

4.2.2.8 Other Allied Laws, Policies, and Regulations

1. **RA 7394** – "Consumer Act of the Philippines"

    - Protect the interest of the consumer against hazards to health and safety
    - Concerned agencies will develop and provide safety and quality standards for consumer products

2. **RA 9711** – "An Act strengthening and rationalizing the regulatory capacity of the Bureau of Food and Drugs (BFAD) by establishing adequate testing laboratories and field offices, upgrading its equipment, augmenting its human resource complement, giving authority to retain its income, renaming it the Food and Drug Administration (FDA), amending certain sections of Republic Act No. 3720, as amended, and appropriating funds thereof" or the "Food and Drug Administration Act of 2009"

    - IRR as per DOH Circular 2011-0101
    - FDA is created under the DOH to assume primary jurisdiction in the collection of samples of health products and to analyze and inspect health products in connection with the implementation of RA 9711
    - Prohibit the manufacture, importation, exportation, sale, offering for sale, distribution, transfer, non-consumer use, promotion, advertising, or sponsorship of any health product that is adulterated, unregistered or misbranded
    - companies intending to manufacture, import, export, distribute, sell, offer for sale, transfer, promote and advertise products under DOH jurisdiction should secure License to operate (LTO) and product registration/notification

3. **PRESIDENTIAL DECREE NO.1144** creates the Fertilizers and Pesticides Authority (FPA) to assure the agricultural sector of adequate supplies of fertilizer and pesticide at reasonable prices, rationalize the manufacture and marketing of fertilizer, and protect the public from the risks inherent in the use of pesticides.

    - IRR as per Rules and Regulations No. 1, series of 1977

- promulgate rules and regulations for the registration and licensing of handlers of fertilizers and pesticides

4. **RA 7076** – "An Act Creating a People's Small-scale Mining Program and for Other Purposes" or the "People's Small-scale Mining Act of 1991" governs the activities surrounding the ASGM sector

    - IRR as per DAO 2015 – 03
    - promote, develop, protect and rationalize viable small-scale mining activities in order to generate more employment opportunities and provide a equitable sharing of the nation's wealth and natural resources, giving due regard to existing rights

5. **DOH AO 2008 – 0021** – "Gradual Phase-out of Mercury in All Philippine Healthcare Facilities and Institutions"

    - All hospitals shall immediately discontinue to distribution of mercury thermometers
    - All hospitals should follow the prescribed guidelines for phase-out indicate in the administrative order
    - All new healthcare facilities applying for License to Operate must submit an inventory of all mercury-containing devices used in their facilities with a corresponding minimization plan

6. **DAO 2009 – 03:** "Mandatory PNS for fluorescent lamps, CFLs, high-intensity discharge lamps, ballasts, and luminaires" (joint DTI – DOE)
7. **DAO 2013 – 09 – 001:** "Lighting Industry Waste Management Guidelines" (joint DENR – DOE) requires a programme for extended producers' responsibility to manage lamp wastes containing mercury"
8. **FPA Pesticide Circular No. 4, series of 1989** bans the importation and use of mercuric fungicides.
9. **EO 79:** "Institutionalizing and Implementing Reforms in the Philippine Mining Sector" - Ban on the use of mercury in ASGM"
10. **DAO 2005 – 02:** "Policies and Guidelines on effective and proper handling, collection, transport, treatment, storage, and disposal of health care wastes" (joint DENR – DOH)
11. **DAO 2006 – 001:** "Adopting Environmental Technology Verification Protocol (ETVP)" (joint DENR – DOST)

12. Philippine Standards: **BPS TC 04** (Lighting Industry) **and BPS TC 10** (Switches and relays)

4.2.3 Multilateral Environmental Agreements

Under international law, the main mechanisms available for countries to work together on global environmental issues are the Multilateral Environmental Agreements (MEA). These agreements form the overarching international legal basis for global efforts to address particular environmental issues[54]. They may include obligations ranging from general principles about a specific environmental issue to more definitive actions to be taken by countries that are party to the agreement. These are often driven by the United Nations given their global convening function.

To date, the Philippines is a party to a total of seventeen (17) MEAs and signatory to one[55]. Table 8.0 enumerates these global treaties, their general descriptions, and pertinent dates including status of ratification.

Table 8.0 Multilateral Environmental Agreements (MEAs) - Philippines

Treaty	Signature	Ratification	Status
Basel Convention – Transboundary Movement of Hazardous Wastes	22 Mar 1989	21 Oct 1993	Ratification
Cartagena Protocol – Biosafety	24 May 2000	5 Oct 2006	Ratification
Convention on Biological Diversity	12 Jun 1992	8 Oct 1993	Ratification
Convention on International Trade in Endangered Species of Wild Fauna and Flora	18 Aug 1981	16 Nov 1981	Ratification
Convention on Migratory Species	1 Feb 1994	1 Feb 1994	Party
Kyoto Protocol – Greenhouse Gases	15 Apr 1998	20 Nov 2003	Ratification
Minamata Convention on Mercury	10 Oct 2013		Signatory
Montreal Protocol – Ozone-Depleting Substances	14 Sep 1988	17 Jul 1991	Ratification
Nagoya Protocol – Access and benefit Sharing		29 Sep 2015	Accession
Paris Agreement – Climate Change	22 Apr 2016	23 Mar 2017	Ratification
Ramsar Convention – Welands	8 Nov 1994	8 Jul 1994	Accession
Rotterdam Convention - Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	11 Sep 1998	31 Jul 2006	Ratification
Stockholm Convention – Persistent Organic Pollutants	23 May 2001	27 Feb 2004	Ratification
United Nations Convention to Combat Desertification	8 Dec 1994	10 Feb 2000	Ratification
United Nations Framework Convention on Climate Change	12 Jun 1992	2 Aug 1994	Ratification

[54] UN Environment. 2016. Role of Multilateral environmental Agreements in Achieving the Sustainable Development Goals

[55] InforMEA initiative. UN Environment. Retrieved from https://www.informea.org

United Nations Convention on the Law of the Sea	10 Dec 1982	8 May 1984	Ratification
Vienna Convention – Law of Treaties		17 Jul 1991	Accession

4.3 Institutional Framework

The Philippines is a republic with a presidential form of government. Power is equally divided among its three branches: executive, legislative, and judicial[56]. One important thing to note in the Philippine presidential system of government is the principle of separation of powers, where legislation belongs to Congress, execution to the Executive, and settlement of legal controversies to the Judiciary. The implementation of the Minamata Convention on Mercury will be the responsibility of the government's Executive branch.

According to the 1987 Philippine Constitution, the Executive branch carries out the laws of the land. It is composed of the President and the Vice President who are elected by direct popular vote and who will each serve a term of six years. The Constitution accords the President the authority to appoint his Cabinet members who will lead the different Departments in the Executive branch. These departments form a large portion of the country's bureaucracy. Acting as the legislative branch of government, the Philippine Congress, both the Senate and the House of Representatives, confirms or rejects the President's appointments.

The Cabinet Secretaries who heads each Department, acting as the official representative of the President, execute, with his authority, the power of the Office of the President in their respective jurisdictions. The Cabinet Secretary has the power to issue directives relative to their departments' mandates. These department orders only apply to offices under the specific department within the cabinet secretary's jurisdiction. Cabinet secretaries also act as advisors to the President of the Philippines within their areas of concern.

Recognizing government's finite resources and the urgent need to orient and direct government programmes, projects, and activities toward the attainment of priority development outcomes, various Cabinet Clusters composed of the different Cabinet Secretaries as members have been established under the Office of the President in order to streamline coordination and maximize synergies while minimizing costs in delivering valuable interventions toward the thematic goals outlined in the Philippine Development Plan.

Since 2011, the Office of the President has organized its Cabinet into thematic clusters in order to ensure efficiency, effectiveness and emphasis on carrying out government plans. The five Cabinet Clusters include:

[56] Philippine Information Agency website, http://pia.gov.ph/branches-of-govt

(1) Good Governance and Anti- Corruption;
(2) Human Development and Poverty Reduction;
(3) Economic Development;
(4) Security, Justice and Peace; and
(5) Climate Change Adaptation and Mitigation

All of which reflect unique multi-dimensional development challenges that cuts across the mandates of various government agencies and offices.

Given the broad spectrum of issues and concerns surrounding mercury captured in the Minamata Convention, implementation of its provisions is expected to require extensive coordination and cooperation among different parts of the Executive branch of government, capitalizing on each parts' mandates, competencies, and expertise, similar to the nature of work being done in the Cabinet Cluster system. Below is the list of national government agencies / departments that may be involved in one way or another, whether within the Cabinet Cluster system or not, in the future implementation of the Minamata Convention on Mercury in the country. An assessment of their formal organizational structures, rules and some informal norms are provided to provide insights on current capacities and gaps to successfully implement the Convention.

4.3.1 Department of Environment and Natural Resources

The DENR is responsible for governing and supervising the conservation, management, development, and proper use of the country's environment and natural resources. It is also responsible for the licensing and regulation of all forms of natural resources as may be provided for by law, ensuring equitable sharing of the benefits derived therefrom for the welfare of the present and future generations of Filipinos57. The Department was first established on January 1, 1917 as the Department of Agriculture and Natural Resources (DANR) through the enactment of Act No. 2666 by the Philippine Commission, otherwise known as "An Act to Re-organize the Executive Department of the Government of the Philippine Islands,". On June 10, 1987, it was finally reorganized into the Department of Environment and Natural Resources by Executive Order No. 192.

In exercising its mandate over the country's natural resources such as forest and grazing lands, mineral resources, including those inside reservations and watershed areas, and lands within public domain, the Department mobilizes government resources through the different bureaus including the Biodiversity Management Bureau (BMB), Ecosystems Research and

[57] DENR website, http://www.denr.gov.ph/index.php/about-us/mission-vision

Development Bureau (ERDB), Environmental Management Bureau (EMB), Forest Management Bureau (FMB), Land Management Bureau (LMB), and the Mines and Geosciences Bureau (MGB). The combined capacities of these DENR offices support the implementation of government interventions toward the Department's 10 – point priority areas identified in 2018. These include:

- ☑ clean air
- ☑ clean water
- ☑ solid waste management
- ☑ geohazard and groundwater assessment, responsible mining
- ☑ intensified forest protection
- ☑ scaling up of coastal and marine ecosystems
- ☑ enhanced biodiversity conservation
- ☑ national greening program
- ☑ anti-illegal logging
- ☑ improved land administering and management
- ☑ Manila Bay clean-up

INSTITUTIONAL FRAMEWORK ASSESSMENT:

Among the various government agencies and offices in the Executive branch of the Philippine government, the DENR has the most experience in leading the implementation of the provisions in multilateral environmental agreements the country is officially a party to. Coordinating government efforts to comply with country obligations to most of these global environmental agreements is centralized at the Environmental Management Bureau (EMB).

Assigned the task to protect, restore and enhance environmental quality towards good public health, environmental integrity and economic viability, the DENR – EMB is directly responsible to implement programmes, projects, and regulatory activities in relation to environmental pollutants including chemicals and wastes. Its mission is to protect, restore, and enhance environmental quality toward good public health, environmental integrity, and economic viability[58].

Generally acting as the government focal point for the coordination and monitoring of the implementation including reporting of multilateral environmental agreements (MEA) involving chemicals and wastes the DENR – EMB draws from the competencies and experiences found in the different divisions within the bureau including the Environmental Quality Division, the

[58] EMB website, https://emb.gov.ph/services-2/

Environmental Impact Assessment and Management Division, and the Solid Waste Management Division, to name a few.

Over the years, the DENR – EMB has been tasked to regulate and monitor country activities in relation to the obligations surrounding the implementation of MEAs on chemicals and wastes such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants, and the Montreal Protocol on Substances that Deplete the Ozone Layer. Apart from these, the bureau is also working in the frontlines for the effective implementation of Republic Act 6969, An Act to Control Toxic Substances and Hazardous and Nuclear Wastes through DENR Department Administrative Order 2013 – 22 and the current version of the Chemical Control Order for Mercury and Mercury Compounds (DAO 1997 – 38), among other chemical control orders.

In the delivery of the functions described above, the EMB has instituted online processes according to the different registration and permitting requirements dictated by the various implementing rules and regulations (IRR) and department administrative orders (DAO). Systems such as the Priority Chemicals List registration, Pre-manufacture and Pre-importation notification, Environmental Compliance certification, Certificate of Non-coverage, Ozone-depleting Substances and Alternative Chemicals registration, Hazwaste Manifest system, Integrated POPs management and the Importation Clearance are all available online for easy access.

While these existing capacities and experiences will undoubtedly be very valuable in assessing the bureau's overall capability to also take over the responsibilities associated with the implementation of the Minamata Convention on Mercury, the wide Convention scope with the broad spectrum of focus areas across various Convention articles spanning from supply and trade, mercury-added products and industrial processes, ASGM, health aspects, R&D, emissions, and releases, to mercury wastes and contaminated sites, will require a closer and more rigorous coordination with other Departments in the Executive branch of government.

Currently, there are existing government models in inter-agency coordination that the DENR can consider such as the inter-agency technical working groups, special task forces, or even the Cabinet Cluster system which will be helpful in facilitating high-level decision making that may be required. A structure similar to the DENR's Philippine Ozone Desk (POD) that acts as the Department's focal point for all matters concerning ozone-depleting substances (ODS) around the Montreal Protocol may also be an excellent structure the Department can look at as initial

basis for the establishment of a mercury focal point office in DENR especially since other bureaus within the Department will potentially be involved in the Implementation of the Minamata Convention particularly the Mines and Geosciences Bureau (MGB).

The DENR, while acting as the overall focal point for the Minamata Convention, will also be directly responsible for certain specific articles in the Convention. These include Articles 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 18, 20, and 21. Details on specific roles based on the Convention provisions and currently – existing stakeholder capacities are listed for convenient reference.

4.3.2 Department of Health

The DOH is responsible for ensuring access to basic public health services by all Filipinos through the provision of quality health care including the regulation of all health-related services and products. The Philippine Bureau of Health was first established on June 23, 1898 and was reorganized several times in the coming decades until 1944 when Executive Order (E.O.) No. 94 was signed into law, calling for the creation of the Department of Health. The shift to the parliamentary form of government during the Marcos administration led to the transformation of the Department of Health into the Ministry of Health on June 2, 1978. On April 13, 1987, the ministry was then converted back to the Department of Health with the change in form of government at the end of the Marcos era.

The mandate of the DOH is to develop national plans, technical standards, and guidelines on health[59]. Its mission is to guarantee equitable, sustainable and quality health for all Filipinos, especially the poor, and to lead the quest for excellence in health[60]. It holds the over-all technical authority on health, being the national health policy-maker and regulatory institution of the country. Specifically, in the health sector, the Department has roles to provide leadership in health, enable and build capacity, and administer specific services. The DOH implements its programmes and projects through various bureaus and attached agencies including the Bureau of International Health Cooperation (BIHC), Bureau of Local Health Systems and Development (BLHSD), Bureau of Quarantine, Disease Prevention and Control Bureau (DPCB), Epidemiology Bureau, Food and Drug Administration (FDA), Health Emergency Management Bureau (HEMB), Health Facilities and Services Regulatory Bureau (HFSRB), Health Facilities Development Bureau (HFDB), Health Human Resource Development Bureau (HHRDB), Health Policy Development and Planning Bureau (HPDPB), and Health Promotion and Communication Service (HPCS) among others.

[59] DOH website, http://www.doh.gov.ph/profile

[60] DOH website, http://www.doh.gov.ph/mission-vision

In 2016, The Department launched the 2016 – 2022 Philippine Health Agenda developed to provide all Filipinos with (1) financial protection against high cost of healthcare, (2) attaining the best possible health outcomes, and (3) receiving the highest standard of value, respect and responsiveness from health systems.

INSTITUTIONAL FRAMEWORK ASSESSMENT:

In pursuit of its mandate to promote nationwide environmental health by preventing illnesses through managing the environment and by changing people's behavior to reduce exposure to agents of disease and injury, the Department pays close attention to environmental sanitation, environmental health impact assessment and occupational health through inter-agency collaboration. In 1991, Executive Order No. 489 institutionalized the Inter-Agency Committee on Environmental Health to provide the venue for technical collaboration, effective monitoring and communication, resource mobilization, policy review and development, and improved overall facilitation and coordination. The sectoral task forces under this inter-agency committee include (1) water, (2) solid waste, (3) air, (4) toxic and chemical substances, and (5) occupational health.

Recognizing the extent and gravity of the negative health impacts caused by exposure to toxic substances in the environment, and the importance for the country to immediately deal with the various concerns surrounding mercury as a major public health concern, the Department, in 2017, identified mercury focal points for DOH to coordinate the Department's efforts toward mitigating the negative health effects caused by mercury. This decision is aligned with the government's partnership with the World Health Organization (WHO) in support of Article 16 of the Minamata Convention on Mercury. The WHO's commitment to the implementation of the Minamata Convention includes assisting Parties to develop strategies, programmes, and plans pertaining to the health aspects associated with mercury at the national and local levels.

The assigned DOH mercury focal points are from the offices of the Health Facilities Development Bureau (HFDB) and the Disease Prevention and Control Bureau (DPCB). The HFDB provides advice on matters pertaining to health facility development, planning, standards and maintenance61. Its other functions include (1) the development of plans, policies, programs, projects, standards and strategies, and (2) providing coordination, technical assistance, capability building and consultation and advisory services related to health facility development, planning, operation and maintenance. The DPCB, on the other hand, is in charge

[61] HFDB website, http://www.doh.gov.ph/orgchart-hfdb

of (1) developing plans, policies, programs, projects and strategies, and (2) providing coordination, technical assistance, capability building, consultancy and advisory services related to disease prevention and control and health protection62.

Similar to most departments in the Executive branch of government, the DOH has regional and provincial offices that can coordinate programme implementation at the regional and provincial levels. In addition, some specific functions related to community health have also been devolved to the Local Government Units whose offices DOH can coordinate with. At the moment, DOH is implementing mercury health assessments in select ASGM communities and providing assistance in baseline data gathering in mercury contaminated sites. A critical technical capacity that DOH still needs to develop is the Department's ability to conduct analysis to determine mercury levels in hair samples.

In addition, the Department is also regulating the mercury content in cosmetic products through the Food and Drug Administration (FDA) and managing the gradual phase-out of mercury-containing devices and equipment in healthcare facilities nationwide though DOH Administrative Order 2008 – 21 through the HFDB. The HFDB is also currently leading the discussions on drafting an administrative order that will regulate mercury in dental amalgam.

The FDA is mandated to ensure the safety, efficacy or quality of health products as defined by Republic Act No. 9711 or "The Food and Drug Administration Act of 2009", which include food, drugs, cosmetics, devices, biologicals, vaccines, in-vitro diagnostic reagents, radiation-emitting devices or equipment, and household/urban hazardous substances, including pesticides and toys, or consumer products that may have an effect on health which require regulations as determined by the agency.

One unique facet of the Minamata Convention on Mercury is that it is the first time an international multilateral environmental treaty has put significant emphasis on the health concerns associated with a chemical pollutant. As such, it strongly encourages Parties to promote the development and implementation of strategies and programmes to deal with the health aspects such as those outlined in Article 16 of the Convention. This also means that it will be the first time for most health ministries of the countries party to the Convention to play a major role in the work surrounding country obligations particularly in international multilateral treaties.

The experience DOH carries with it in working closely within an inter-agency committee or working group will undoubtedly be useful moving forward. However, the Department will also need to take into account the nuances involved in coordinating activities within the context of a

[62] DPCB website, http://www.doh.gov.ph/orgchart-dpcb

multilateral agreement. Having mercury focal points this early in the game even before ratification of the Minamata Convention ahead of other government agencies is certainly helpful. For the future implementation of the Minamata Convention on Mercury, DOH can mobilize the different bureaus within its organizational structure who have the specific mandates and basic capacities to help comply with country obligations to a wide range of concerns indicated in the provisions in the Minamata Convention. DOH will be directly involved in articles 4, 7, 12, 16, 17, 18, 20, and 21.

4.3.3 Department of Labor and Employment

The DOLE is the national government agency in the Philippines mandated to formulate policies, implement and coordinate programs and services, and serve as the policy-coordinating arm of the executive branch of the government in the area of labor and employment. It assumes the primary responsibilities of (1) promoting gainful employment opportunities and optimizing the development and utilization of the country's manpower resources; (2) advancing workers' welfare by providing for just and humane working conditions and terms of employment; (3) maintaining industrial peace by promoting harmonious, equitable, and stable employment relations that assure equal protection for the rights of all concerned parties; and (4) enforcing the provisions of the Labor Code of the Philippines63. The Department was founded on December 8, 1933 via the Act No. 4121, renamed as the Ministry of Labor and Employment in 1978, and back to the Department of Labor and Employment in 1986.

The Department operates through various bureaus namely the Bureau of Local Employment (BLE), Bureau of Labor Relations (BLR), Bureau of Working Conditions (BWC), Bureau of Workers with Special Concerns (BWSC), International Labor Affairs Bureau (ILAB), National Reintegration Center for OFWs (NRCO); and attached agencies such as the Occupational Safety and Health Center (OSHC) and the Professional Regulation Commission (PRC), among others.

The 2017 – 2022 Philippine Labor and Employment Plan64 (LEP) is still currently under development. It is expected to take off from the current administration's 10 – point economic agenda and other mutually – reinforcing development plans and strategies from various sectors and development partners. The LEP will focus on the four pillars of (1) employment, (2) Labor Relations, Labor Standards, and Social Dialogue, (3) Social Protection, and (4) Governance.

INSTITUTIONAL FRAMEWORK ASSESSMENT:

[63] DOLE website, https://www.dole.gov.ph/pages/view/7

[64] Report on the On-going Process Toward Developing the Philippine labor and Employment Plan (LEP) 2017 – 2022. International Labor Organization website, http://www.ilo.org/manila/country/WCMS_523524/lang--en/index.htm

One of DOLE's attached agencies, the Occupational Safety and Health Center (OSHC) was established by Executive Order No. 307 in 1987 to protect Filipino workers against accidents and illnesses and promote workers' welfare through effective programs that enhance productivity, workers well-being and afford social protection to its client sector. Some of its functions include (1) planning, developing and implementing occupational safety and health training programs, (2) formulating policies and standards on occupational safety and health matters, (3) issuance of technical guidelines for prevention of occupational disease and accidents, and (4) functioning as the national authority for research and training on matters pertaining to safety and health at work, among others.

For the implementation of the Minamata Convention, OSHC will be specifically dealing with provisions outlined in Article 5 on Mercury-added Products (MAPs), Article 7 on National Action Plans for ASGM, Article 12 on Mercury Contaminated Sites, Article 16 on monitoring workplace conditions as part of government's health program under Mercury Health Aspects, and Article 18 on Public Awareness, Training, and Education. In relation to these articles, the programmes and projects currently being implemented by OSHC include:

1. monitoring and assessment of workplace conditions in the ASGM sector
2. managing the Chemical Safety Information Network(CSIN)
3. issuance of technical guidelines for prevention of occupational disease and accidents
4. providing occupational safety and health trainings

Although the contributions OSHC has to make in accordance with most of the articles mentioned above are already more or less a part of the regular programme the office is currently implementing, it will be helpful in facilitating inter-agency coordination and increased focus on outcome / output delivery, to designate an agency mercury focal point with a corresponding work plan, similar to that in the DOH. The mercury focal point can likewise provide proper attribution and highlight agency contributions to the efforts aligned with the Minamata Convention on mercury.

Particularly referring to the concerns around mercury in dental amalgam under Article 5, The Professional Regulation Commission (PRC), also an attached agency of DOLE, will need to take an active role in facilitating the removal of the use of mercury in dental universities / schools as part of the dental curriculum. While there are anecdotal data indicating that most dentists in the country no longer use mercury dental amalgam in their dental practice, schools still continue to require students to handle mercury since it is still part of the dentistry licensure examination.

The Professional Regulation Commission (PRC) is mandated to implement a reliable, trustworthy and progressive system of determining the competence of professionals by credible and valid licensure examinations and standards of professional practice that are globally recognized. Under the supervision of the PRC are the forty-three Professional Regulatory Boards (PRB) which exercise administrative, quasi-legislative, and quasi-judicial powers over their respective professions. These PRBs were established by separate enabling laws and perform their functions subject to the review and approval of the PRC. These include the (1) preparation of the contents of licensure examinations, (2) determine, prescription, and revision of course requirements, (3) adoption and enforcement of a Code of Ethics for the professional practice, (4) issuance, renewal, suspension, revocation, of Certificates of Registration and professional licenses as provided by law, and (5) recommendation of measures necessary for advancement in their fields.

4.3.4 Department of Energy

The DOE is mandated to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the government relative to energy exploration, development, utilization, distribution and conservation65. Through this mandate, the Department shall improve the quality of life of the Filipino by formulating and implementing policies and programs to ensure sustainable, stable, secure, sufficient, accessible and reasonably-priced energy. The DOE was initially created through Presidential Decree No. 1206 which created the Ministry of Energy with the National Power Corporation (NPC) and Philippine National Oil Company (PNOC) as attached agencies. In 1992, the Department was re-established as a Department due to Republic Act No. 7638 otherwise known as the Department of Energy Act of 1992.

Within the Department, various bureaus such as the Energy Policy and Planning Bureau (EPPB), the Energy Resource Development Bureau (ERDB), the Energy Utilization and Management Bureau (EUMB), the Oil Industry Management Bureau (OIMB), the Electric Power Industry Management Bureau (EPIMB), Renewable Energy Management Bureau (REMB), Energy Research Testing and Laboratory Services (ERTL), and the Information Technology and Management Services, among others, work toward the achievement of the 2012 – 2030 Philippine Energy Plan (PEP). Attached agencies like the PNOC, the NPC, and the National Electrification Administration (NEA) also contribute to the implementation of the PEP. The plan is anchored on three important principles, namely, (1) ensure energy security, (2) pursue

[65] DOE website, https://www.doe.gov.ph/transparency/mandate-mission-and-vision

effective implementation of energy sector reforms, and (3) implement social mobilization and cross-sector monitoring mechanisms[66].

INSTITUTIONAL FRAMEWORK ASSESSMENT:

The important role that the Department of Energy will play in the implementation of the Minamata Convention on Mercury may not be immediately apparent until we pay attention to the mercury that is found as impurities in fossil fuel and in the oil and gas sector (emissions) as well as the mercury found in energy-efficient lighting products (wastes).

In 2009, the Energy Research Testing and Laboratory Services of DOE (DOE – ERTLS) and the Bureau of Product Standards of DTI (DTI – BPS) developed the joint administrative order No. 09 – 03 requiring the mandatory adoption of the Philippine national standard for fluorescent lamps, compact fluorescent lamps (CFLs), high intensity discharge lamps, ballasts, and luminaires to promote energy efficiency as part of the Department's Philippine Efficient Lighting Market Transformation Program (PELMATP). Furthering the campaign for energy efficiency in lighting, in 2013, the Department started implementation of the ADB – funded Philippine Energy Efficiency Project where 13 million compact fluorescent lamps (containing mercury) were distributed to homeowners and businesses. The project also retrofitted government office buildings and public lighting systems with efficient lighting.

Anticipating the increased stress placed on the domestic waste stream with busted compact fluorescent lamps containing mercury, the Department then collaborated with the DENR to develop the joint administrative order No. 2013 – 09 – 0001, introducing the Lighting Industry Waste Management Guidelines. This, and the previously discussed joint administrative order with DTI, constitute concerns captured in two separate articles in the Minamata Convention, Article 4 on MAPs and Article 11 on Mercury Wastes. Just as DOE was instrumental in the increased presence of mercury in lighting products in the pursuit of energy efficiency, its role will also be crucial in facilitating the phase out of CFLs (and other mercury-containing lamps) according to the Convention - agreed phase-out67 deadline of 2020.

Although fossil fuels are in general not covered by the Minamata Convention, the mercury impurities found in coal used in coal-fired boilers and power plants contribute to mercury emissions discussed in Article 8 of the Convention. While the approach is not to prohibit the use of coal in these facilities but instead to utilize appropriate BAT/BEP technologies to reduce mercury emissions, DOE can contribute through Article 19 by promoting clean and toxic free energy alternatives.

[66] 2012 – 2030 Philippine Energy Plan. DOE website, https://www.doe.gov.ph/pep/philippine-energy-plan-2012-2030

[67] Minamat Convention on Mercury, Annex A

Similar to the OSHC, DOE mostly needs only to continue supporting its ongoing energy programmes and priorities in order to help comply with obligations in the Minamata Convention. Intensifying research and technology development focused on clean and toxic-free energy technologies is recommended in order to reduce mercury emissions from the energy sector in the long run. Of particular interest given their potential to help reduce mercury emissions and releases into the environment while promoting sustainable sources of energy are the ERTLS and the Renewable Energy Management Bureau (REMB).

The ERTLS under the DOE is tasked to formulate policies, plans and programs in support of exploration and development of indigenous energy resources as well as to promote energy efficiency through research and scientific, physical and calibration testings. The REMB, on the other hand, formulates and implements policies, plans and programs related to the accelerated development, transformation, utilization and commercialization of renewable energy resources including emerging energy technologies. Designating a mercury focal point in the Department is also advised in order to facilitate coordination.

4.3.5 Department of Trade and Industry

This Department is tasked to be the main economic catalyst of the country that enables innovative, competitive, job – generating, inclusive businesses, and empowers consumers at the same time. It helps intensify private – sector activity leading to accelerated and sustained economic growth through (1) comprehensive industrial growth strategies, (2) progressive and socially – responsible trade liberalization and deregulation programs and (3) policy interventions designed for the expansion and diversification of both the country's domestic and foreign trade. On October 4, 1947, Executive Order No. 94 created the Department of Commerce and Industry. The Department was later separated into 2 groups, the Department of Industry established by PD 488 on June 21, 1974 and the Department of Trade on June 2, 1975 by PD 721. It was then reorganized into the Ministry of Trade and Industry on July 27, 1981 to be later converted back to the Department of Trade and Industry on February 27, 1987 by Executive Order No. 133.

In 2017, Department Order No.17-35 defined seven functional groups within the Department. These are the Office of the Secretary (OSec), the Competitiveness and Ease of Doing Business Group (CEODBG), the Consumer Protection Group (CPG), the Industry Development and Trade Policy Group (IDTPG), the Management Services Group (MSG), the Regional Operations Group (ROG), and the Trade and Investments Promotion Group (TIPG). Bureaus and attached agencies such as the Board of Investments (BOI), the Bureau of

Philippine Standards (BPS), and the Bureau of Import Services (BIS) are placed strategically under one of the seven functional groups headed by a DTI Undersecretary.

This rejuvenated organizational structure allows the Department to effectively pursue the goals they have set out to achieve under the Prosperity for All Plan 2022 (PAP)68. This plan capitalizes on the learnings and successes the Department has had in the past and takes guidance and direction from Ambisyon 2040 spearheaded by the National Economic Development Authority (NEDA) and the Philippine Development Plan 2017 – 2022. In the PAP, the Department's goals are three-fold: (1) Scale-up selected globally competitive industries to be world market leaders; (2) Grow innovative and competitive MSMEs with strong brands that contribute significantly to the national economy; and (3) Heighten consumer vigilance for quality and safe products and services from responsible suppliers.

INSTITUTIONAL FRAMEWORK ASSESSMENT:

DTI's role in the implementation of the Minamata Convention can mainly be seen in Article 4 (Mercury-added Products) and Article 5 (Manufacturing Processes) where the Department can support government efforts to reduce / eliminate mercury in products and mercury used in processes through the issuance of product standards and business licenses. These two articles cover provisions related to products and processes, containing mercury or using mercury during the manufacturing process, managed by private sector players participating in the domestic market.

Article 4 of the Minamata Convention lists down the different MAPs that need to be phased out by 2020 (Part I, Annex A of the Minamata Convention). The Bureau of Product Standards (DTI – BPS) under the Consumer Protection Group (CPG) of DTI can support the country's phase-out plan by developing, promoting, and implementing standards and related programs nationwide in relation to MAPs. Development of standards to prohibit products containing mercury to enter the domestic market is can prove to be an effective reinforcing instrument in preventing the re-entry of unwanted MAPs after the phase-out period.

The Convention also requires the phase out of mercury use in certain industrial manufacturing processes while restricting mercury use in others. Through the business registration process being implemented by the DTI, applications from industries and other business entities that do not comply with national regulations aligned with the provisions in Article 5 of the Minamata Convention can be denied. The current business registration process

[68] DTI website, http://www.dti.gov.ph/resources/presentations

allows for other agencies like the DENR, DA, and DOH, depending on the type of business, to issue clearances before applying for registration.

Similar control measures should be mirrored by the Philippine Economic Zone Authority (PEZA) in monitoring the operations of the manufacturing and service facilities inside PEZA special economic zones (ECOZONE). These functions can be housed in the Enterprise Regulation and Support Service Group in charge of enterprise regulation and environmental safety.

Authority over the ECOZONEs is given to the PEZA, created to operate, administer, manage and develop the ECOZONE according to the principles and provisions set forth in the Special Economic Zone Act69. In its function to uphold environmental standards, the PEZA, in coordination with appropriate government agencies, shall implement, established policies and guidelines to ensure environmentally and socially acceptable development of industrial areas in the respective ECOZONES under its jurisdiction. Specific regulations to protect and conserve environmental quality in the ECOZONES as may be promulgated by the PEZA shall be consistent with those of the national government and shall aim to maintain the water and air quality standards established by the DENR.

Given DTI's foreseen participation in the effective implementation of government control measures consistent with the provisions in the Minamata Convention, a mercury focal point in the Department is not necessarily essential. However, it will still be crucial for DTI to actively contribute as a member of inter-agency technical working groups that may be established.

4.3.6 Department of Interior and Local Government

The Executive branch of the government extends beyond the national level. According to Article X, Section 4 of the constitution, the President of the Philippines is also mandated to supervise local governments throughout the country. However, because of Republic Act No. 7160, otherwise known as the Local Government Code of 1991, local governments enjoy relative autonomy from the national government in matters concerning primary health, social welfare, and information services, solid waste disposal systems or environmental management systems, infrastructure facilities such as roads, bridges, school buildings, health clinics, sewerage, traffic lights, road signs, public markets, slaughterhouses, public cemeteries, tourism facilities, cultural centers, public parks, playgrounds, and sports facilities and equipment, police and fire stations and municipal jails.

[69] PEZA website, http://www.peza.gov.ph/index.php/about-peza/special-economic-zone-act

The DILG is overall responsible for promoting peace and order, ensuring public safety, and strengthening capability of local government units for the effective delivery of basic services to the citizenry through active people participation and a professionalized corps of civil servants[70]. The history of the Department traces back to 1897 when the Department of the Interior was among the first Cabinet positions of the proposed revolutionary Philippine government. Executive Order No. 383 abolished the Interior Department in 1950, with its functions transferring to the Office of Local Government under the Office of the President. The Department was renamed as the Ministry of Local Government in 1982 and the Department of Local Government in 1987. Republic Act 6975 reorganized Department of the Interior and Local Government in 1990 and placed the Philippine National Police, Bureau of Fire Protection, Bureau of Jail Management and Penology and the Philippine Public Safety College under its administration and supervision.

Among the functions the Department is mandated to carry out include assisting the President in the (1) overall supervision of local governments, (2) promulgation of policies, rules, regulations and other issuances in relation to local government supervision, public order and safety, local autonomy, and community empowerment, (3) formulation of plans, policies, programs, and coordination mechanisms that addresses local emergencies arising from natural and man-made disasters, and (4) organization, training and capacity development of a police force that is national in scope and civilian in character.

INSTITUTIONAL FRAMEWORK ASSESSMENT:

In relation to national laws aligned with the mercury control measures developed by the Minamata Convention particularly pertaining to the flow, trade, and use of mercury described in Articles 3, 4, 5, 7, and 11, the DILG's role is mainly to support government agencies in the apprehension of violators and confiscation of mercury contraband. The Philippine National Police (PNP) is the lead office under the DILG that delivers this function. The PNP is mandated by Philippine law to enforce the different national and local laws, prevent and control crimes, maintain peace and order, and ensure public safety and internal security with the active support of the community.

The DILG can also potentially support the implementation of Article 18 on Public Information, Awareness and Education by capacitating and empowering local government units (LGUs) and helping them disseminate valuable information at local level.

[70] DILG website, http://www.dilg.gov.ph/page/Vision-Mission/20

4.3.7 Department of Education

The Department of Education is tasked to formulate, implement, and coordinate policies, plans, programs and projects in support of both formal and non-formal basic education71. The DepEd provides for the establishment and maintenance of a complete, adequate, and integrated system of basic education relevant to the goals of national development. In administering its functions, it supervises all elementary and secondary educational institutions, both public and private, including alternative learning systems (ALS). In January 1901, by virtue of Act No. 74. The Taft Commission established the Department of Public Instruction in the Philippines. A few years later in 1908, the Philippine Legislature approved Act No. 1870 that established the University of the Philippines.

After the Second World War, the Commonwealth Government of the Philippines established the Department of Instruction in February 1945. This was later renamed the Department of Education by Executive Order No. 94. During Martial Law, the Department was named the Department of Education and Culture and later reorganized into the Ministry of Education and Culture in June 1978 by virtue of Presidential Decree No. 1397. Subsequently, the Education Act of 1982 created the Ministry of Education, Culture and Sports under a parliamentary form of government which later became the Department of Education, Culture and Sports in 1987 via Executive Order No. 117. In 1994, the Commission on Higher Education (CHED) under the office of the President and the Technical Education and Skills Development Authority (TESDA) under DOLE were created to respectively supervise tertiary degree programs and non-degree technical-vocational programs focused on post-secondary, middle-level manpower training and development.

The Governance of Basic Education Act in 2001 renamed the DECS to the Department of Education which redefined the role of field offices, regional offices, division offices, district offices, and schools. The administration of cultural and sports activities were transferred to the National Commission for Culture and the Arts (NCCA) and the Philippine Sports Commission (PSC), both under the Office of the President. Streamlined now to deliver its mandate related to basic primary and secondary education, the DepEd is organized and composed of various offices, bureaus, and attached agencies such as the Bureau of Curriculum Development (BCD), the Bureau of Human Resources and Organizational Development (BHROD), the Bureau of Learning Resources (BLR), and the National Museum of the Philippines. Together, they protect and promote the right of every Filipino to quality, equitable, culture-based, and complete basic education aligned with the goals in the PDP 2017 – 2022.

[71] DepEd website, http://www.deped.gov.ph/mandate

INSTITUTIONAL FRAMEWORK ASSESSMENT:

Being the government agency responsible for basic education, the DepEd is in the position to help implement the provisions in Article 18 of the Minamata Convention on Public Information, Awareness, and Education. Having recently instituted the K-to-12 curriculum, where the country's previous 10-year pre-university cycle was updated to the globally – recognized standard 12-year program found to be the best period for learning under basic education in order to equip learners with appropriate skills, creativity, and intelligence to cope with a rapidly – changing world, the Department has created the platform to promote innovative learning approaches with diverse yet relevant learning content, delivered during a learner's critical pre-tertiary formative years.

Consistent with the goal of providing well-rounded and relevant basic education to Filipinos, strengthening the K-to-12 learning materials with information about the role of chemicals, including mercury, to support society's present lifestyle and the negative impacts brought about by inadequate chemicals and wastes management to human health and the environment, will not only empower the youth and other marginalized sectors but also importantly, equip future leaders and members of society to help sustain the expected gains from the implementation of the Minamata Convention.

To facilitate the incorporation of learning content about mercury and to institutionalize it into K-to-12 curriculum in support of the goals of the Minamata Convention, the Department can take advantage of the experience and existing capacities of the Bureau of Curriculum Development (BCD) and the Bureau of Learning Resources (BLR), among others. Two of the important functions of the BCD are to (1) develop national curriculum standards for basic education and to (2) design and develop special curriculum programs appropriate for all types of learners. The BLR, on the other hand is primarily in charge of providing learning resources aligned to the curriculum and supportive of the various curriculum programs and modes of delivery, including those for learners with special needs. In conjunction, the Bureau of Learning Delivery (BLD) can support these efforts by virtue of its function as the DepEd's arm in (1) developing standards for learning management and delivery systems that consider diversity of learners and their contexts and (2) designing learning management and delivery models for different learning groups / types of learners in accordance with the learning system where the learners are engaged.

Apart from the regular curriculum, the Department can also look at the Alternative Learning System as a vehicle for promoting information about mercury, reaching the most vulnerable.

Effective coordination with the DENR and the DOH will be crucial for DepEd to be able to play its important role in support of the country's efforts toward Minamata Convention implementation. While, a mercury focal point may not necessarily be need, DepEd participation in inter-agency work in relation to the Convention is recommended.

4.3.8 Department of Science and Technology

The DOST is mandated to provide central direction, leadership and coordination of scientific and technological efforts, ensuring that the results are geared and utilized in areas of maximum economic and social benefits for the Filipino people72. The Department's Eleven-point agenda73 prioritizes research and development (R&D) activities to address pressing national problems, enhance productivity and improve management of resources, and generate and apply new knowledge and technologies across sectors. Utilization of R&D results will be maximized through technology transfer and commercialization.

The Department was established in 1958 as the National Science Development Board and was reorganized as the National Science and Technology Authority (NSTA) in 1981, given broader policy-making and programme – implementing functions. The NSTA was then elevated in 1987 to cabinet-level status with the signing of Executive Order 128, and was renamed as the Department of Science and Technology74.

Unlike other departments in the Executive branch of the Philippine government, DOST has an organizational structure uniquely its own, composed mainly of planning councils like the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), research and development institutes such as the Metal Industry Research and Development Center (MIRDC), collegial and scientific bodies namely the National Academy of Science and Technology (NAST) and the National Research Council of the Philippines (NRCP), and scientific and technological services like Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and the Philippine Science Highschool System (PSHS). All these offices make up the DOST internal structure that delivers various functions including (1) formulation and implementation of a National Science and Technology Plan, (2) promotion and undertaking of scientific and technological research and development, including technological services, vital to the country's development, and (3) development of indigenous technology and the adaptation and innovation of suitable imported technology up to commercial stage, among others.

[72] DOST website, http://www.dost.gov.ph/transparency/about-dost/mandate-mission-and-vision

[73] DOST website, http://www.dost.gov.ph/transparency/about-dost/strategies

[74] DOST website, http://www.dost.gov.ph/index.php/transparency/about-dost/history-and-logo

INSTITUTIONAL FRAMEWORK ASSESSMENT:

In the Minamata Convention, the role of DOST as the nation's steward with regard to scientific and technological efforts toward sustainable development will potentially play a big part in ensuring that the provisions under Article 10: Environmentally – sound Interim Storage of Mercury Other than Mercury Wastes, Article 12: Contaminated Sites, and Article 14: Capacity-building, Technical Assistance, and Technology Transfer are taken into account during implementation. This is consistent with the DENR – DOST joint administrative order No. 2006 – 01 on Adopting Environmental Technology Verification Protocol (ETVP) where DOST is recognized as the national authority responsible for technology review and the verification process of new and modified environmental technologies.

DOST's national agenda in relation to research and development includes a focus on technology development and transfer directed at nation-building based on government's development plans. The work is mostly carried out by the Department's various planning councils and research institutes such as the PCIEERD and MIRDC, to name a few. Their contributions to Article 10 may be in the form of additional technical information and knowledge pertaining to parametric values critical for the design of environmentally – sound mercury storage facilities including operational protocols. Research on risk management options involving remediation of mercury contaminated sites can further capacitate government in delivering action plans based on the identified national approach to mercury contaminated sites discussed in Article 12 of the Convention.

Overall, the DOST can also look after the country's efforts to facilitate the evaluation, transfer and potential pilot operation and roll out of environmental technologies according to Article 18 of the Convention in collaboration with DENR, DOE, DOH and other relevant government agencies. With particular interest on mercury and the associated control measures explained in the Convention text, the International Technology Cooperation Unit (ITCU), in consultation with offices like the Industrial Technology Development Institute (ITDI) and PCIEERD, can potentially represent the Department in planning, discussion and implementation of matters relating to foreign technical cooperation with respect to the Minamata Convention.

1. For the period until 2013, the ITDI has completed projects such as:
2. Bioremediation of Mercury Contaminated Sites
3. Modification of Natural Zeolite for Industrial Separation Process
4. The PCIEERD, during the same period, reported results in studies like:
5. Assessing Biosorption Performance of Water hyacinth (E. crassipes) and other Aquatic plants in Cleaning Mine Tailings

6. Development and Testing of Coco Peat Filter Bed for Treatment of Heavy Metals
7. Rehabilitation of mercury-contaminated gold mining sites in South Cotabato and Sultan Kudarat Provinces
8. Development of an Alternative Technologies for Small-Scale Gold Mining in CARAGA and South Cotabato Region

4.3.9 Department of Finance

The DOF is primarily responsible for (1) the formulation, institutionalization and administration of fiscal policies, (2) generation and management of the government's financial resources, (3) supervision of the revenue operations of all local government units, (4) the review, approval and management of all public – sector debt, and the (5) rationalization, privatization and public accountability of corporations and assets owned, controlled or acquired by the government. It is the government's steward of sound fiscal policy, ensuring the funding of critical government programs that promote welfare among Filipinos and accelerate economic growth and stability75.

The Department was founded on April 24,1897 by the Philippine Revolutionary Government. A few years later, the Department of Finance and Justice was formally organized as one department in 1901 by virtue of an act passed by the Civil Service Commission. By 1916, the department was split into two separate departments through the Reorganization Act No. 2666 of the Philippine Legislature. With the adoption of a parliamentary form of government, the Department was converted into a Ministry in 1974. Finally, in 1987, it was again reverted back to a Department with its organizational structure, distribution of powers and functions, and coordination mechanisms streamlined.

Apart from the seven functional groups inside the Department, The DOF also supervises bureaus, agencies and government corporations such as the Bureau of Internal Revenue (BIR), the Bureau of Customs (BOC), and the Securities and Exchange Commission (SEC).

INSTITUTIONAL FRAMEWORK ASSESSMENT:

The Bureau of Customs (BOC) under the DOF is the country's frontline agency responsible for customs administration76 which includes (1) border protection against smuggling, illicit activities, and fraud, (2) trade facilitation through an informed compliance program, and (3) lawful revenue collection, among others. Its role in the implementation of the Minamata Convention will be prominent particularly in Article 3, 4, and 11 which involve transboundary

[75] DOF website, http://www.dof.gov.ph/index.php/about/who-we-are/
[76] BOC website, http://customs.gov.ph/mission-and-vision/

movement of mercury, mercury compounds, MAPs, and mercury wastes as defined by the Convention.

The Enforcement and Security Services - Environmental Protection Unit (EPU – ESS) under the Enforcement Group (EG) of the BOC police authority to secure the country's ports and BOC installations, particularly protecting against illicit trade and smuggling activities that negatively impacts the environment. It has the right of supervision and police authority over all seas within the jurisdiction of the Philippines and over all coasts, ports, airports, harbors, bays, rivers, and inland waters.

This unit has extensive experience in coordinating with DENR with regard to the implementation of environmental laws and international treaties involving illegal chemical, wastes, and wildlife trades. It is a member of the Regional Enforcement Network (REN) established by the United Nations Environment Programme to promote collaboration among customs offices across the region. Given its crucial role in preventing illegal movement and trade of mercury consistent with the objectives of the Minamata Convention, it is recommended that the EPU – ESS actively participates as a member of whatever inter-agency working group that may be created to facilitate coordination among agencies for the implementation of the Minamata Convention.

The DOF also has a potentially critical role to play in the implementation of Article 5 of the Convention. In this article, Parties to the Convention are prohibited to use mercury in certain identified manufacturing processes, and at the same time restricting / minimizing use in others. While the DTI is responsible for business registration, the DOF is in charge of providing registration for partnerships, corporations, and cooperatives. Through this mechanism, the Securities and Exchange Commission (SEC) and the Cooperative Development Authority (CDA), both attached agencies of the DOF can deny applications from industries and other business entities that do not comply with national regulations aligned with the provisions in Article 5 of the Minamata Convention.

4.3.10 Office of the President

4.3.10.1 Philippine Information Agency

The Philippine Information Agency (PIA) is the country's chief information arm tasked to provide an effective channel for the efficient flow of information between the government headed by Office of the President and the citizenry, facilitating (1) the dissemination of public information about government programs, projects, and services required by the Filipino public to assist them in decision making for the improvement of the overall quality of life as

well as (2) the free expression of their opinions, views and beliefs that can be presented to government77. The Department of Information was created in 1972 and later reorganized as the Ministry of Information, with the incorporation of the national media production center (NMPC). It was later converted to the office of Media Affairs and in 1986, the Philippine Information Agency through Executive Order No, 100. In 1987, the PIA was attached to the Office of the Press Secretary by virtue of Executive Order No. 297. The office of the Press Secretary was reorganized and renamed the Presidential Communications Operations Office in 2010 where PIA is among the 11 agencies under its supervision.

Under the Office of the PIA Director General, 9 divisions and units coordinate and implement the agency's activities in accordance with their overall programme of work in relation to advocacy, communications and media planning, communications research, creative production and events management, and news monitoring and issues management, among others. Currently, the PIA has 16 Regional Offices and 72 Provincial Information Centers in charge of planning, implementation and evaluation of the region's work programs in accordance with the agency's priority thrusts and directives in program areas and core services including, but not limited to IEC production and dissemination, communication research, institutional development and support to Presidential visits.

The PIA, in collaboration with the different government agencies and through their regional offices can assist in the implementation of Article 18, particularly in relation to the provisions on Public Information and Awareness.

4.3.10.2 Technical Education and Skills Development Authority

The Technical Education and Skills Development Authority (TESDA), under the Office of the Cabinet Secretary, is the government agency mandated to manage and supervise technical education and skills development (TESD) in the country. Republic Act 7796, also known as the "Technical Education and Skills Development Act of 1994" integrated the functions of the former National Manpower and Youth Council (NMYC), the Bureau of Technical-Vocational Education of the Department of Education, Culture and Sports (BTVE-DECS) and the Office of Apprenticeship of the Department of Labor and Employment (DOLE) into one office.

TESDA sets directions, promulgates relevant standards, and implements programs toward a quality-assured and inclusive technical education and skills development and certification system. Through the conduct of researchers and studies, stakeholders are

[77] PIA website, http://pia.gov.ph/about-us

enabled to make informed decisions in relation to TESDA's role as the national authority in technical vocational education and training (TVET). With quality information, TVET policies and plans are formulated and serves as the blueprint for TVET implementation in the country leading to the best jobs-skills-fit. Standards setting and systems development efforts such as the Compentency Standards Development, the Competency Assessment and Certification, the Unified TVET Program Registration and Accreditation System, and the Ladderized Education Program emphasizes TESDA's role in the TVET sector in ensuring quality.

Core to TESDA is the direct training provision the agency carries out through four training modalities, namely, school-based, center-based, enterprise-based and community-based. These are conducted in 57 TESDA - administered schools, 60 training centers, enterprise-based training through DTS / Apprenticeship and community-based training in convergence with the LGUs.

While DepEd can potentially lead government efforts in relation to Article 18 targeting efforts toward formal education structures within the K-to-12 and ALS frameworks, TESDA, in parallel, can take charge of implementing similar interventions but within their areas of jurisdiction focused on the TVET.

4.3.10.3 Fertilizer and Pesticide Authority

The Fertilizer and Pesticide Authority (FPA) is tasked to assure adequate, safe and affordable supply of fertilizers and pesticides, rationalize the manufacture and marketing of fertilizers, protect the public from risks inherent pesticides and educate the agricultural sector on the proper use of these inputs. The agency's many functions include (1) licensing to handlers, (2) import control, (3) product quality and safety, (4) fertilizer and pesticide product registration, (5) stewardship programme, and (6) public information.

Currently also under the Office of the Cabinet Secretary, the FPA aims for improved quality of life for all Filipinos through increased farm incomes, productivity and food production using safe and appropriate fertilizer and pesticide inputs78. In 1973, Presidential Decree No. 135 created the Fertilizer Industry Authority (FIA). In 1977, the government abolished the FIA and created the Fertilizer and Pesticide Authority by virtue of P.D. 1144, attaching it to the Department of Agriculture. Executive Order No.165 eventually transferred the FPA to the Office of the President under the Office of the Presidential Assistant for Food Security and Agricultural Modernization (OPAFSAM) on May 2014.

[78] FPA website, http://fpa.da.gov.ph/index.php/about-us/vision-mandate

The FPA can potentially join other relevant government agencies in the implementation of the provisions stated in Article 4 of the Minamata Convention, particularly on the phase-out and future prohibition of mercury – containing pesticides and related agricultural inputs.

4.4 Regulatory and Institutional Framework Assessment – Readiness for Implementation

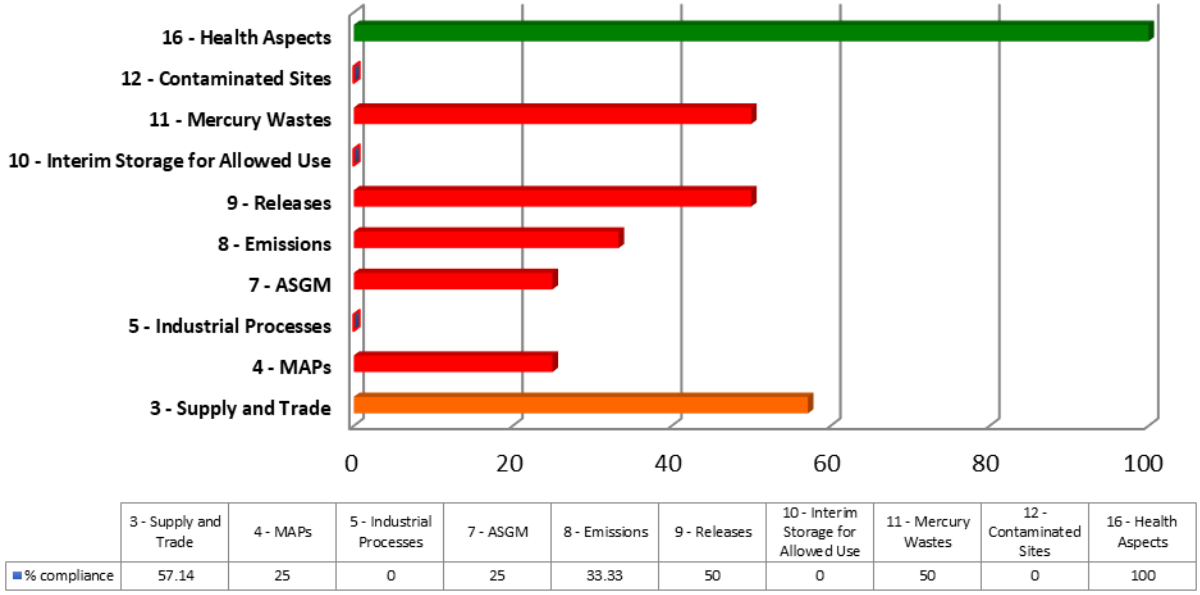
While the Philippines already has a set of laws that are relatively sound and comprehensive compared to many other nations as far as environmental protection is concerned, there are still some areas that need to be addressed in order for these laws to be able to adequately contribute to the successful compliance with country obligations specified in the Minamata Convention on Mercury and Mercury Compounds.

Overall, the current regulatory framework does provide a certain level of control in terms mercury trade, mercury in products and equipment used by consumers, mercury in waste streams, and mercury use in industry. Above all, the provisions detailed in DAO 1997 – 38 particularly zero in on concerns specific to mercury and mercury compounds. However, these need to be updated in areas such as:

1. Prohibited Use and Exemptions
2. Importation of Mercury and Mercury Compounds
3. Phase out of Use, Distribution, and Storage, Manufacture, and Importation of Mercury, Mercury Compounds, and Mercury-Added Products

ANNEX 3 of this report provides more details on the assessment including identified gaps and indication of readiness for ratification. Ways to determine readiness for implementation of the Minamata Convention on Mercury may include assessments of the (1) presence of relevant institutional structures; and (2) extent of compliance with important provisions in the Convention. In Table 9.0, a quantitative measure as an indication of the country's readiness for implementing the Minamata Convention on Mercury, focused on the Convention's control measures is presented. Figure 5.0 illustrates the readiness of the existing regulatory framework to implement the Convention.

Figure 5.0 Regulatory Readiness for the Implementation of the Minamata Convention on Mercury



	3 - Supply and Trade	4 - MAPs	5 - Industrial Processes	7 - ASGM	8 - Emissions	9 - Releases	10 - Interim Storage for Allowed Use	11 - Mercury Wastes	12 - Contaminated Sites	16 - Health Aspects
% compliance	57.14	25	0	25	33.33	50	0	50	0	100

>= 80%
>= 50% but < 80%
< 50%

Table 9.0 Summary of the Country's Readiness for Ratification		
Article 3 Mercury Supply Sources and Trade	Provisions in this article aims to limit the sources of mercury available for use and trade, and specify procedures to follow where such trade is still allowed.	
Important Provisions	**Policy and Regulatory**	**Institutional**
Not allow new primary mercury mining	none	DENR - MGB
Phase out existing primary mercury mining within 15 years	none	DENR - MGB
Prevent the import and use of mercury from primary mercury mining for artisanal and small-scale gold mining (ASGM)	present	DENR - EMB DENR – MGB DOF - BOC
In accordance with Article 3.5(b), restrict the import and use of excess mercury from decommissioning chlor-alkali plants, and require environmentally sound disposal	present	DENR - EMB DOF - BOC
Obtain information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/yr	present	DENR - EMB
Not allow the export of mercury unless the importing country provides written consent, the mercury is for an allowed use or environmentally sound storage, and all other conditions of Article 3.6 are met	none	DOF - BOC

Not allow the import of mercury without government consent, ensuring both the mercury source and proposed use are allowed under the Convention (and applicable domestic law)	present	DENR - EMB DOF - BOC
% Compliance	4 out of 7	7 out of 7
	57.14%	**100%**

Article 4 Mercury – added Products	Provisions in this article aims to limit the sources of mercury available for use and trade, and specify procedures to follow where such trade is still allowed.

Important Provisions	**Policy and Regulatory**	**Institutional**
Not allow the manufacture, import, and export of products listed in Part I of Annex A, following the phase out date in Annex A of the Convention	partial	DENR – EMB DTI – BPS
Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A of the Convention	partial	DENR – EMB DOH
Prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products	none	DENR – EMB DTI – BPS
Discourage the manufacture and distribution of mercury-added products not covered by any known use before the Convention entered into force	none	DENR – EMB DTI – BPS
% Compliance	1 out of 4	4 out of 4
	25%	**100%**

Article 5 Manufacturing Processes in which Mercury or Mercury Compounds are used	The control measures in this article are designed to prohibit or restrict mercury use in manufacturing processes as an important step in reducing global mercury demand.

Important Provisions	**Policy and Regulatory**	**Institutional**
Not allow the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B of the Convention, following the Annex B phase out date	none	DENR - EMB
Restrict (as specified in the Annex) the use of mercury in the processes listed in Part II of Annex B of the Convention	none	DENR - EMB
Not allow new facilities to use mercury in the regulated processes under Article 5, as specified in Annex B of the Convention	none	DENR - EMB
For facilities with processes listed in Annex B of the Convention, identify and obtain information on mercury or mercury compound use; and control mercury emissions to air, and releases to land and water	none	DENR - EMB
Discourage new uses of mercury in industrial processes	none	DENR - EMB
% Compliance	0 out of 5	5 out of 5
	0%	**100%**

Article 7 Artisanal and small-	A Party must determine if ASGM in its territory is “more than insignificant” and develop and implement a NAP in accordance with Annex C of the

scale Gold Mining	Minamata Convention text.	
Important Provisions	**Policy and Regulatory**	**Institutional**
Reduce, and where feasible, eliminate mercury and mercury compound use, emissions (to air), and releases (to land and water) associated with ASGM.	present	DENR - MGB
Establish a coordinating mechanism and delineate agency roles for development/implementation of an ASGM National Action Plan (NAP)	none	DENR - MGB
Define and formalize or regulate ASGM consistent with the Convention	partial	DENR - MGB
Eliminate whole ore amalgamation, open burning of amalgam or processed amalgam, burning of amalgam in residential areas, and cyanide leaching of mercury-laden sediment, ore or tailings (the “worst practices”)	none	DENR - MGB
Set mercury use reduction goals or targets consistent with the timely elimination of the worst practices and other use reduction efforts	none	DENR - MGB
Reduce mercury emissions, releases, and exposures associated with ASGM, and prevent mercury exposures of vulnerable populations (particularly women of child-bearing age and children)	none	DENR - MGB
Prevent the diversion of mercury and mercury compounds from other sectors to ASGM, and manage mercury trade consistent with the NAP	none	DENR - MGB
Implement a public health strategy to address mercury exposures to ASGM miners and communities	partial	DENR - MGB
% Compliance	2 out of 8	8 out of 8
	25%	100%
Article 8 Emissions	The objective of this article is to reduce mercury emissions to air from five of the most significant source categories identified during the Convention negotiations.	
Important Provisions	**Policy and Regulatory**	**Institutional**
Require best available techniques/best environmental practices (BAT/BEP) or associated emission limit values (ELVs) for new facilities (as defined in Article 8.2c of the Convention)	none	DENR - EMB
Require one or more measures identified in Article 8.5 to control/reduce mercury emissions from existing sources listed in Annex D, which shall be operational at the source within 10 years	none	DENR - EMB
Require monitoring/reporting and/or otherwise establish a mercury emissions inventory for sources listed in Annex D of the Convention	present	DENR - EMB
% Compliance	1 out of 3	3 out of 3
	33.33%	**100%**
Article 9	This article aims to reduce mercury releases to land and water from sources	

Releases	not already addressed by the other provisions of the Convention.

Important Provisions	Policy and Regulatory	Institutional
Require reporting and/or otherwise obtain information as needed to identify significant sources of mercury/mercury compound releases to land or water, and to maintain an inventory of releases from the sources identified	present	DENR - EMB
Require one or more measures specified in Article 9.5 to control/reduce mercury and mercury compound releases to land and water from significant sources a country identifies	none	DENR - EMB
% Compliance	1 out of 2	2 out of 2
	50%	**100%**

Article 10 Environmentally-sound Interim Storage of Mercury Other than Mercury Wastes	The Convention requires countries to take measures to ensure the environmentally-sound storage of mercury that is held in various locations prior to its intended allowed use in order to prevent the possible adverse effects the stored mercury may cause.

Important Provisions	Policy and Regulatory	Institutional
Ensure interim mercury storage is conducted in an environmentally sound manner, taking into account guidelines to be developed by the Conference of the Parties (COP)	none	DENR - EMB
% Compliance	0 out of 1	1 out of 1
	0%	**100%**

Article 11 Mercury Wastes	Provisions in this article are focused on the environmentally-sound management (ESM) of mercury wastes and controls over their transboundary movement.

Important Provisions	Policy and Regulatory	Institutional
Use a definition of mercury waste consistent with Article 11.2 of the Convention	none	DENR – EMB
Manage mercury wastes in an environmentally sound manner, taking into account guidelines developed under the Basel Convention and in accordance with COP requirements to be developed	present	DENR – EMB
Restrict mercury derived from the treatment or re-use of mercury waste to allowed uses under the Convention or environmentally sound disposal	none	DENR – EMB
Require transport across international boundaries in accordance with the Basel Convention, or if the Basel Convention does not apply, consistent with international rules, standards, and guidelines	present	DENR – EMB
% Compliance	2 out of 4	4 out of 4
	50%	**100%**

Article 12 Contaminated Sites	This article calls for the creation and adoption of guidance in approaching mercury contaminated sites. It is essentially a set of capacity building provisions, with governments largely left to their own devices in developing

	the legal framework, and the financial and technical capability to support preferred risk management options and their measures.

Important Provisions	Policy and Regulatory	Institutional
Develop strategies for identifying and assessing mercury/mercury compound contaminated sites	none	DENR - EMB
If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate	none	DENR - EMB
% Compliance	0 out of 2	2 out of 2
	0%	**100%**

Article 16 Health Aspects	This article provides guidance to health ministries on the activities they can undertake to minimize the mercury exposure of vulnerable populations, and the adverse consequences of such exposures.

Important Provisions	Policy and Regulatory	Institutional
Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines	present	DOH
Promote occupational exposure educational and prevention programs	present	DOH
Promote prevention, treatment, and care services for affected populations	present	DOH
Strengthen institutional and professional capacities for addressing health risks associated with mercury exposure	present	DOH
% Compliance	4 out of 4	4 out of 4
	100%	**100%**

CHAPTER 5: POPULATIONS AT RISK AND GENDER DIMENSIONS

5.1 The Artisanal and Small-scale Gold Mining Sector

The Philippines is host to some 500,000 individuals[79] and their families whose main livelihood is derived from extracting gold in artisanal and small-scale gold mining (ASGM) sites found in more than 30 different provinces around the country. Among these small-scale miners, 75% are engaged in subsistence mining, 15% are small individual or family businesses, while the remaining 10% are established commercial mining firms[80]. The informal gold miners and processors in the country's ASGM communities often are displaced agricultural workers and fisher folk who have very few options in terms of alternative livelihood, driving them to resort to rudimentary gold mining activities for income generation in the rural communities where they live. In 2009, studies have suggested that around 18,000 women and children in ASGM communities[81] are in some way involved in gold mining activities. Using the same ratio, the estimated number may have already reached at least 30,000 at present. A report released by the International Labor Organization (ILO) in 2011 has estimated the number of children working in mines and mining offices for all types of minerals in the Philippines to roughly 20,000[82]. Overall, ASGM in the Philippines is believed to directly and indirectly support the livelihood of 2.3 million people.

Based on consolidated resource inventory data provided by mining companies in the country, the Philippines reportedly has an estimated gold deposits of around 5 billion metric tons[83] from 40 different provinces. The country is ranked third among countries in the world with the highest density of deposits per square kilometer land area. On average, ASGM contributed to an estimated 75% (~25 MT/year) of the annual gold production[84] of the Philippines from 2000 to 2009. However, this volume could be higher given that most of small-scale gold mining is operated without a license, and some of their production not reported.

[79] Philippine Extractive Industries Transparency Initiative (EITI) Country Report, Volume 2, 2015

[80] Mining Industry Report, University of Notre Dame, Business on the Frontlines IV, 2012

[81] International Labor Organization Press release, 10 June2009 posted at www.haribon.org.ph

[82] 2011 Survey on Children, accessed from http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---ilo manila/documents/meetingdocument/wcms_184097.pdf

[83] National Strategic Plan for the Phase-out of Mercury in Artisanal and Small-scale Gold Mining in the Philippines, 2012

[84] Mining Industry Statistics, Mines and Geosciences Bureau, Department of Environment and Natural Resources, 2015 and the USGS Minerals Yearbook 2000 – 2009, accessed from http://minerals.usgs.gov/minerals/pubs/commodity/gold/index.html#myb

In recent years, data from the Mines and Geosciences Bureau (DENR – MGB) indicated a noticeable decrease in gold production from the ASGM sector, 36% drop in 2011, 94% in 2012, and 39% in 2013. This sudden drop coincided with the government's policy reform initiatives to strengthen the implementation of laws governing small-scale mining such as the Executive Order 79[85] that aims to harmonize all mining laws in the country. These efforts by the government to impose stricter measures have inadvertently pushed the informal miners outside of the government radar, thus promoting illegal trade and other unsustainable practices such as the use of mercury in mining practices and the proliferation of several forms of social and economic injustices in the form of (1) gender related inequalities, (2) human rights violations, and (3) inadequate child protection among other issues relating to human and environmental insecurities.

The socio-economic conditions in rural ASGM communities present a complex set of development challenges that are closely linked to health, culture, environmental, and human security concerns[86]. Inadequate infrastructure, weak forms of social services, and the absence of economic opportunities are just a few of the reasons that promote the proliferation of unsustainable mining practices. With grave repercussions to both health and the environment, these practices that fulfill an immediate subsistence need is not only short-term in nature but also create an additional barrier that prevents these communities from lifting themselves out of poverty. Clearly there is a need to re-examine the policy and regulatory framework surrounding the ASGM industry and identify stronger implementation strategies and approaches.

To assist this sector, the Department of Environment and Natural Resources (DENR), together with the Department of Health (DOH), has, in the past, collaborated with the United Nations Industrial Development Organization (UNIDO), through the financial support of the Global Environment Facility (GEF), to implement the project on ***Improving the health and environment of artisanal gold miners by reducing mercury emissions***. Through the participation of local government units and civil society, both health trainings and technical capacity building to introduce the use of mercury-free processing technologies were conducted. DOH was able to conduct health assessments through bio-monitoring studies while DENR was able to draft the revised chemical control order for mercury in line with the provisions in the Minamata Convention on Mercury.

[85] Official Gazette of the Philippines, accessed from http://www.gov.ph/2012/07/06/executive-order-no-79-s-2012/

[86] Monroy, T. 2016. Artisanal and Small-scale Gold-mining (ASGM) in the Philippines: A Review of the Legal and Regulatory Environment Affecting the Implementation of a Mine-to-Market Approach to "Responsible Gold"

More recently, the International Labor Organization, through the financial support provided by the United States Department of Labor (USDOL), has implemented the ***CARING GOLD Mining project*** in collaboration with BAN Toxics. The project was designed to address child labor and poor working conditions in the ASGM sector.

In 2019, UN Environment and UNIDO will jointly implement the GEF GOLD project in the Philippines, in partnership with Mines and Geosciences Bureau (DENR – MGB) to ***Contribute to the elimination of mercury in ASGM by applying a value chain approach from the miners to the refiners***.

5.2 Consumers of Mercury-added Products

Mercury and mercury compounds are among the thousands of chemicals found in consumer products in the Philippines. These chemicals are used in the production of the food we eat, the items we wear, use, and play on a daily basis. So much so that the risk to human exposure of Filipino consumers has greatly compounded. While not all chemicals are harmful to man and environment, some, like mercury, are extremely toxic. Unfortunately, progress in the proper management of chemicals and the products that contain them has not been sufficient even at the global level, massively contaminating the environment due to long – range transport, leading to the impairment of the health and welfare of millions[87].

Dealing with chemicals in consumer products pose unique challenges as far as human exposure is concerned[88]. Due to the wide proliferation of consumer products in the Philippine market, the chemicals they contain are able to reach out to a large population within a short amount of time. Mercury in glass thermometers used to be a common item in Filipino households as well as in health facilities and schools. Mercury in lighting products are still hugely common nationwide. Moreover, mercury in consumer products is often subject to close contact with consumers almost on a daily basis. Cosmetics, for instance, are one of those products whose utility requires their direct contact with the human body. In the Philippines, cosmetic products are still allowed to contain up to one part mercury in one million parts (1 ppm), as according to the ASEAN Cosmetic Directive being implemented by the Food and Drug Administration (FDA).

After commercialization and once adverse health effects are discovered, removing these toxic chemicals from products or prohibiting their use in manufacturing processes can prove

[87] UN Environment, Strategic Approach to International Chemicals Management (SAICM)

[88] Li, D. and S. Suh. 2018. Health risks of chemicals in consumer products: A review. Environment International 123 (2019) 580–587

to be an enormous task, requiring serious political will and cooperation of various sectors most especially the industries whose bottomlines may be detrimentally affected. Mercury has been used in dental restorative procedures in the Philippines for decades, exposing patients, the dentists, and even the students who are required to demonstrate their ability to handle the chemical before being allowed into the profession. To date, the Philippines has yet to phase out the use of mercury in dental clinics, schools, and universities.

More importantly, consumers of these mercury – containing products are vulnerable to the various levels of risks associated with exposure to the chemical because of lack of information and transparency that can aid decision making as to which product to consume. Situations such as these demonstrate a crucial gap in promoting the rights of every individual to the highest attainable standard of health, right to a healthy natural and working environment, right to know, and ultimately, the right to life. In 2014, the Philippine Commission on Human Rights pointed out that the right to chemical safety encompasses broad and pressing aspects in people's lives such as consumer protection, occupational safety, and food security[89].

Toward the end of its life cycle, mercury in consumer products often find itself in municipal solid waste streams due to lack of information and poor waste management practices. Through this route, mercury ends up in landfills and dumpsites, eventually contaminating ground water, finding its way back to general circulation through urban water systems, village communal water resources, and irrigation. Mercury that enters the sewerage system ends up in important water bodies, contaminating ecosystems, bioaccumulating in marine animals and working its way up the food chain.

Mercury-added products (MAPs) in the Philippines are mostly imported from outside of the country. The 2018 Mercury Inventory provides an estimate of the amount of mercury entering national borders through the MAPs.

5.3 Agricultural and Industrial Workers

Industry workers are also at risk to exposure to mercury particularly in the workplace. Mercury is used in many industries and the Minamata Convention on Mercury has highlighted a number of them that needs to be discontinued according to specified timelines outlined in ANNEX B and according to Article 5 of the Convention. These include chlor-alkali and acetaldehyde production processes using mercury catalysts. There are also a number of other chemical processing petrochemical plants that may use mercury in their processes.

[89] Philippine Commission on Human Rights. 2014. The People's Right to Chemical safety: A 15 – point Human Rights Agenda

Other industries where workers may be exposed to mercury are facilities that utilize instruments and equipment parts such as switches, gauges, thermostats, regulators, and high-intensity lamps. Mercury can also be found in facilities where electrical equipment, and automotive parts are manufactured. Workers in medical, dental, or other health services who work with equipment that contains mercury and dental amalgam are likewise vulnerable.

In the Philippines, the Occupational safety and Health Center (OSHC) has recently recommended an amendment to the threshold limit value (TLV) for mercury in the workplace from 0.05 to 0.025 mg/m^3.

Workers in the agriculture sector, on the other hand are susceptible to the impacts of mercury through possible exposures to the pesticides they use. Although mercury in pesticides and fungicides have been disallowed in the Philippines since the 1980s, monitoring of new formulations with regard to mercury content has been weak.

One persistent concern with regard to workers' exposure to mercury and mercury compounds is still prevalent in the infomal sectors such as the ASGM (discussed in a previous section) and the electronic waste recycling.

5.4 Gender Aspects

While there are some studies indicating some level of disparity in terms of health effects of mercury to men and women, results are highly inconclusive. However, in terms of risk to exposure, data have shown that men are mostly vulnerable in the workplace environment with certain exceptions in the artisanal and gold mining sector (ASGM) where mercury amalgam smelting may be operated by women miners or the wives of miners.

Countries such as the Philippines need to provide special attention for women given their lozalized societal role and exposure risks. A review of the country's Gender and Development (GAD) framework may reveal gaps related to mercury and mercury compounds. Communication and advocacy directed at women can also benefit whole communities given women's influence in decision-making particularly in relation to their children, product purchases, family diet and food consumption.

CHAPTER 6: PUBLIC AWARENESS AND UNDERSTANDING

6.1 General Mercury Awareness

As one of the enabling project components of the GEF project entitled “Development of Minamata Initial Assessment (MIA) in the Philippines”, the Philippine Minamata Initial Assessment Project Unit held a nationwide information drive concerning the use, handling and disposal of mercury and mercury-contaminated products and also disseminating key information to the different stakeholders about the Minamata Convention.

With a major objective of building national capacities toward implementation of future obligation, the project unit organized information drive activities targeted at different stakeholders who are both directly and indirectly involved in mercury use in the Philippines. These stakeholders include Local Government Units and Agencies, policy developmenrs and enforcers, mercury-using industries and the general public. The campaign includes a series of awareness-raising symposium around the country, dissemination of the Information, education and communication materials and a launch of an informational video about the project.

6.2 Awareness-raising Programmes

With its goal of disseminating awareness about the health and environmental consequences of mercury and raise awareness of the public about the Minamata Convention, the project unit held a National Awareness -raising program last November 2018 to capacitate agency regional offices in facilitating the simultaneous region-wide awareness raising activities. During the two-day workshop, the participants were familiarized with mercury characteristics, sources and uses, health and environmental impacts, mercury management, and the Minamata Convention through the engagement of national key persons on mercury management in the country.

Awareness raising materials and modules for the nationwide roll-out of the awareness programme were streamlined. The module to be discussed includes the major topics: Mercury and its characteristics, Health Effect of Mercury and Mercury-related health issues and policies, Usage and disposal of Mercury-containing products, Environmental effect of mercury and mercury-related environmental issues and policies, and Emergency response for mercury contamination.

With different target stakeholders, the materials were tailored for each of the stakeholders and each awareness raising activity to optimized information relay and understanding.

A total of 38 activities nationwide was held, each of the activities capturing a specific stakeholder depending on identified mercury-related activities on the region. Alongside the information drives, information materials such as information boards regarding the basic information about mercury use and its hazard and the Minamata Conventions were disseminated to raise local community awareness.

6.3 Training and Capacity Development

The project unit held different training and capacity development activities that were stakeholder specific. These include different regional consultations for industry players and grassrrots users and stakeholder and mercury inventory for policy enforcers.

Several National and Regional Consultations for Minamata Initial Assessment in the Philippines were conducted. The consultations were used as venue for collecting significant data and information straight from the different mercury-use players as well as a dialogue and information dissemination about the convention. Four legs of consultations were done across the country: NCR and Southern Luzon, Visayas, Mindanao and Northern and Central Luzon. These consultations were attended by different stakeholders ranging from government officials, policy enforcers, industries using mercury-containing materials and local mineral miners.

Consequently, to capacitate the country of proper monitoring mercury use, series of training on the use of UNEP Toolkit for mercury inventory was held to capacitate the forefront policy implementers. To better understand the cycle and use of mercury, government agencies were trained to create a comprehensive data base of mercury data using UNEP ToolKit 2.0 ver. 1.4 to have a useful data for policy making. Moreover, the standard methodology used in creating database will produce an inventory that would be comparable to the member states of the Convention which can be also use in strengthening policies of the convention.

To be able to reach and understand the mercury-use cycle in the country, identified mercury-use hotspots, such as gold-mining sites, were visited to have a first-hand accounts of the activities. The engagement also gave an opportunity to raise awareness to the individuals that directly use mercury as source of living with the hazard that it poses.

Though limited, the project was able to involve major stakeholder in its awareness raising activities and capacity building. One of the major outputs that should be enhanced even after the project will be the mercury database and data collection.

CHAPTER 7: CHALLENGES, AND OPPORTUNITIES

Successful implementation of the provisions in the Minamata Convention on Mercury entails important capacities to be in place at the national level, taking into account the specific needs in each relevant sector affected by mercury and mercury use. Some of these capacities include:

1. Comprehensive regulatory framework addressing mercury issues in its entire life cycle
2. Institutional framework that is operational and also facilitates multi-agency and multi-sectorial coordination, data collection, knowledge sharing, and dealing with socio-economic implications
3. Technical capabilities to ensure the effective discharge and implementation of (1) government regulatory functions in relation to mercury, (2) sector plans to phase-out the use of mercury and mercury compounds in products and processes, (3) specific industry monitoring activities, and (4) risk management strategies particularly when dealing with mercury contaminated sites
4. Financial latitude to support strategies, programmes, projects, services, and awareness-raising activities for the mitigation or minimization of the negative socio-economic and environmental impacts of mercury use

It is therefore critical that governments who intend to ratify the Minamata Convention recognize the importance of identifying the challenges and opportunities in moving forward given their unique national and local contexts.

7.1 National Level Assessment

Implementation of the Minamata Convention will mostly be focused at the national level with specific support coming from the local level in areas described in particular convention articles such as Article 7 on Artisanal Small-scale Gold Mining or Article 11 on Mercury Wastes. Complying with the obligations will require adjustments / improvements in the capacities discussed in the previous section. Certain challenges may be faced in the process.

7.1.1 Challenges

1. ***The country's national priorities in relation to ecological Integrity and a clean and healthy environment, as outlined in the Philippine Development Plan (PDP) 2017 – 2022, does not particularly include specific articulations on the subject matter***

concerning regulation and the environmentally-sound management of hazardous chemicals.

While the PDP does put emphasis on ensuring ecological Integrity and a clean and healthy environment, it does not mention efforts toward the environmentally – sound management of hazardous chemicals across their entire life cycle including trade and use in products and processes. Focus of the discussions regarding hazardous chemicals lie mainly on end-of-life streams such as emissions and releases to the environment. Since the official results framework document does not contain indicators pertaining to hazardous chemicals, it may be difficult to technically and financially support national efforts toward the implementation of an international treaty such as the Minamata Convention given the competing priorities.

In contrast, the 2030 Sustainable Development Goals (SDG) framework developed by the member states of the United Nations clearly indicate the importance of managing hazardous chemicals in an environmentally-sustainable manner as presented in the targets and Indicators.

Table 10: 2030 Global Development Agenda (SDG)

Targets	Indicators
Goal 3. Ensure healthy lives and promote well-being for all at all ages	
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Mortality rate attributed to hazardous chemicals, water and soil pollution and contamination
Goal 6. Ensure availability and sustainable management of water and sanitation for all	
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	Percentage of wastewater safely treated
Goal 12. Ensure sustainable consumption and production patterns	
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	Number of parties to international multilateral environmental agreements on hazardous and other chemicals and waste that meet their commitments and obligations in transmitting information as required by each relevant agreement

2. ***Issues and concerns surrounding mercury cut across multiple government agencies and offices that will require coordination of interventions based on agency mandate and competency.***

The various impacts brought about by mercury to both health and the environment are experienced throughout its entire life cycle, starting from the time it is taken out of the mines until such time when it enters the waste stream in one form or another. The 35 articles of the Minamata Convention reflect this life cycle approach and cover provisions ranging from mercury source and trade, mercury-added products, industrial processes, ASGM, all the way to interim storage, emissions and releases, wastes, and contaminated sites.

The breadth of these concerns provides the opportunity for a number of different government agencies and offices to look at their specific mandates and responsibilities and jointly implement the Minamata Convention, taking full advantage of their individual agency competencies. While inter-agency work and coordination in the Philippine government is not an unknown concept and synergies have been successfully created in the past, it is in most cases, ad hoc, time bound, and highly dependent on current decision-makers in upper management. In this sense, implementation mechanisms involving more than one government agency can become tricky.

3. ***Data and information regarding mercury such as trade, usage, and storage are inadequate and unreliable.***

The availability of reliable and timely data and information will be critical in the successful implementation of the Minamata Convention. For many developing countries like the Philippines, often times, such data is not available due to lack of information sharing (or reporting) mechanisms or inefficient systems that provide untimely and incomplete data. Although the Philippines has achieved some level of success in collecting information from the industry through self-monitoring mechanisms, independently verifying these sets of information is not easily conducted. In addition, unreported data from illicit activities are still prevalent. Efforts to conduct regular monitoring of mercury levels in various media especially in locations suspected / reported to be contaminated are likewise difficult to accomplish.

While difficult, improving the relevant baseline data through coordinated national assessments and the conduct of other studies and researches will certainly be significant step toward successfully putting forward the country's mercury management agenda aligned with the Minamata Convention.

4. ***There is weak enforcement of environmental laws, policy, and regulatory instruments in the country mainly due to limited financial resources.***

In order for the country to be able to comply with the legally-binding provisions of the Minamata Convention on Mercury, relevant legislations and policies need to be in place that will support and facilitate regulatory, monitoring, and adjudicating actions implemented by the relevant government agencies.

According to a World Bank report in 200990, the Philippines, in general, has sound and comprehensive environmental laws and policies but suffers from weak implementation because of inadequate capacity and financial constraints both at the national and local levels. Several laws and regulations are already in place that deal with chemicals and other pollutants taking into account their transport and mobility in the general environment. Allied to these environmental laws are other laws that also involve some level of regulation with regard to mercury and mercury compounds.

5. ***Non-compliance to the country's environmental laws and policies are encouraged by penalties that do not adequately reflect the environmental costs due to the violations committed.***

Overall, the country's regulatory framework pertaining to the protection of human health and the environment from the negative impacts of exposure to chemicals and wastes is in place. At the moment it is adequate to support government efforts to comply with existing MEA obligations. However, this framework needs updating to take into account the nuances associated with the Minamata Convention. Efforts to update the chemical control order for mercury is a move in the right direction.

However, government needs to take steps to also ensure that the penalties for violation and / or non-compliance with policies and regulations should adequately reflect the environmental costs associated with the violation. This will likewise support the creation of funds to manage mercury contaminated sites.

[90] The Philippines: Country Environmental Analysis. 2009. Sustainable Development Department, East Asia and Pacific Region, World Bank

7.1.2 Opportunities

1. ***Access financial and technical support from development partners such as the Global Environment Facility (GEF) or the Specific International Programme (SIP) for the Minamata Convention once the Minamata Convention is ratified.***

    Financial support to aid countries who have ratified the Minamata Convention for them to implement the convention will be provided through the GEF. The Philippines is already familiar with the GEF and have been able to access grants for projects such as those under the Stockholm Convention for Persistent Organic Pollutants. Other projects funded by GEF fall within several priority thematic areas including biodiversity, climate change, chemicals and wastes, international waters, desertification, among others.

    The SIP, on the other hand, is a new programme created under Article 13 of the Minamata Convention to support capacity building and technical assistance in the implementation of the Convention in an effective and efficient manner.

2. ***Integration with existing Regional and South – South Cooperation***

    The Philippines is a member state of the Association of Southeast Asian Nations (ASEAN) and can integrate upcoming mercury programmes with the existing ASEAN Cooperation on the Environmental in order to maximize results while optimizing resources. Cooperation with the global South can also be an excellent platform to lodge future mercury initiatives.

3. ***Capitalize on and synergize with current national programmes on health, chemicals, and wastes management***

    Synergies can also be created at the national level to take advantage of the existing programmes and projects to kick start and support future mercury initiatives.

7.2 Sectorial Level Assessment

Given the wide-range of use for mercury spanning various sectors and also taking into account its life cycle, identification of sectorial strategies and approaches will also be needed.

7.2.1 Industry Sector

Based on the provisions in the Minamata Convention, this sector will need to face certain challenges that may include:

- Identifying alternative materials to replace mercury and mercury compounds in products and processes
- Establishing processes and pollution control systems that will comply with the standards set by the Convention
- Adoption of new technologies and the accompanying costs
- Declining global supply of mercury that may lead to drastic increase in market price
- Costs for the handling, treatment, and final disposal of mercury wastes
- Adequate and environmentally-sound design for the interim storage of mercury for allowed use

7.2.2 Agriculture Sector

The Philippine agriculture sector, on the other hand, has already banned mercury that could be intentionally added in approved pesticides and fungicides. However, there is currently no information regarding mercury in these agricultural products that could be present in the form of impurities and what levels are tolerable.

7.2.3 Artisanal and Small-scale Gold Mining (ASGM)

The Philippines is host to roughly 500,000 individuals and their families whose main livelihood is derived from extracting gold in artisanal and small-scale gold mining (ASGM) sites found in more than 40 different provinces around the country. The informal gold miners and processors in the country's ASGM communities often are displaced agricultural workers and fisher folk who have very few options in terms of alternative livelihood, driving them to resort to rudimentary gold mining activities for income generation in the rural communities where they live. Overall, ASGM in the Philippines is believed to directly and indirectly support the livelihood of 2.3 million people.

Based on consolidated resource inventory data provided by mining companies in the country, the Philippines reportedly has an estimated gold deposits of around 5 billion metric tons from 40 different provinces. On average, ASGM contributed to an estimated 75% (~25 MT/year) of the annual gold production of the Philippines from 2000 to 2009. However, this volume could be higher given that most of small-scale gold mining is operated without a license, and some of their production not reported.

In recent years, data from the Mines and Geosciences Bureau (MGB) indicated a noticeable decrease in gold production from the ASGM sector, 36% drop in 2011, 94% in 2012, and 39% in 2013. This sudden drop coincided with the government's policy reform initiatives to strengthen the implementation of laws governing small-scale mining such as the Presidential Decree 1899

or the regulation that “Establishes Small-scale Mining as a New Dimension in Mineral Development”, the Republic Act 7076 or the “Peoples’ Small-scale Mining Act of 1991”, and most recently, the Executive Order 79 that aims to harmonize all mining laws in the country. These efforts by the government to impose stricter measures have inadvertently pushed the informal miners outside of the government radar, thus promoting illegal trade and other unsustainable practices such as the use of mercury in mining practices and the proliferation of several forms of social and economic injustices in the form of (1) gender related inequalities, (2) human rights violations, and (3) inadequate child protection among other issues relating to human and environmental insecurities.

Recognizing that the ASGM sector poses a complex development issue especially for developing nations, Article 7 of the Minamata Convention allows the flexibility for each Party to prepare an ASGM National Action Plan (NAP), tailoring their approach to the unique conditions of the ASGM sector under their jurisdiction.

In the preparation of the NAP, it should be considered that, based on learnings in previous interventions designed to assist the ASGM sector, the socio-economic conditions in rural ASGM communities and the informality of the sector are the main contributors to the present a complex set of development challenges that are closely linked to health, culture, environmental, and human security concerns. Inadequate infrastructure, weak forms of social services, and the absence of economic opportunities are just a few of the reasons that promote the proliferation of unsustainable mining practices. With grave repercussions to both health and the environment, these practices that fulfill an immediate subsistence need is not only short-term in nature but also create an additional barrier that prevents these communities from lifting themselves out of poverty. Clearly there is a need to re-examine the policy and regulatory framework surrounding the ASGM sector and identify stronger implementation strategies and approaches toward formalization and regulation.

Formalization of the sector also entails the solidification of government’s responsibility to (1) promote health and environmental protection, (2) provide technical capacity and (3) support the financial aspects in relation to the extraction, processing and other related economic activities surrounding the ASGM gold supply / value chain. Crucial as well is the monitoring of this chain to ensure that the product is responsibly produced using methods that are:

- not harmful to health and environment;
- done through legal entities and channels; and

- following international norms such as the Minamata Convention on Mercury and the OECD Guidance

7.3 Benefits of Ratification

For the Philippines, benefits to ratification of the Minamata Convention include:

- The Philippines will be protected from being a dumping ground for products containing mercury
- The country will have access to international support on strategies to eliminate mercury use especially in ASGM
- The Convention will help avoid further risk to the country's aquatic life, where mercury levels have been increasing
- The Convention will support the country's achievement of Sustainable Development goals (SDGs)
- The Convention will provide the Philippines with access to financial and technical assistance

Possible disadvantages may include:

- Increase in cost for the consumption of electricity from coal-fired power plants, products containing mercury for allowed use, and products manufactured by industrial processes classified under allowed uses for mercury.
- More expensive products to replace those that used to contain mercury.

CHAPTER 8: IMPLEMENTATION STRATEGIES AND PRIORITIES FOR ACTION

Taking off from the findings of this Minamata Initial Assessment report, following are specific strategies and actions steps the country needs to consider.

8.1 Institutional Strengthening

- Establish an inter-agency coordinating group (IACG) composed of mercury focal points from different relevant agencies and offices to be chaired by DENR
- Create a technical group under the IACG that will take charge of dealing with contaminated sites identification, assessment, and risk management according to an agreed national guideline / standard operating procedure
- Prepare a National Framework and National Implementation Plan (NIP) for the Minamata Convention on Mercury

8.2 Regulatory and Legislative Framework

- Review, finalize and approve the revised version of the chemical control order for mercury
- Review, finalize and approve the administrative order for the phase-out of mercury use in dental restorative procedures
- Review and update policies and regulations to include sectors using mercury that are currently unaccounted for (e.g., industrial thermometers, online selling platforms, etc.)
- Review the existing policies related to the management of chemicals and wastes and update them, as necessary, to reflect technical guidelines and requirements as recommended and prescribed by the Minamata Convention Conference of Parties (COP)
- Strengthen regulatory instruments in relation to contaminated sites identification, assessment and risk management

- Create legislation to support the banning of mercury mines in the country in accordance to Article 3 of the Minamata Convention on Mercury

8.3 Mercury Sources and Trade and Material Flow

- Intensify monitoring and transparent data reporting through comprehensive planning and rigorous implementation of the agreed plans
- Strengthen analysis on sources, trade, and material flow for mercury and mercury compounds in the country.
- Build institutional capacities to support country strategies to monitor, regulate, and prohibit illegal mercury trade including mercury-added products (MAPs).

8.4 ASGM

- Prepare a National Action Plan for ASGM as recommended by Article 7 of the Minamata Convention on Mercury

8.5 MAPs and Processes with Intentional Use of Mercury

- Prepare a National Action Plan for the phase-out of MAPs taking into account country context and deadlines indicated in part I and II of ANNEX A of the Minamata Convention on Mercury
- Take into account COP technical guidance documents particularly on Article 10 on environmentally – sound interim storage of mercury other than waste mercury (e.g. for allowed use and confiscated products)
- Develop a strategic research plan to support industries affected by the MAPs phase-out

8.6 Emissions and Releases

- Intensify monitoring activities
- Promote more rigorous and efficient reporting through the SMRs and CMRs
- Update relevant standards
- Improve capacity for mercury measurement in priority sectors
- Promote best available technologies and best environmental processes (BAT/BEP) consistent with the Minamata Convention on Mercury

8.7 Mercury Wastes Management

- Update and implement the existing action plan for mercury waste management in accordance with Article 10 of the Minamata Convention on Mercury
- Take advantage of the existing technical capacity to manage mercury wastes from busted lamps through the operationalization of the country's lamp waste management facility (LWMF)
- Identify synergies with the Basel Convention on the Transboundary Movement of Hazardous Wastes, taking into consideration the proposed Basel Amendment
- Assess technical viability for final disposal

8.8 Contaminated Sites

Develop a national guideline and operating procedure for the identification, assessment and management of contaminated sites, taking off from the preliminary guidance provided by the MIA project and the guidance documents recommended by the COP of the Minamata Convention on Mercury

However, for the purposes of this report, contaminated sites will be defined as locations (such as air, water, soil, or sediments) that contain unwanted substances (such as mercury) at concentrations that are (1) above the legally-allowed standard levels, (2) above background levels and could potentially present a significant risk to human health and the environment, and (3) highly unusual caused by improper handling and disposal, natural and man-made disasters.

This report aims to provide the country with an initial guidance in relation to the identification and management of sites contaminated with mercury and mercury compounds. Discussions will include topics on the definition of contaminated sites using national context, initial identification of sites, conducting rapid assessments and detailed verification studies, engaging stakeholders, assessment of risks, and identification of risk management measures including monitoring plans. Moving forward, a national consultation workshop may be arranged at a later time to further validate and concretize the guidelines provided.

8.9 Monitoring and Reporting

- Strengthen data collection and monitoring mechanisms across government agencies and offices
- Partner with academe and civil society
- Take into account the reporting cycles of other MEA

ANNEX 1: STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder Engagement Activities	Date/ Duration Conducted
Project Inception and Launch	27 July 2017
Regional Consultations	
1. Northern and Central Luzon	13-14 September 2017
2. Mindanao	09-10 October 2017
3. Visayas	12-13 October 2017
4. NCR and Southern Luzon	02-03, November 2017
Sectoral Focused Group Discussions	January- March 2018
Inter-agency Technical working group Meetings	March 2018- February 2019
National assessment of existing sources of information on mercury (including qualitative and quantitative inventory and contaminated sites)	January- December 2018
Assessment of national infrastructure and capacity for mercury management	March 2018
Series workshop of UNEP Toolkit Level 2 and Presentation of results to stakeholders	2016-2019
MIA Awareness Raising Activities	January 2019-March 2019
MIA Culminating Activity	March 2019

ANNEX 2: MERCURY SOURCE SUB-CATEGORIES

The ten main mercury source categories are further broken down into a number of sub-categories listed here.

Main Source Category: 1 – Extraction and use of fuels / energy sources	
1.1	Coal combustion in large power plants
1.2	Other coal combustion
1.3	Extraction, refining and use of mineral oil
1.4	Extraction, refining and use of natural gas
1.5	Extraction and use of other fossil fuels
1.6	Biomass fired power and heat production
1.7	Geothermal power production
Main Source Category: 2 – Primary (virgin) metal production	
2.1	Primary extraction and processing of mercury
2.2	Gold and silver extraction with the mercury-amalgamation process
2.3	Zinc extraction and initial processing
2.4	Copper extraction and initial processing
2.5	Lead extraction and initial processing
2.6	Gold extraction and initial processing by other processes than mercury amalgamation
2.7	Aluminum extraction and initial processing
2.8	Extraction and processing of other non-ferrous metals
2.9	Primary ferrous metal production
Main Source Category: 3 – Production of other minerals and materials with mercury impurities	
3.1	Cement production
3.2	Pulp and paper production
3.3	Lime production and light weight aggregate kilns
3.4	Others minerals and materials

Main Source Category: 4 – Intentional use of mercury as an auxiliary material in industrial processes	
4.1	Chlor-alkali production with mercury-technology
4.2	VCM (vinyl-chloride-monomer) production with mercury-dichloride ($HgCl_2$) as catalyst
4.3	Acetaldehyde production with mercury-sulphate ($HgSO_4$) as catalyst
4.4	Other production of chemicals and polymers with mercury compounds as catalysts
Main Source Category: 5 – Consumer products with intentional use of mercury	
5.1	Thermometers with mercury
5.2	Electrical and electronic switches, contacts and relays with mercury
5.3	Light sources with mercury
5.4	Batteries containing mercury
5.5	Biocides and pesticides
5.6	Paints
5.7	Pharmaceuticals for human and veterinary uses
5.8	Cosmetics and related products
Main Source Category: 6 – Other intentional products/process uses	
6.1	Dental mercury-amalgam fillings
6.2	Manometers and gauges
6.3	Laboratory chemicals and equipment
6.4	Mercury metal use in religious rituals and folklore medicine
6.5	Miscellaneous product uses, mercury metal uses and other sources
Main Source Category: 7 – Production of recycled metals	
7.1	Production of recycled mercury ("secondary production)
7.2	Production of recycled ferrous metals (iron and steel)
7.3	Production of other recycled metals
Main Source Category: 8 – Waste incineration	
8.1	Incineration of municipal / general waste

8.2	Incineration of hazardous waste
8.3	Incineration of medical waste
8.4	Sewage sludge incineration
8.5	Informal waste burning
Main Source Category: 9 – Waste deposition/landfilling and waste water treatment	
9.1	Controlled landfills/deposits
9.2	Diffuse deposition under some control
9.3	Informal local deposition of industrial production waste
9.4	Informal dumping of general waste
9.5	Waste water system/treatment
Main Source Category: 10 – Cremation and cemeteries	
10.1	Crematoria
10.2	Cemeteries

ANNEX 3: 2018 MERCURY INVENTORY SUMMARY CALCULATIONS USING THE UNEP TOOLKIT LEVEL 2

Refer to the 2018 Philippine Mercury Inventory Report.

ANNEX 4: ARTICLES OF THE MINAMATA CONVENTION ON MERCURY

The articles of the Minamata Convention on Mercury can generally be classified into (1) Convention Control Measures and (2) Convention Support Measures. Below is a list of the articles grouped according to the classifications with a brief description explaining the general aim of each article.

Articles of the Minamata Convention Pertaining to Convention Control Measures

Number	Article Title	Brief Description
Article 3	Mercury Supply Sources and Trade	Provisions in this article aim to limit the sources of mercury available for use and trade, and specify procedures to follow where such trade is still allowed. They complement and reinforce the demand reduction control measures in Articles 4.
Article 4	Mercury – added Products	Provisions here intend to reduce mercury demand in products through a combination of measures which a). phase out mercury uses in many key products, b). phase down mercury use in another, c). require the review of remaining products for possible restrictions within five years, and d). discourage the manufacture of new products using mercury. Annex A of the Minamata Convention text provides a list of mercury-added products (MAPs) to be phased out or phased down including the agreed deadlines.
Article 5	Manufacturing Processes in which Mercury or Mercury Compounds are used	The control measures in this article are designed to prohibit or restrict mercury use in manufacturing processes as an important step in reducing global mercury demand. Annex B of the Minamata Convention text provides a list of industrial processes whose mercury use needs to be phased out or phased down including the agreed deadlines.
Article 6	Exemptions Available to a Party upon Request	This article specifies procedures each Party to the Convention must follow if seeking additional time to comply with the deadlines for the phase-out of mercury use in products (Article 4) or industrial processes (Article 5). They potentially allow a Party to extend the deadline for two consecutive five – year periods, with all exemptions expiring ten years after the applicable Article 4 and 5 deadlines.
Article 7	Artisanal and Small-scale Gold Mining (ASGM)	In recognition that the ASGM sector poses a complex development issue especially for developing nations, this article provides flexibility to each Party through the preparation of an ASGM National Action Plan (NAP), allowing countries to tailor their approach to the conditions of the sector under their jurisdiction. A Party must determine if ASGM in its territory is “more than insignificant” and develop and implement a NAP in accordance with Annex C of the Minamata Convention text.
Article 8	Emissions	The objective of this article is to reduce mercury emissions to air from five of the most significant source categories identified during the Convention negotiations. Annex D of the Minamata Convention text lists the five source categories covered under this article.
Article 9	Releases	In parallel to Article 8, this article aims to reduce mercury releases to land and water from sources not already addressed by the other provisions of the Convention. There is no required list of sources

		similar to Article 8, so the sources controlled under Article 9 may vary among countries based on their identified "relevant point sources", initially reported no later than 3 years after the Convention enters into force for that Party, and on an agreed regular schedule thereafter.
Article 10	Environmentally-sound Interim Storage of Mercury Other than Mercury Wastes	Under this article, the Convention requires countries to take measures to ensure the environmentally-sound storage of mercury that is held in various locations prior to its intended allowed use in order to prevent the possible adverse effects the stored mercury may cause. The scope of Article 10 is limited to "interim" or temporary storage since this is storage associated with an allowed use under the Convention. The environmentally-sound management of waste mercury and mercury compounds is covered in Article 11.
Article 11	Mercury Wastes	The Convention anticipates a certain amount of mercury eventually becoming waste as a consequence of restrictions on global supply and trade. Provisions in Article 11 are focused on the environmentally-sound management (ESM) of mercury wastes and controls over their transboundary movement. They are supportive of the Basel Convention and complementary with it in addressing the mercury waste issue.
Article 12	Contaminated Sites	Article 12 calls for the creation and adoption of guidance in approaching mercury contaminated sites. It contains no obligations to propel progress in cleaning up mercury contaminated sites. It is essentially a set of capacity building provisions, with governments largely left to their own devices in developing the legal framework, and the financial and technical capability to support preferred risk management options and their measures.
Article 16	Health Aspects	Article 16 provides guidance to health ministries on the activities they can undertake to minimize the mercury exposure of vulnerable populations, and the adverse consequences of such exposures.

Articles of the Minamata Convention Pertaining to Convention Support Mechanisms

Number	Article Title	Brief Description
Article 13	Financial Resources and Mechanisms	The Convention recognizes that providing financial assistance to developing countries to facilitate the effective implementation of the Convention will be crucial. Article 13 establishes a financial mechanism through the (1) Global Environment Facility Trust Fund (GEF-TF), and a (2) Specific International Programme (SIP) to support capacity building and technical assistance.
Article 14	Capacity-building, Technical Assistance, and Technology Transfer	According to Article 14, Parties should cooperate to provide, within their respective capabilities, timely and appropriate capacity-building and technical assistance to developing country Parties to assist them in implementing their obligations under the Convention. These efforts can be delivered via a). regional, sub-regional, and national arrangements, including existing regional and sub-regional centers, b). other multilateral and bilateral means, and c). partnerships, including those with private sectors.

Article 15	Implementation and Compliance Committee	This article creates the Implementation and Compliance Committee (ICC) which will function as a subsidiary body to the Conference of Parties (COP) with the task of promoting implementation of, and review compliance with, all the provisions of the Minamata Convention. The ICC will be composed of 15 members, nominated by Parties and elected by the COP. Due consideration will be given to equitable geographical representation based on the five UN regions.
Article 17	Information Exchange	Article 17 focuses on the exchange of information between countries. It identifies key information such as a). scientific, technical, economic, and legal information concerning mercury and mercury compounds, b). information on the reduction or elimination of the production, use, trade, emissions, and releases of mercury and mercury compounds, and c). information on technically and economically viable alternatives to MAPs and industrial processes using mercury, among others that Parties to the Convention need to share with each other and identifies mechanisms for sharing the information.
Article 18	Public Information, Awareness, and Education	Similar to Article 17, Article 18 identifies key information that governments need to share with the public and the mechanisms that can be employed for public awareness-raising. Parties to the Convention are required, within their capabilities to promote and facilitate public information sharing, education, and training on topics pertaining to the a). health and environmental effects of mercury and mercury compounds, b). alternatives to mercury and mercury compounds, c). activities being implemented to meet the Convention obligations, and d). updates and progress in relation to Articles 17 and 19.
Article 19	Research, Development and Monitoring	This article seeks cooperation among countries to develop and improve on key areas of research that can support effective implementation of the Convention which include, but are not limited to inventories of mercury use and consumption, the levels of mercury in human beings, information on mercury commerce and trade, new mercury-free alternative technologies, assessments of the impact of mercury and mercury compounds on human health and the environment, and the environmental cycle, transport, transformation and fate of mercury and mercury compounds in a range of ecosystems.
Article 20	Implementation Plans	After the initial assessment, a country may decide to prepare a National Implementation Plan (NIP). Article 20 provides Parties with the necessary guidance in the preparation of a NIP. Regardless of a country's decision with respect to the preparation of a NIP, governments are still encouraged to submit information on the measures taken to implement the Convention when the ratification instrument is submitted, and also at regular intervals during the Convention as determined by the COP.
Article 21	Reporting	Article 21 essentially grants authority to the COP to develop the reporting format and reporting frequency that will provide information to help evaluate both individual government compliance and the

		overall effectiveness of the Convention. Parties are expected to provide information on a regular basis pertaining to a). measures taken to implement the provisions of the Convention, the effectiveness of such measures, and the possible challenges in meeting the objectives of the Convention, and b). information as called for in Articles 3, 5, 7,8, and 9.
Article 22	Effectiveness Evaluation	The first evaluation will take place beginning no later than six years after the date of entry into force of the Convention. The evaluation shall be conducted by the COP on the basis of available scientific, environmental, technical, financial and economic information such as reports and other monitoring information provided to the COP, reports submitted pursuant to Article 21 on Reporting, information and recommendations provided pursuant to Article 15, and reports and other relevant information on the operation of the financial assistance, technology transfer and capacity-building arrangements put in place under the Convention.
Article 23	Conference of Parties	This article defines the role and functions of the Conference of Parties (COP) including the frequency of COP meetings. The COP, during its first meeting will by consensus agree upon and adopt rules of procedure and financial rules for itself and any of its subsidiary bodies, as well as financial provisions governing the functioning of the Secretariat.
Article 24	Secretariat	This article defines the role and functions of the Secretariat.

ANNEX 5: REGULATORY AND INSTITUTIONAL FRAMEWORK DETAILED ASSESSMENT

This annex contains (1) detailed information on relevant provisions in specific articles of the Minamata Convention on Mercury, (2) discussion on pertinent aspects of the current regulatory framework that is pertinent to the provisions, (3) provides a list of agencies and offices who may play important roles in the implementation of the provisions given their institutional capacities, and (4) assessment of country readiness in terms of compliance with important provisions in specific articles, including identification of certain gaps.

Article 3	Mercury Supply Sources and Trade		
Description	Provisions in this article aim to limit the sources of mercury available for use and trade, and specify procedures to follow where such trade is still allowed.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Not allow new primary mercury mining	none	DENR - MGB
	▪ Phase out existing primary mercury mining within 15 years	none	DENR - MGB
	▪ Prevent the import and use of mercury from primary mercury mining for artisanal and small-scale gold mining (ASGM)	present	DENR - EMB DENR – MGB DOF - BOC
	▪ In accordance with Article 3.5(b), restrict the import and use of excess mercury from decommissioning chlor-alkali plants, and require environmentally sound disposal	present	DENR - EMB DOF - BOC
	▪ Obtain information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/yr	present	DENR - EMB
	▪ Not allow the export of mercury unless the importing country provides written consent, the mercury is for an allowed use or environmentally sound storage, and all other conditions of Article 3.6 are met	none	DOF - BOC
	▪ Not allow the import of mercury without government consent, ensuring both the mercury source and proposed use are allowed	present	DENR - EMB DOF - BOC

	under the Convention (and applicable domestic law)		
		4 out of 7	57.14%
Relevant Laws and Regulations			
DENR	Existing Laws and Regulations	Gaps	
	▪ **RA 6969** – "An Act to Control Toxic Substances and Hazardous and Nuclear Wastes, Providing Penalties for Violations Thereof, and for other Purposes" 1. IRR as per **DAO 1992 – 29** 2. regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment; and 3. prohibit the entry, even in transit, of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose 4. pre-manufacturing and / or pre-importation requirements for chemical substances or mixtures to be manufactured, processed or imported for the first time 5. update and maintain a Philippine Inventory of Chemicals and Chemical Substances (PICCS) which are stored, imported, exported, used, processed, manufactured or transported 6. compile and amend a list to be known as the Priority Chemicals List for Chemicals which will require clearance from DENR even if already included the PICCS 7. a Chemical Control Order (CCO) is issued for any new substances or a priority chemical that poses an unreasonable risk or hazard to public health or the	1. Current CCO for Mercury needs to be updated to reflect the obligations under the Minamata Convention on Mercury particularly improving on the regulatory guidelines for import / export and diversion of mercury supply for use in ASGM 2. Legal basis for the prohibition of opening new primary mercury mining in the country needs strengthening	

	environment 8. **DAO 1997 – 38 for Mercury and Mercury Compounds** prohibit or limit the use, manufacture, import, export, transport, process, storage, possession or sale of mercury and mercury compounds, instituting relevant controls	
Relevant National Stakeholder		
1. DENR	Role with respect to the above listed provisions: ▪ Protect the country from illegal mining activities – Regulate mining activities in the country including mercury ▪ Protect the environment by regulating mercury flow into and within the country: – Allow only the importation of mercury from allowed source and for allowed use according to the Convention – Prevent the flow of mercury to the ASGM sector – Monitor country activities pertaining to the sale of mercury in local markets ▪ Strengthen institutional capacity through relevant and updated data: – Develop a mercury inventory including information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/yr., in compliance to Convention obligations	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Mining Tenements Division of the DENR - MGB is in charge of undertaking final evaluation of all mining applications, conduct audit of the disposition of mineral lands and resources, and manage the Mineral Rights Management System. This system is designed to guide and expedite the processing of mining applications and should also be capable of building up a national database, facilitating the production of reports and maps that may be required. ▪ At the regional level, the Mine Management Division (MMD), under the offices of the MGB Regional Directors, undertakes the initial evaluation of mining and mining-related applications, monitoring of the disposition and utilization of mineral lands and resources, and survey of mineral lands. ▪ The Chemical Management Section under the Environmental Quality Management Division of the EMB is in charge or the implementation of Title II: Chemical Management" described in Republic Act 6969[91]. ▪ The Chemicals Management Section regulates the importation of chemicals including mercury according to the DENR Chemical Control Orders (CCO), the Rotterdam Convention, the Stockholm Convention, and the Montreal Protocol. ▪ The Chemicals Management Section also manages the online application for (1) Priority Chemicals List Compliance Certificate and the (2) Pre-manufacture and Pre-importation notification certificate.	

[91] RA6969, Toxic, hazardous, and Nuclear Wastes Control Act of 1991

2. DOF	Role with respect to the above listed provisions: ▪ Protect the country's borders from the influx of illegal mercury through both formal and informal channels. ▪ Lead and oversee the country's daily frontline efforts to protect against illegal mercury trade – Regulate mercury exports in coordination with DENR - EMB – Disallow export of mercury without written consent from the importing country signifying that the mercury is for an allowed use or environmentally sound storage and in accordance with the requirements stipulated in Article 3 of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The EPU – ESS in the Bureau of Customs (BOC) under the DOF monitors the processing of all importation of hazardous chemicals, waste products, and/or recyclable products in accordance with the Imports and Assessment System and taking into consideration the country's environmental laws aligned with the various Multilateral Environmental Agreements (MEA). ▪ The EPU – ESS also oversees all exports involving hazardous chemicals and wastes via the Exports Processing System.
3. DILG	Role with respect to the above listed provisions: ▪ Support and provide assistance to government agencies in the implementation of national laws and regulations in relation to mercury – Apprehend reported and validated sellers of illegal mercury in coordination with DENR – Confiscate illegal mercury supply and turn them over to DENR for proper handling and storage.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Philippine National Police (DILG – PNP) is mandated to investigate crimes and bring offenders to justice.

Article 4	Mercury – added Products		
Description	This article intends to reduce mercury demand in products through a combination of measures which a). phase out mercury uses in many key products, b). phase down mercury use in another, c). require the review of remaining products for possible restrictions within five years, and d). discourage the manufacture of new products using mercury.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Not allow the manufacture, import, and export of products listed in Part I of Annex A, following the phase out date in Annex A of the Convention	partial	DENR – EMB DTI – BPS
	▪ Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A of the Convention	none	DENR – EMB DOH

	▪ Prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products	none	DENR – EMB DTI – BPS
	▪ Discourage the manufacture and distribution of mercury-added products not covered by any known use before the Convention entered into force	none	DENR – EMB DTI – BPS
		0.5 out of 4	12.50%
Relevant Laws and Regulations			
DENR	Existing Laws and Regulations	Gaps	
	9. **DAO 1997 – 38 for Mercury and Mercury Compounds** prohibit or limit the use, manufacture, import, export, transport, process, storage, possession or sale of mercury and mercury compounds, instituting relevant controls 10. **DAO 2013 – 09 – 001**: "Lighting Industry Waste Management Guidelines" (joint DENR – DOE) requires a programme for extended producers' responsibility to manage lamp wastes containing mercury	1. Current CCO for Mercury needs to be updated to reflect the obligations under the Minamata Convention on Mercury particularly on the phase-out of mercury-added products (MAPs). 2. DAO 2013 – 09 – 001 requires reviewing.	
DOH	Existing Laws and Regulations	Gaps	
	3. **RA 7394** – "Consumer Act of the Philippines" a. Protect the interest of the consumer against hazards to health and safety b. Concerned agencies will develop and provide safety and quality standards for consumer products c. Implementing agencies: ➢ DOH – food, drugs, cosmetics, devices, and substances ➢ DA – products related to agriculture ➢ DTI – all the rest ▪ **RA 9711** – "An Act Strengthening and Rationalizing the Regulatory Capacity of BFAD …. Renaming in the FDA, …. Amending Certain Sections of RA 3720" or the "Food and Drug Administration Act of 2009" – IRR as per **DOH Circular 2011-**	1. An administrative order for the phase-down and eventual phase-out of dental amalgam in dentistry training and practice need to be put in place 2. DOH – LGU collaboration through a joint administrative order is recommended to facilitate implementation of health programs and other interventions with regard to the promotion of dental health	

	0101 – FDA is created under the DOH to assume primary jurisdiction in the collection of samples of health products and to analyze and inspect health products in connection with the implementation of RA 9711 – Prohibit the manufacture, importation, exportation, sale, offering for sale, distribution, transfer, non-consumer use, promotion, advertising, or sponsorship of any health product that is adulterated, unregistered or misbranded – companies intending to manufacture, import, export, distribute, sell, offer for sale, transfer, promote and advertise products under DOH jurisdiction ➢ License to operate (LTO) ➢ product registration/notification ▪ **ASEAN Cosmetic Directive** – In ANNEX II, Part I, mercury is identified as one substance not allowed in cosmetic products except as indicated in ANNEX VI, Part I. – In ANNEX VI, Part I, maximum allowable Hg content due to preservatives such as thiomersal and phenylmercurial salts in eye make-up and eye make-up remover is 0.007%. ▪ **DOH AO 2008 – 0021** – "Gradual Phase-out of Mercury in All Philippine Healthcare Facilities and Institutions" – All hospitals shall immediately discontinue to distribution of mercury thermometers – All hospitals should follow the prescribed guidelines for phase-out indicate in the administrative order – All new healthcare facilities applying for License to Operate must submit an inventory of all mercury-containing devices	

	used in their facilities with a corresponding minimization plan	
DTI	Existing Laws and Regulations	Gaps
	▪ **DAO 2009 – 03**: "Mandatory PNS for fluorescent lamps, CFLs, high-intensity discharge lamps, ballasts, and luminaires" (joint DTI – DOE) ▪ Mandatory **Philippine National Standards** (PNS)	1. Mercury – containing lighting products that have alternatives need to be phased-out 2. Mandatory PNS needs reviewing to include parameters on mercury content
FPA	Existing Laws and Regulations	Gaps
	▪ **PRESIDENTIAL DECREE NO.1144** creates the Fertilizers and Pesticides Authority (FPA) to assure the agricultural sector of adequate supplies of fertilizer and pesticide at reasonable prices, rationalize the manufacture and marketing of fertilizer, and protect the public from the risks inherent in the use of pesticides. – IRR as per **Rules and Regulations No. 1, series of 1977** – promulgate rules and regulations for the registration and licensing of handlers of fertilizers and pesticides ▪ **FPA Pesticide Circular No. 4, series of 1989** bans the importation and use of mercuric fungicides.	Identification of any new mercury – containing pesticides
Relevant National Stakeholder		
1. DOH	Role with respect to the above listed provisions: ▪ Protect the country from the negative health effects due to human exposure to mercury from MAPs: – Implement a phase out of the manufacture, importation, trade, and use of those products relevant to the Department's mandate listed in Part I of Annex A of the Convention – Implement a phase down and eventual phase out of the use of dental amalgam – Regulate the manufacture, importation, trade, and use of materials and products containing mercury not listed in Part I of Annex A of the Convention	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Food and Drugs Administration (FDA) of the DOH is assigned to regulate food and drugs, including medical, radiation, and health-related	

	devices and cosmetics. ▪ The Center for Cosmetic Regulation and Research (CCRR) under the FDA has capacities to provide licensing and registration based on existing policies, to develop product standards, and to conduct research and laboratory analyses. ▪ In charge of plans, policies, programs, projects, standards and strategies related to health facility development, planning, and maintenance, the Health Facilities Development Bureau (HFDB) of DOH is responsible to implement the phase-out of medical devices containing mercury from public health facilities.
2. DTI	Role with respect to the above listed provisions: ▪ Protect the consumers from MAPs: – Implement a phase out of the manufacture, importation, trade, and use of those products relevant to the Department's mandate listed in Part I of Annex A of the Convention – Regulate the manufacture, importation, trade, and use of materials and products containing mercury not listed in Part I of Annex A of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Bureau of Product Standards (BPS) under the Consumer Protection Group (CPG) of DTI is responsible for the development, promotion, and implementation of product standards, protecting both the consumers and the environment. ▪ The BPS also requires all manufacturers and importers to comply with the acquisition of Philippine Standard License (PSL) and Import Commodity Clearance (ICC) before distribution and sale. ▪ In parallel, The Fair Trade Enforcement Bureau (FTEB) of the Department takes on the role of overall implementation of trade and consumer protection laws through import regulation, sales promotion, product standards monitoring, business licensing, enforcement, mediation, and adjudication with regard to the country's Consumer Act, Price Act, and Business Name Laws. ▪ The Bureau of Import Services (BIS) under the Industry Development and Trade Policy Group (IDTPG) of DTI also facilitates imports, administers import regulation on selected items, and monitors the importation of liberalized and sensitive items. The group initiates and conducts preliminary investigations on dumping, countervailing, and safeguard protests.
3. DOF	Role with respect to the above listed provisions: ▪ Protect the country's borders from the influx of illegal MAPs through both formal and informal channels. – Prevent the import, and export of products listed in Part I of Annex A of the Convention – Regulate the import and export of materials and products containing mercury not listed in Part I of Annex A of the Convention including dental amalgam particularly during the phase down period
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The EPU – ESS in the Bureau of Customs (BOC) under the DOF

	monitors the processing of all importation of hazardous chemicals, waste products, and/or recyclable products in accordance with the Imports and Assessment System and taking into consideration the country's environmental laws aligned with the various Multilateral Environmental Agreements (MEA). ▪ The EPU – ESS also oversees all exports involving hazardous chemicals and wastes via the Exports Processing System.
4. FPA	Role with respect to the above listed provisions: ▪ Protect the country from agricultural chemicals containing mercury: – Implement a phase out of the manufacture, importation, trade, and use of those products relevant to the Department's mandate listed in Part I of Annex A of the Convention – Regulate the manufacture, importation, trade, and use of agricultural inputs and products containing mercury not listed in Part I of Annex A of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Fertilizer and Pesticides Authority under the Presidential Assistant for Food Security and Agricultural Modernization (PAFSAM) of the Office of the President requires the registration of all pesticide products that are imported or produced locally. Registration is also required for the importation and production of fertilizers, including raw materials and ingredients for their manufacture. A Certificate Authorizing Importation of pesticide (CAIP) is needed before any pesticide product is allowed entry into the country.
5. DOE	Role with respect to the above listed provisions: ▪ Facilitate the country's transition to the use of clean energy that is environmentally-friendly: – Implement a phase out of the manufacture, importation, trade, and use of those products relevant to the Department's mandate listed in Part I of Annex A of the Convention – Regulate the manufacture, importation, trade, and use of energy - related products containing mercury not listed in Part I of Annex A of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Energy Research and Testing Laboratory Services (ERTLS) under the DOE has a Lighting and Appliances Testing Laboratory (LATL) that is capable of conducting energy performance tests on electrical household appliances such as room air conditioners and refrigerators and lighting products such as fluorescent lamps, CFLs, and ballasts. ▪ The ERTLS is also implementing a joint administrative order with the (1) DTI – BPS on the Mandatory Philippine National Standard for fluorescent lamps, compact fluorescent lamps, high intensity discharge lamps, ballasts, and luminaires and with the (2) DENR on the Lighting Industry Waste Management Guideline to regulate the end-of-life disposal of such lighting products containing mercury, arsenic, and other toxic chemicals.
6. DILG	Role with respect to the above listed provisions: ▪ Support and provide assistance to government agencies in the

	implementation of national laws and regulations in relation to mercury – Apprehend reported and validated sellers of illegal mercury in coordination with DENR – Confiscate illegal mercury supply and turn them over to DENR for proper handling and storage.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Philippine National Police (DILG – PNP) is mandated to investigate crimes and bring offenders to justice.

Article 5	Manufacturing Processes in which Mercury or Mercury Compounds are used		
Description	The control measures in this article are designed to prohibit or restrict mercury use in manufacturing processes as an important step in reducing global mercury demand.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Not allow the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B of the Convention, following the Annex B phase out date	none	DENR - EMB
	▪ Restrict (as specified in the Annex) the use of mercury in the processes listed in Part II of Annex B of the Convention	none	DENR - EMB
	▪ Not allow new facilities to use mercury in the regulated processes under Article 5, as specified in Annex B of the Convention	none	DENR - EMB
	▪ For facilities with processes listed in Annex B of the Convention, identify and obtain information on mercury or mercury compound use; and control mercury emissions to air, and releases to land and water	none	DENR - EMB
	▪ Discourage new uses of mercury in industrial processes	none	DENR - EMB
		0 out of 5	0.00%
DENR	Existing Laws and Regulations	Gaps	
	▪ **DAO 1997 – 38 for Mercury and Mercury Compounds** prohibit or limit the use, manufacture, import, export, transport, process, storage, possession or sale of mercury and mercury compounds, instituting relevant controls ▪ **DAO 2003 – 30**: "Implementing Rules	Current CCO for Mercury needs to be updated to reflect the obligations under the Minamata Convention on Mercury particularly on prohibiting the disallowed use of mercury and mercury	

	and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System"	compounds
Relevant National Stakeholder		
1. DENR	Role with respect to the above listed provisions: ▪ Protect the environment by regulating mercury use in industry: – Prevent the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B of the Convention – Monitoring the use of mercury in the processes listed in Part II of Annex B of the Convention, including emissions to air, and releases to land and water – Disallow the establishment of new facilities that use mercury in their processes	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Chemical Management Section under the Environmental Quality Management Division of the EMB is in charge or the implementation of Title II: Chemical Management" described in Republic Act 6969. ▪ The Chemicals Management Section regulates the importation of chemicals including mercury according to the DENR Chemical Control Orders (CCO), the Rotterdam Convention, the Stockholm Convention, and the Montreal Protocol. ▪ The Chemicals Management Section also manages the online application for (1) Priority Chemicals List Compliance Certificate and the (2) Pre-manufacture and Pre-importation notification certificate. ▪ The Environmental Impact Assessment and Management Division of EMB leads the implementation of the Philippine Environmental Impact Statement (EIS) System for environmentally-critical projects / undertakings and for projects in environmentally-critical areas.	
2. DTI and DOF	Role with respect to the above listed provisions: ▪ Support the government efforts in regulating the use of mercury in the industry: – Prevent the establishment of new facilities that use mercury in the regulated processes under Article 5, as specified in Annex B of the Convention – Prevent the establishment of new facilities not listed under Article 5, as specified in Annex B of the Convention that use mercury in their processes	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Department of Trade and Industry is in charge of approving business registration applications for single proprietor applicants. ▪ The Department of Finance, together with its attached agencies the Securities and Exchange Commission (SEC) and the Cooperative Development Authority (CDA) is in charge of issuing business, SEC, and CDA registrations to private applicants who intend to conduct business in the country.	

	▪ The registration process includes requiring proponents to secure clearances from other government agencies, as applicable or mandated by law, depending on the type of business they are applying for. ▪ The Philippine Economic Zone Authority (PEZA), attached to the DTI, is specifically in charge of monitoring and facilitating the business operations of registered investors in export-oriented manufacturing and service facilities inside selected areas called PEZA special economic zones.
3. DILG	Role with respect to the above listed provisions: ▪ Support the government efforts in regulating the use of mercury in the industry: – Prevent the establishment of new facilities that use mercury in the regulated processes under Article 5, as specified in Annex B of the Convention – Prevent the establishment of new facilities not listed under Article 5, as specified in Annex B of the Convention that use mercury in their processes
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The different local government units, whose capabilities are strengthened through the DILG, are responsible for issuing business permits in the areas of their jurisdiction. These permits are renewed annually.

Article 7	Artisanal and Small-scale Gold Mining (ASGM)		
Description	A Party must determine if ASGM in its territory is “more than insignificant” and develop and implement a NAP in accordance with Annex C of the Minamata Convention text.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Reduce, and where feasible, eliminate mercury and mercury compound use, emissions (to air), and releases (to land and water) associated with ASGM.	present	DENR - MGB
	▪ Establish a coordinating mechanism and delineate agency roles for development/implementation of an ASGM National Action Plan (NAP)	none	DENR - MGB
	▪ Define and formalize or regulate ASGM consistent with the Convention	partial	DENR - MGB
	▪ Eliminate whole ore amalgamation, open burning of amalgam or processed amalgam, burning of amalgam in residential areas, and cyanide leaching of mercury-laden sediment, ore or tailings (the “worst practices”)	none	DENR - MGB

	▪ Set mercury use reduction goals or targets consistent with the timely elimination of the worst practices and other use reduction efforts	none	DENR - MGB
	▪ Reduce mercury emissions, releases, and exposures associated with ASGM, and prevent mercury exposures of vulnerable populations (particularly women of child-bearing age and children)	none	DENR - MGB
	▪ Prevent the diversion of mercury and mercury compounds from other sectors to ASGM, and manage mercury trade consistent with the NAP	none	DENR - MGB
	▪ Implement a public health strategy to address mercury exposures to ASGM miners and communities	partial	DENR - MGB
		2 out of 8	25.00%
DENR	Existing Laws and Regulations	Gaps	
	▪ **RA 7076 – "An Act Creating a People's Small-scle Mining Program and for Other Purposes" or the "People's Small-scale Mining Act of 1991"** governs the activities surrounding the ASGM sector – IRR as per **DAO 2015 – 03** – promote, develop, protect and rationalize viable small-scale mining activities in order to generate more employment opportunities and provide a equitable sharing of the nation's wealth and natural resources, giving due regard to existing rights ▪ **EO 79**: "Institutionalizing and Implementing Reforms in the Philippine Mining Sector" – Ban on the use of mercury in ASGM	**DAO 2015 – 03** and **EO 79** need to be reviewed to facilitate better implementation and delivery of development outputs in the ASGM sector including the prohibition of the use of mercury	
Relevant National Stakeholder			
1. DENR	Role with respect to the above listed provisions: ▪ Govern the ASGM sector toward effective environmental protection through best mining and processing practices, eliminating the use of mercury and other hazardous chemicals as appropriate. – Establish a coordinating mechanism and delineate agency roles for the development and implementation of a NAP for ASGM – Formalize and regulate the ASGM sector. – Prohibit the use of "worst practices" in ASGM processing. – Set mercury use reduction goals or targets in the ASGM sector, included in the NAP		

	– Prevent the diversion of mercury from other sectors to ASGM
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – MGB has the overall responsibility to regulate mining practices in the ASGM sector, facilitating and granting permits to operate in approved mining sites ("Minahang Bayan") in accordance with existing laws. ▪ The Environmental Impact Assessment and Management Division of EMB also implements the Philippine Environmental Impact Statement (EIS) System for ASGM processing areas.
2. DOH and DOLE	Role with respect to the above listed provisions: ▪ Protect the health of the ASGM and other affected communities – Develop and implement a public health strategy to address mercury exposures
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DOH – DPCB conducts health assessments in ASGM communities in relation to mercury poisoning and can capacitate LGUs when necessary as part of a national health strategy. ▪ The Occupational Safety and Health Center (OSHC) of DOLE conducts assessments of working conditions in ASGM sites.
3. DILG	Role with respect to the above listed provisions: ▪ Support and provide assistance to government agencies in the implementation of national laws and regulations in relation to mercury – Apprehend reported and validated sellers of illegal mercury in ASGM in coordination with DENR – Confiscate illegal mercury supply and turn them over to DENR for proper handling and storage.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Philippine National Police (DILG – PNP) is mandated to investigate crimes and bring offenders to justice.

Article 8	Emissions		
Description	The objective of this article is to reduce mercury emissions to air from five of the most significant source categories identified during the Convention negotiations.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Require best available techniques/best environmental practices (BAT/BEP) or associated emission limit values (ELVs) for new facilities (as defined in Article 8.2(c) of the Convention)	none	DENR - EMB
	▪ Require one or more measures identified in Article 8.5 to control/reduce mercury emissions from existing sources listed in Annex	none	DENR - EMB

	D, which shall be operational at the source within 10 years		
	▪ Require monitoring/reporting and/or otherwise establish a mercury emissions inventory for sources listed in Annex D of the Convention	present	DENR - EMB
		1 out of 3	33.33%
DENR	Existing Laws and Regulations	Gaps	
	▪ **RA 8749 –** "An Act Providing for a Comprehensive Air Pollution Control Policy and for Other Purposes (Clean Air Act of 1999)" – IRR as per **DAO 2000 – 81** – formulate and implement a holistic national air pollution management program – develop a set of Ambient Air Quality Guideline Values and Standards ▪ **DAO 2000 - 81** – "Emission Standards for Pollution from Stationary Sources" – Mercury (<5 mg/CM) – Ban on incineration	Need to update	
Relevant National Stakeholder			
1. DENR	Role with respect to the above listed provisions: ▪ Protect the environment by regulating mercury emissions from industry: – For new facilities classified as one of the five most significant mercury source categories in terms of emissions, require BAT/BEP and ELVs – Require the implementation of one or more measures identified in Article 8.5 to control/reduce mercury emissions from existing sources listed in Annex D – Require regular monitoring reports from the identified facilities.		
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Air Quality Management Section (AQMS) of the DENR – EMB monitors emission sources, compliance to standard and formulates performance standards for stationary emission sources. ▪ The Environmental Impact Assessment and Management Division of EMB leads the implementation of the Philippine Environmental Impact Statement (EIS) System for environmentally-critical projects / undertakings and for projects in environmentally-critical areas.		
2. Private sector	Role with respect to the above listed provisions: ▪ Protect the environment and human health from the adverse effects of mercury emissions as part of their commitment to social responsibility and the promotion of rights – Comply with the requirement of monitoring and submitting regular emissions report.		
	Relevant institutional capacity in place to comply with the above listed		

	provisions: ▪ Industry players who operate facilities with significant waste emissions are required to have a Pollution Control Officer in charge of monitoring and reporting.

Article 9	Releases		
Description	This article aims to reduce mercury releases to land and water from sources not already addressed by the other provisions of the Convention.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Require reporting and/or otherwise obtain information as needed to identify significant sources of mercury/mercury compound releases to land or water, and to maintain an inventory of releases from the sources identified	present	DENR - EMB
	▪ Require one or more measures specified in Article 9.5 to control/reduce mercury and mercury compound releases to land and water from significant sources a country identifies	none	DENR - EMB
		1 out of 2	50.00%
DENR	Existing Laws and Regulations	Gaps	
	▪ **RA 9275 –** "An act Providing for a Comprehensive Water Quality Management and for Other Purposes" – IRR as per **DAO 2005 – 10** – formulate and implement a holistic national water quality management program – promote environmental strategies, use of appropriate economic instruments and of control mechanisms for the protection of water resources ▪ **DAO 2016 – 08 on Water Quality Guidelines and General Effluent Standards (WQG and GES)** – Secondary Parameters in Water Quality Guidelines (WQG) ➢ Metals (mercury, arsenic, cadmium, etc.) – Effluent Discharge Guidelines ➢ Mercury - Max of 0.008 ppm for class D and SD		

	water bodies Note: Class D and SD – navigable freshwater and marine water	
Relevant National Stakeholder		
1. DENR	Role with respect to the above listed provisions: ▪ Protect the environment by regulating mercury emissions from industry: - Require the implementation of one or more measures identified in Article 9.5 to control/reduce mercury releases from existing significant sources - Require regular monitoring reports from the identified facilities.	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Water Quality Management Section (WQMS) of DENR – EMB, in coordination with the National Water Resources Board, designates certain areas as water quality management areas where thru stakeholder collaboration, the water body and its tributaries are protected by keeping water quality within the Water Quality Guidelines or Criteria conforming to the water body's classification. ▪ The WQMS also monitors to reduce pollution loads into receiving surface waters. ▪ The Environmental Impact Assessment and Management Division of EMB leads the implementation of the Philippine Environmental Impact Statement (EIS) System for environmentally-critical projects / undertakings and for projects in environmentally-critical areas.	
2. Private sector	Role with respect to the above listed provisions: ▪ Protect the environment and human health from the adverse effects of mercury releases as part of their commitment to social responsibility and the promotion of rights – Comply with the requirement of monitoring and submitting regular releases report.	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ Industry players who operate facilities with significant waste emissions are required to have a Pollution Control Officer in charge of monitoring and reporting.	

Article 10	Environmentally-sound Interim Storage of Mercury Other than Mercury Wastes		
Description	The Convention requires countries to take measures to ensure the environmentally-sound storage of mercury that is held in various locations prior to its intended allowed use in order to prevent the possible adverse effects the stored mercury may cause.		
Important Provisions	Provisions	Policy and Regulatory	Institution

	▪ Ensure interim mercury storage is conducted in an environmentally sound manner, taking into account guidelines to be developed by the Conference of the Parties (COP)	none	DENR - EMB
		0 out of 1	0.00%
DENR	Existing Laws and Regulations	Gaps	
	▪ **DAO 2005 – 02:** "Policies and Guidelines on effective and proper handling, collection, transport, treatment, storage, and disposal of health care wastes" (joint DENR – DOH) ▪ **DAO 2006 – 001**: "Adopting Environmental Technology Verification Protocol (ETVP)" (joint DENR – DOST)	Private sector needs to be required to adopt appropriate guidelines that will be developed or taken from Minamata COP technical guidance documents	
Relevant National Stakeholder			
1. DENR	Role with respect to the above listed provisions: ▪ Lead in government efforts to provide overall guidance in the interim storage of mercury for allowed use – Develop guidelines for the interim storage of mercury for allowed use, taking into consideration the technical guidance provided by the Minamata Convention COP – Develop and implement a strategy and work plan for national adoption		
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat for the development and adoption of technical guidance documents. ▪ The various sections in the EMB including the Environmental Research and Laboratory Services Division (ERLSD) also conducts research and development activities in support of environmental and compliance monitoring as well as the study of existing and potential environmental problems and issues.		
2. DOST	Role with respect to the above listed provisions: ▪ In relation to environmental technologies particularly on the environmentally-sound interim storage of mercury for allowed use: – Promote, assist, and undertake scientific and technological research and development – Undertake policy research, technology assessment, technology development, among others – Adapt suitable imported technology when available		
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DOST is responsible for implementing the Environmental Technology Verification Protocol, supported by the DENR. Generally, this refers to the testing and demonstration of proposed technologies or		

	protocols to verify or prove claims on their functional performance with regard to all relevant parameters. ▪ The DOST also supports the conduct of research and product / process development through various offices such as the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) and the Industrial Technology Development Institute (ITDI).
3. Academe and research institutes	Role with respect to the above listed provisions: ▪ Contribute to existing body of knowledge with regard to the environmentally-sound interim storage of mercury for allowed use.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ Major universities in the country often have established science and technology research centers / institutes that can implement programmes pertaining to the research and development of relevant technologies.
4. Private sector and the industry	Role with respect to the above listed provisions: ▪ Protect from human exposure and prevent contamination to the environment during mercury storage
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ Large industry players often have the technical and financial capacity to implement strategies, protocols, and action plans for the protection of human health and the environment. Government, through DOST and DENR, can also provide technical assistance when needed.

Article 11	Mercury Wastes		
Description	Provisions in this article are focused on the environmentally-sound management (ESM) of mercury wastes and controls over their transboundary movement.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	▪ Use a definition of mercury waste consistent with Article 11.2 of the Convention	none	DENR – EMB
	▪ Manage mercury wastes in an environmentally sound manner, taking into account guidelines developed under the Basel Convention and in accordance with COP requirements to be developed	present	DENR – EMB
	▪ Restrict mercury derived from the treatment or re-use of mercury waste to allowed uses under the Convention or environmentally sound disposal	none	DENR – EMB
	▪ Require transport across international boundaries in accordance with the Basel Convention, or if the Basel Convention does not apply,	present	DENR – EMB

	consistent with international rules, standards, and guidelines		
		2 out of 4	50.00%
DENR	Existing Laws and Regulations	Gaps	
	▪ **DAO 2013 – 22** revised the previous versions in terms of the Hazardous Wastes provisions. – Taking into account the requirements agreed upon in the Basel Convention, this revised DAO provides: ➢ a detailed classification of various hazardous wastes ➢ rules and regulations for transporters, waste treaters, storage, and disposal facilities ➢ guidelines for storage and labeling ➢ provisions for personnel training ➢ importation rules of recyclable materials containing hazardous substances ➢ export rules ➢ monitoring mechanisms ➢ prohibited acts including penalties ▪ **DAO 2005 – 02**: "Policies and Guidelines on effective and proper handling, collection, transport, treatment, storage, and disposal of health care wastes" (joint DENR – DOH) ▪ **RA 9003** – "An Act Providing for an Ecological Solid Waste Management Program, Creating the Necessary Institutional Mechanisms and Incentives, Declaring Certain Acts Prohibited and Providing Penalties, Appropriating Funds Therefor, and for Other Purposes" or the "Ecological Solid Waste Management Act of 2000" – IRR as per **DAO 2001 – 34** – Hazardous wastes are not allowed in landfills and controlled dumpsites	Update **DAO 2013 – 22** and **DAO 2005 – 02** to properly define the three classifications of mercury wastes according to the Minamata Convention on Mercury, determine threshold limits and identify the appropriate management requirements for each. 1. wastes consisting of Hg 2. wastes containing Hg 3. wastes contaminated with Hg	
Relevant National Stakeholder			

1. DENR	Role with respect to the above listed provisions: ▪ Protect the environment by regulating the management and disposal of mercury wastes generated in the country – Institutionalize a legal definition and classification of different types of mercury wastes as per advice and guidance by the COP – Develop mercury wastes management guidelines, taking into account the various classifications determined by the COP and incorporating the guidelines developed under the Basel Convention including the new COP requirements – Regulate the use of mercury derived from treatment process for allowed uses or environmentally-sound disposal only ▪ Protect the environment by regulating mercury wastes flow into the country according to the Basel Convention and other applicable national legislations and regulations
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Hazardous Wastes section of DENR – EMB is responsible for implementing the provisions in the Toxic Chemicals and Nuclear and Hazardous Wastes Control Act (RA 6969) directly attributed to DENR's mandate of protecting the environment. ▪ The section is also in charge of monitoring compliance to RA 6969 and the efficient implementation of the Hazardous Wastes Manifest System.
2. DOH	Role with respect to the above listed provisions: ▪ Protect human health from exposure to mercury wastes generated in the country
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ In relation to medical wastes from health care facilities, the DOH through the HFDB is responsible for: – regulating all hospitals and other health facilities through licensure and accreditation – formulating policies, standards, guidelines, systems and procedures on the management of health care wastes – providing technical assistance to ensure an effective and efficient implementation of health care waste management programme – evaluating DOH hospitals' compliance with proper health care waste management programme
3. DOE	Role with respect to the above listed provisions: ▪ Facilitate the efficient supply and economical use of energy consistent with the approved national economic plan and with the policies of environmental protection and conservation and maintenance of ecological balance.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ In tandem with the DENR, the DOE is co-implementing a joint administrative order, providing the Lighting Industry Waste Management Guidelines to mitigate the negative impacts of mercury and other toxic chemicals contained in lighting products.
4. DOF	Role with respect to the above listed provisions: ▪ Protect the country's borders from the influx of illegal mercury through

	both formal and informal channels
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The EPU – ESS in the Bureau of Customs (BOC) under the DOF monitors the processing of all importation of hazardous chemicals, waste products, and/or recyclable products in accordance with the Imports and Assessment System and taking into consideration the country's environmental laws aligned with the various Multilateral Environmental Agreements (MEA).
5. Waste generators, transporters, handlers, and treatment / disposal facilities	Role with respect to the above listed provisions: ▪ Protect human health and the environment by implementing environmentally-sound practices in the management and disposal of mercury wastes – Comply with DENR – EMB regulations
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ These groups are required by law to comply with all requirements and procedures in relation to the generation, storage, transport, treatment, and disposal of wastes.
6. DILG	Role with respect to the above listed provisions: ▪ Support national government agencies in the implementation of laws, policies, and regulations through local ordinances and mechanisms that facilitate local implementation.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ LGUs at the city and municipal levels are often involved in the implementation of environmental laws at the local level through the City Environment and Natural Resources Office (CENRO) and the Municipal Environment and Natural Resources Office (MENRO).

Article 12	Contaminated Sites		
Description	This article calls for the creation and adoption of guidance in approaching mercury contaminated sites. It is essentially a set of capacity building provisions, with governments largely left to their own devices in developing the legal framework, and the financial and technical capability to support preferred risk management options and their measures.		
Important Provisions	Provisions	Policy and Regulatory	Institution
	• Develop strategies for identifying and assessing mercury/mercury compound contaminated sites	none	DENR - EMB
	• If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate	none	DENR - EMB
		0 out of 2	0.00%
DENR	Existing Laws and Regulations	Gaps	

	▪ **RA 6969, RA 8742, RA 9275, and RA 9003** – – Some existing guidelines and standards for maximum allowable mercury levels in wastes, water discharges, and air emissions – Some form of environmental fund that can be tapped or replicated to fund risk management measures for identified contaminated sites	1. No legal definition of Hg contaminated sites 2. No long-term mechanism to deal with issues related to Hg contaminated sites (i.e. ad-hoc / task force) 3. Identifying Hg contaminated sites is not conducted proactively. 4. Lack of capacity to manage the risks associated with Hg contaminated sites
Relevant National Stakeholder		
1. DENR	Role with respect to the above listed provisions: ▪ Lead in government efforts to identify, manage, and implement risk reduction measures in relation to mercury contaminated sites in the country – Develop national strategies on contaminated sites – Develop national approaches and guidelines on the identification and management of mercury contaminated sites	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR has created special task forces to deal with the urgent issues surrounding locations with verified elevated levels of toxic chemicals.	
2. DOH, DOLE, DOST, and other relevant government agencies and offices	Role with respect to the above listed provisions: ▪ Support the government process of identification, management, and implementation of risk reduction measures in relation to mercury contaminated sites in the country through data gathering, research, and other programmes	
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ These government agencies and offices, through a Special Order, are involved in special task forces for contaminated sites as needed.	

Article 13	Financial Resources and Mechanism
Description	This article establishes a financial mechanism, providing financial assistance to developing countries to facilitate the effective implementation of the Convention.
Important Provisions	▪ Access domestic resources as may be needed to implement Convention obligations ▪ Particularly for developing countries, access financial resources available under the Convention financial mechanism and other resources available from multilateral, regional, and bilateral funding sources
Relevant National Stakeholder	
1. DENR	Role with respect to the above listed provisions: ▪ Focal point for the coordination of government activities to access financial assistance from the Convention mechanisms described in this

	article
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR has existing national operating focal points for both the Global Environment Facility (GEF) and the Strategic Approach to International Chemicals Management (SAICM).

Article 14	Capacity-building, Technical Assistance, and Technology Transfer
Description	This article promotes cooperation among Parties to provide, within their respective capabilities, timely and appropriate capacity-building and technical assistance to developing countries, assisting them in implementing their obligations under the Convention.
Important Provisions	▪ cooperate to provide capacity building and technical assistance to developing countries, within their respective capabilities. ▪ Cooperate to promote and facilitate the development, transfer, and diffusion of and access to up-to-date environmentally-sound alternative technologies to developing country Parties
Relevant National Stakeholder	
1. DENR	Role with respect to the above listed provisions: ▪ Focal point to coordinate and facilitate the delivery of capacity building and technical assistance to comply with Convention obligations, including technology transfer of up-to-date environmentally-sound alternative technologies
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat in relation to provisions for capacity building activities and technical assistance. ▪ The various sections in the EMB including the Environmental Research and Laboratory Services Division (ERLSD) also conducts research and development activities in support of environmental and compliance monitoring as well as the study of existing and potential environmental problems and issues.
2. DOST	Role with respect to the above listed provisions: ▪ Represent the government in coordination with DENR on engagements in relation to technology transfer under the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DOST is responsible for implementing the Environmental Technology Verification Protocol, supported by the DENR. Generally, this refers to the testing and demonstration of proposed technologies or protocols to verify or prove claims on their functional performance with regard to all relevant parameters. ▪ The DOST also supports the conduct of research and product / process development through various offices such as the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) and the Industrial Technology Development Institute (ITDI).

<table>
<tr><td>Article 16</td><td colspan="3">Health Aspects</td></tr>
<tr><td>Description</td><td colspan="3">This article provides guidance to health ministries on the activities they can undertake to minimize the mercury exposure of vulnerable populations, and the adverse consequences of such exposures.</td></tr>
<tr><td rowspan="6">Important Provisions</td><td>Provision</td><td>Policy and Regulatory</td><td>Institution</td></tr>
<tr><td>▪ Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines</td><td>present</td><td>DOH</td></tr>
<tr><td>▪ Promote occupational exposure educational and prevention programs</td><td>present</td><td>DOH</td></tr>
<tr><td>▪ Promote prevention, treatment, and care services for affected populations</td><td>present</td><td>DOH</td></tr>
<tr><td>▪ Strengthen institutional and professional capacities for addressing health risks associated with mercury exposure</td><td>present</td><td>DOH</td></tr>
<tr><td colspan="2"></td><td>4 out of 4</td><td>100.00%</td></tr>
<tr><td colspan="4">Relevant National Stakeholder</td></tr>
<tr><td rowspan="2">1. DOH</td><td colspan="3">Role with respect to the above listed provisions:
▪ Protect human health from the adverse impacts of mercury exposure
– Develop and implement national strategies to protect the general public particularly the vulnerable population from mercury exposure
– Implement plans to promote prevention, treatment and care services
– Develop institutional and professional capacities to implement risk reduction measures in relation to the negative impacts of mercury exposure to human health</td></tr>
<tr><td colspan="3">Relevant institutional capacity in place to comply with the above listed provisions:
▪ The DOH leads an inter-agency committee on environmental health, focusing on technical collaboration, effective monitoring and communication, resource mobilization, policy review and development for the promotion of environmental sanitation, environmental health impact assessment and occupational health. It is composed of five sectoral task forces on water, solid waste, air, toxic and chemical substances and occupational health.
▪ The DOH has also identified focal points within the Department for the implementation of the Minamata Convention on Mercury in relation to this article.</td></tr>
<tr><td rowspan="2">2. DILG</td><td colspan="3">Role with respect to the above listed provisions:
▪ Support the implementation of the country’s health programmes at the local level.</td></tr>
<tr><td colspan="3">Relevant institutional capacity in place to comply with the above listed provisions:
▪ The DILG provides assistance to LGUs in the form of institutional strengthening and capacity building activities to enable them to</td></tr>
</table>

	implement health programmes at the local level. ▪ LGUs implement health programmes at the local level through the different city, provincial, and municipal health centers.
3. DOLE	Role with respect to the above listed provisions: ▪ Promote occupational exposure educational and prevention programs
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The OSHC under DOLE provides expertise and establishes intervention mechanisms to improve workplace conditions in the country. It regularly monitors work environment and conduct medical examinations of workers. It also develops and implements occupational safety and health training programs as needed. ▪ The OSHC spearheaded the creation of the Chemical Safety Information Network (CSIN) in the Philippines to provide, disseminate accurate, relevant and timely information on chemical safety. It promotes coordination and collaboration among government agencies, employers' organizations, workers' organizations, academia and non-governmental organizations for the better management of the use of chemicals and communication of risks due to chemicals.

Article 17	Information Exchange
Description	This article focuses on the exchange of information between countries.
Important Provisions	▪ Facilitate the exchange of information indicated in Article 17 of the Convention ▪ Designate a national focal point for the exchange of information under the Convention ▪ Share information on the health and safety of humans and the environment as non-confidential, in accordance with Article 17.5 of the Convention
Relevant National Stakeholder	
1. DENR	Role with respect to the above listed provisions: ▪ Country focal point to coordinate and facilitate information exchange as per this article of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat in relation to provisions for information exchange.
2. Other government agencies	Role with respect to the above listed provisions: ▪ Support the provisions in this article by sharing timely information to DENR.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ Reporting mechanisms and inter-agency communication systems are in place. The Cabinet Cluster system is also operational and can be tapped for this purpose.

Article 18	Public Information, Awareness, and Education

Description	Provisions in this article identify key information that governments need to share with the public and the mechanisms that can be employed for public awareness-raising.
Important Provisions	▪ Collect and disseminate information on annual quantities of mercury and mercury compounds emitted, released, or disposed; and other information specified in Article 18 of the Convention
Relevant National Stakeholder	
1. PIA	Role with respect to the above listed provisions: ▪ Disseminate information, in collaboration with national government agencies, to raise public awareness about mercury, its effects to both human health and the environment, and the country's efforts to comply with the obligations under the Minamata Convention.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The Philippine Information Agency (PIA) works with the Office of the President, National Government Agencies, and other public-sector entities in communicating their programs, projects, and services to the Filipino people through its 16 regional offices and information centers in 72 provinces across the Philippines.
2. DepEd	Role with respect to the above listed provisions: ▪ Safeguards the rights of current and future generations to enjoy a healthy environment and to protect themselves from the negative health effects of mercury through information dissemination about mercury in both the normal curriculum and the alternative learning system (ALS).
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The required revisions and new inclusions to the basic education curriculum is handled by the Department of Education through the Bureau of Curriculum Development (BCD) while the development of learning materials is led by the Bureau of Learning Resources (BLR) and delivery by the Bureau of Learning Delivery (BLD).
3. DOLE	Role with respect to the above listed provisions: ▪ Facilitates the provision for training related to mercury in the work environment.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DOLE monitors and ensures that workers receive adequate information and training on workplace safety in accordance with the Labor Code of the Philippines. ▪ The OSHC develops and implements occupational safety and health training programs as needed.
4. TESDA	Role with respect to the above listed provisions: ▪ Facilitates the inclusion of topics related to mercury in skills-based training programs.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ TESDA is the country's expert in the management and supervision of technical education and skills development (TESD) in the Philippines. Central to this is the delivery of technical, vocational, education, and training (TVET) through various modalities including school-based,

	center-based, enterprise-based and community-based approaches.
5. DENR and other relevant government agencies	Role with respect to the above listed provisions: ▪ Facilitates the exchange of information at the national level, working in close collaboration with the PIA.
	Relevant institutional capacity in place to comply with the above listed provisions: Government agencies have their own respective offices that handle information dissemination. In DENR, for instance, there is the Environmental Education and Information Division (EEID) under the EMB

Article 19	Research, Development, and Monitoring
Description	This article seeks cooperation among countries to develop and improve on key areas of research, development, and monitoring, taking into account respective circumstances and capabilities, that can support effective implementation of the Convention.
Important Provisions	▪ Cooperate to develop and improve the key areas identified in Article 19 in relation to research, development, and monitoring
Relevant National Stakeholder	
1. DOST	Role with respect to the above listed provisions: ▪ Represent the government in coordination with DENR on engagements in relation to research and development under this article of the Convention.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DOST also supports the conduct of research and product / process development through various offices such as the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) and the Industrial Technology Development Institute (ITDI).
2. DENR	Role with respect to the above listed provisions: ▪ Provide support and coordination within government and with COP members in relation to research and development under this article of the Convention.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat regarding Convention matters. ▪ The various sections in the EMB including the Environmental Research and Laboratory Services Division (ERLSD) also conducts research and development activities in support of environmental and compliance monitoring as well as the study of existing and potential environmental problems and issues.

Article 20	Implementation Plans
Description	This article provides Parties with the necessary guidance in the preparation of a National Implementation Plan (NIP) for mercury.
Important Provisions	▪ Encouraged to develop and execute an implementation plan and transmitted to the Convention Secretariat as soon as it is developed

Relevant National Stakeholder	
1. DENR	Role with respect to the above listed provisions: ▪ Country focal point to coordinate and facilitate information exchange as per this article of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat regarding Convention matters. ▪ Has developed NIPs for other MEAs such as the Stockholm Convention for Persistent Organic Pollutants (POPs).
2. Other government agencies	Role with respect to the above listed provisions: ▪ Provide support for the development of a National Implementation Plan (NIP) for mercury.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ Government agencies and offices are represented in various Inter-agency Technical Work Groups.

Article 21	Reporting
Description	Parties are expected to provide information on a regular basis pertaining to a). measures taken to implement the provisions of the Convention, the effectiveness of such measures, and the possible challenges in meeting the objectives of the Convention, and b). information as called for in Articles 3, 5, 7,8, and 9.
Important Provisions	▪ Report to the COP on progress in implementing Convention obligations under Article 21 of the Convention
Relevant National Stakeholder	
1. DENR	Role with respect to the above listed provisions: ▪ Country focal point to coordinate and facilitate information exchange as per this article of the Convention
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR – EMB has been the country focal point for the implementation of the Basel, Rotterdam, and Stockholm (BRS) and has coordinated with the BRS Secretariat regarding the country's reporting obligations.
2. Other government agencies	Role with respect to the above listed provisions: ▪ Provide timely information as per the Convention requirements on reporting.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ National government agencies provide regular annual reports on key outputs and outcomes as required by the different Departments.

Articles 6, 15, 22, 23, and 24	Exemptions Available to a Party upon Request Implementation and Compliance Committee Effectiveness Evaluation

	Conference of the Parties Secretariat
Relevant National Stakeholder	
1. DENR and DFA	Role with respect to the above listed provisions: ▪ Represent the country in the Mercury Convention COP and participate in discussions and other activities administrative in nature.
	Relevant institutional capacity in place to comply with the above listed provisions: ▪ The DENR, in coordination with DFA has been representing the country in the BRS Triple COPs.

ANNEX 6: LIST OF CONTRIBUTORS

This list enumerates the names of the offices that have contributed to the report either through providing direct information and data or by participating in interviews, focus group discussions (FGD), and consultations.

Main author and National MIA consultant: **Engr. Teddy G. Monroy, M.S. Ch.E.**
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Public Sector		**Private Sector / Others**
Bureau of Local Government Development, Department of Interior and Local Government	**Fertilizer and Pesticide Authority, Department of Agriculture**	**BAN Toxics**
Bureau of Product Standards, Department of Trade and Industry	**Food and Drug Administration**	**Chevron**
Commission on Higher Education	**Jose Panganiban, Camarines Norte Local Government Unit**	**De La Salle University**
Disease Prevention and Control Bureau, Department of Health	**Metals Industry Research and Development Center, Department of Science and Technology**	**Ecowaste Coalition**
Energy Research and Testing Laboratory, Department of Energy	**Mines and Geosciences Bureau – Region IV-B, Department of Environment and Natural Resources**	**Healthcare Without Harm Asia**
Environmental Control Division, Occupational Safety and Health Center, Department of Labor and Employment	**Mt. Diwata, Compostela Valley Local Government Unit**	**International Association of Oral Medicine and Toxicology**
Environmental Management Bureau – Central Office, Department of Environment and Natural Resources	**Philippine Commission on Women**	**International Labor Organization**
Environmental Management Bureau – National Capital Region, Department of Environment and Natural Resources	**Philippine Economic Zone Authority**	**Petron**
Environmental Management	**Philippine Nuclear Research**	**Philippine Dental Association**

Bureau – Region III, Department of Environment and Natural Resources	**Institute, Department of Science and Technology**	
Environmental Management Bureau – Region V, Department of Environment and Natural Resources	**Policy Development and Planning Bureau, Department of Social Welfare and Development**	**Philippine Hospital Association**
Environmental Management Bureau – Region VII, Department of Environment and Natural Resources	**Professional Regulation Commission**	**Pilipinas Shell**
Environmental Management Bureau – Region XI, Department of Environment and Natural Resources	**Puerto Princesa, Palawan Local Government Unit**	**SPIK**
Environmental Protection Unit, Enforcement and Security Service, Bureau of Customs	**TESDA**	**United Nations Industrial Development Organization**

2018 Philippine Mercury Inventory

Report to the Department of Environment and Natural Resources

Teddy M. Monroy, M.S. ChE
MIA Consultant
October 2019

Philippine Mercury Inventory Report 2018:

The Philippine Minamata Initial Assessment Report (MIA)

Executive Summary

This report provides an inventory of the annual distribution of mercury from anthropogenic sources, through mercury-related goods and industries, in the Philippines for base year 2018. As part of the Minamata Initial Assessment, the project updated country's mercury inventory in accordance and guidance using UNEP Toolkit for Identification and Quantification of Mercury Releases[1] as the basis for the framework. The general methodology for the inventory involves identification and data collection of activity rates of the wide-range possible mercury sources, coupled with calculations determining mercury quantities mobilized and entered the country (Inputs) and the rate of mercury released into the different emissions to the environment such as in air, land, water, as waste and in products (Output). Compared to its predecessors, the current inventory makes use of updated input and output factors from the local or regional mercury studies and UNEP Toolkit framework that enhanced the reports certainty. Moreover, the major gaps from the previous inventory that were addressed by this report from the previous inventory are the following: (i) using an input and output mercury factor for ASGM from a local published study, (ii) Consideration of the impact of the mercury-containing cosmetic product in the local market; (iii) activity rates that are based on population or general assumption are calculated incorporating local assumptions to increase certainty. In general, the inventory considered wider range of mercury emission sources and increased estimate certainties.

[1] UNEP Toolkit 2.0 ver. 1.4 (UNEP, 2017)

Philippine Mercury Inventory Report 2018:

The Philippine Minamata Initial Assessment Report (MIA)

Estimated Mercury Inputs and Outputs

The primary results of the assessment are summarised below:

Source category	Calculated Hg output, Kg/y						Total releases by source category	Percent of total releases
	Air	Water	Land	By-pro-ducts and impuritie s	General waste	Sector specific treatment /disposal		
Extraction and use of fuels/energy sources	2,412.6	604.1	33.8	1,031.2	6.0	332.8	4,421	1.63%
Primary (virgin) metal production	147,116.8	3,331.7	49,090.8	803.4	-	9,441.8	209,785	77.59%
Production of other minerals and materials with mercury impurities	1,300.7	-	-	516.5	0.050	956.7	2,774	1.03%
Intentional use of mercury in industrial processes	-	-	-	-	-	-	-	0.00%
Consumer products with intentional use of mercury (whole life cycle)	753.1	30,932.6	2,516.8	-	1,675.8	26.6	35,905	13.28%
Other intentional product/process use	869.9	2,157.1	837.2	1,735.5	2,125.1	373.4	8,098	3.00%
Production of recycled metals	5.2	0.0	5.3	-	5.2	0.1	16	0.01%
Waste incineration and burning	-	-	-	-	-	-	-	0.00%
Waste deposition/landfilling and waste water treatment	45.7	3,842.4	365.3	-	2,278.0	1,526.1	8,057	2.98%
Crematoria and cemeteries	145.1	-	1,178.8	-	-	-	1,324	0.49%

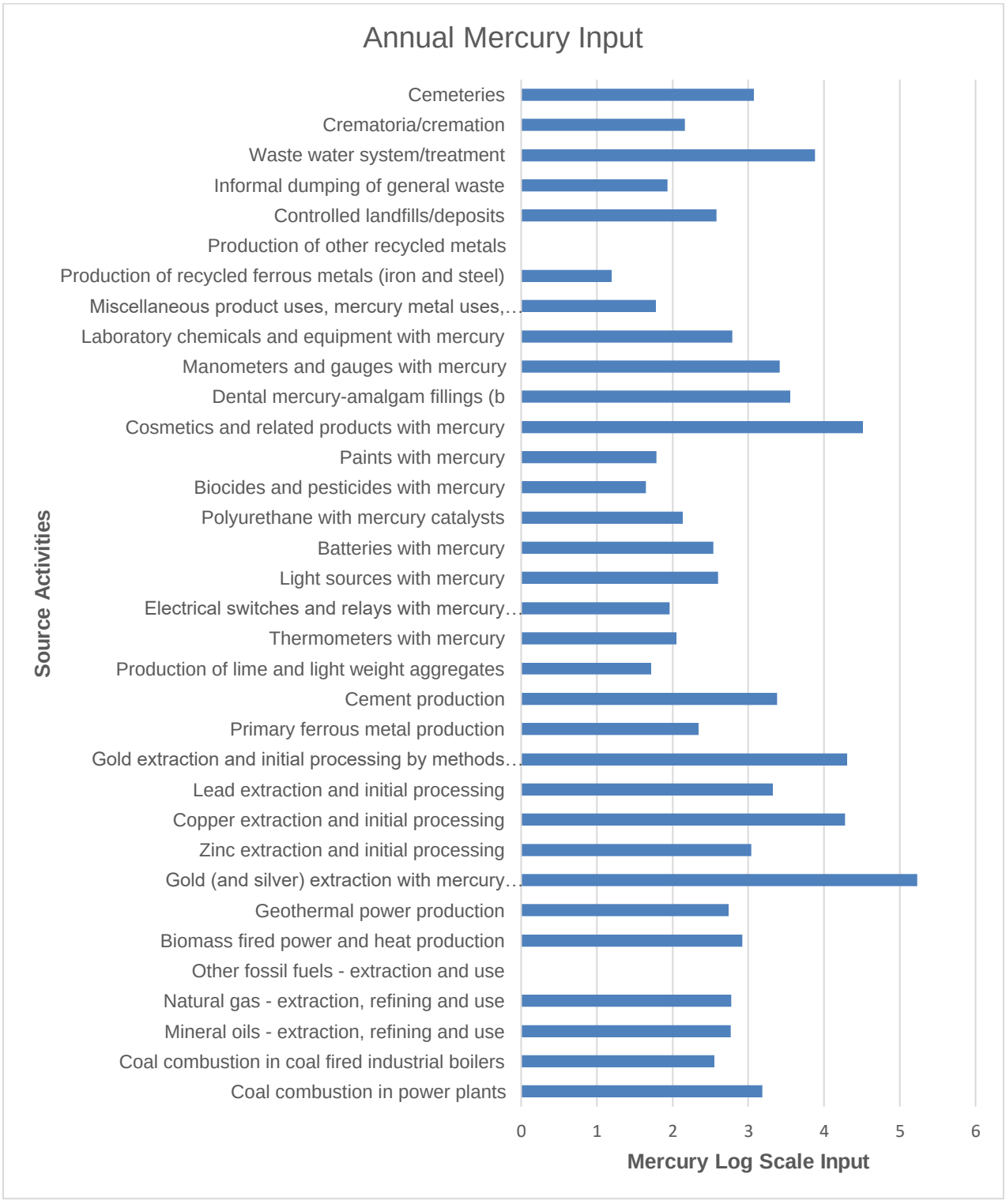
Totals	**152,649**	**37,071**	**53,959**	**4,087**	**6,090**	**12,657**	**270,379**	**100%**

Primary metal production has the greatest estimated release of mercury among the category sources due to the rampant use of liquid mercury as amalgam for gold extraction for small-scale gold miners. There is also a prevalence of release from consumer products that contains mercury. Smuggled whitening and skin products found and sold in the country contains mercury levels that are way beyond the regulation limits.

Other contributing category source on mercury emission are extraction and use of fuel and other processes that involves intentional mercury use. Extraction and use of geothermal energy for power production releases the most mercury for the fuel use category. While, the prevalent use of mercury in dental amalgamation generates the highest mercury release of intentional use of mercury. Although relatively insignificant compared to the generation from ASGM, the identification of mercury releases from the rest of the sub-categories provides a significant releases from each of their own categories

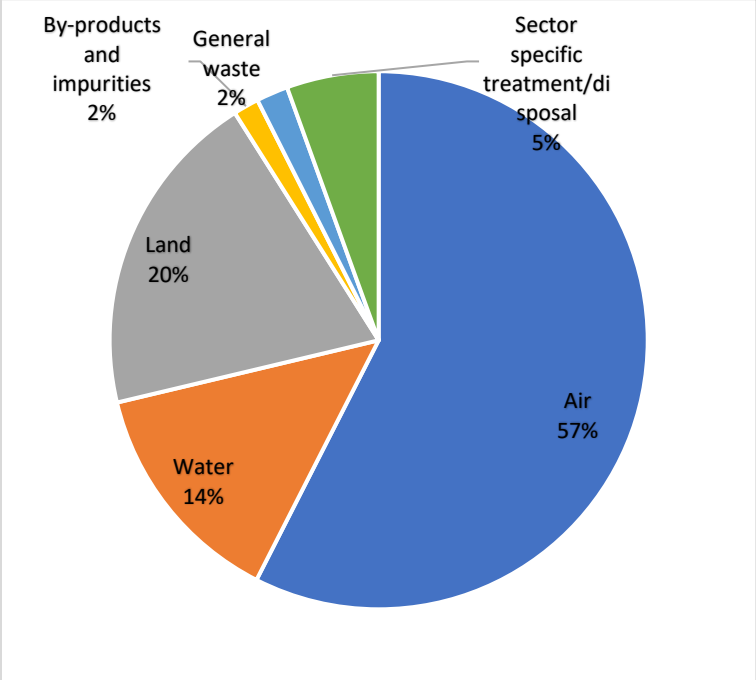
Estimated Inputs and Outputs

The relative annual mercury input from individual sources identified in the inventory are illustrated in the figure below.



As shown, the source category that poses the greatest quantity of mercury release is the primary (virgin) metal production, specifically the use of mercury in artisanal small-scale gold mining (ASGM). Although there is already a ban on the use of mercury on the gold mining in the country, the extensive use mercury in recovery of gold prevails due to its cheap availability on the underground market and also due to the fact that the industry is a major subsistence source of income for the people who are living on and near mining areas. Apart from the artisanal gold-mining sector, another source stream that has a significant bulk of emission is associated with the extraction of very large volume of ore in gold mining. These ores contain a trace amount of mercury which is released to land through the mine tailings.

It is also important to highlight that there are significant and presence amount of mercury, in other consumer products/use such as mercury-containing consumer products. The prevalence of the mercury-laden cosmetic products in informal and underground market and increases the release of mercury through domestic public usage. Although there is a decrease in the sales of mercury-containing devices, significant quantity of mercury from these obsolete devices are still in stock and needs to be properly disposed. These mercury in stock are not mobilized into the environment, however there is still a chance of mercury release to the environment when breakage occurs.



Mercury Release to the Environment

Philippine Mercury Inventory Report 2018:

The Philippine Minamata Initial Assessment Report (MIA)

INTRODUCTION

This report summarizes the Philippines' annual inventory of mercury and mercury-containing products from different anthropogenic sources and activities for base year 2018. It has been produced as part of the project by Department of Environment and Natural Resources-Environmental Management Bureau and UNEP. The report updates the previous inventories that was made last 2008[2] and 2015[3].

The inventory was done using the suggested framework provided in the UNEP Toolkit for identification and quantification of mercury releases (The UNEP Toolkit 2.0 ver. 1.4). It aims to assist through a knowledge base the countries in identifying and quantifying mercury release estimates-which are an essential information needed for a better decision-making on building policies regarding mercury release control and monitoring measure and communications with stakeholders.

A. Background

The Minamata Convention on Mercury (MC) is a global treaty created to protect human health and the environment from the adverse effects of mercury[1]. The Convention highlights the urgent need for the global community to control, and in some cases to prohibit the extraction, manufacture, use, trade, storage and disposal of mercury, mercury compounds, and products containing mercury in the attempt to minimize, if not eliminate, anthropogenic emissions and releases to various media, throughout the entire life cycle, that lead to environmental degradation and hazardous human exposure.

The Convention contains 35 articles and several annexes that list down recommendatory as well as legally-binding provisions surrounding globally-significant concerns pertaining to mercury such as the operations of existing mercury mines, mercury use in a number of products and processes, emissions to air, releases to land and water, and the informal sector of artisanal and small-scale gold mining (ASGM). It also talks about technical issues around interim storage of mercury for allowed use, waste management, treatment and disposal, sites contaminated by mercury, and other health-related matters.

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[2] 2008 Mercury Inventory of the Philippines

[3] Mercury Inventory of The Philippines 2015

Philippine Mercury Inventory Report 2018:

The Philippine Minamata Initial Assessment Report (MIA)

The Convention was signed on 10 October 2013 by the Philippine government at the Conference of Plenipotentiaries held in Kumamoto, Japan. The country's agreement to the Convention text ushered in renewed efforts to build national capacities, establish legal and policy frameworks, and promote information sharing and dissemination toward the future ratification of the Convention. The Convention was set into force on 16 August 2017 with 72 states[2] successfully depositing their respective instruments of ratification, acceptance, approval, and accession to the Minamata Secretariat. To date, most of the ASEAN countries are officially parties to the Convention. The Philippines has yet to ratify it through the Philippine Senate.

While the ratification of the Convention provides parties with global - best tools, technical and financial support to protect their people and the environment they live in from the negative impacts of mercury, mercury compounds, products containing mercury and mercury – containing wastes, being a party to the Convention also creates legal obligations for all parties to comply with. The Minamata Initial Assessment (MIA) is an enabling activity financially-supported by the Global Environment Facility (GEF) to assist countries in (1) strengthening national decision-making toward ratification of the Minamata Convention on Mercury and (2) building national capacities toward implementation of future obligations[3].

Countries are encouraged to undertake an MIA project to help assess their readiness for being a party to the Minamata Convention as indicated in Article 20 of the Convention text. The needed government structures, coordination mechanisms, technical capacity, and financial implications has to be fully understood. According to the GEF, the MIA should also be able to provide basic and essential level of information to (1) enable policy and strategic decisions to be made and (2) assist in plans that identify priority activities within a country. The MIA project allows countries to undertake a mercury inventory, determine and agree upon the measures it will take to implement the Convention, estimate associated costs, and communicate this information in a concise and clear manner, among other requirements stipulated in the "Initial Guidelines for Enabling Activities for the Minamata Convention on Mercury" published in 2013 by the GEF.

In July of 2017, the Philippines began its MIA project led by the Department of Environment and Natural Resources and managed by the Environmental Management Bureau (DENR-EMB).

B. Methodology

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The methodology employed for this report was the UNEP Toolkit 2.0 ver. 1.4 published in 2017. The toolkit take account the general approach and procedure using the framework are as follows:

1. Review the information given in the Toolkit for each of the category sources and assess its applicability to the local context;
2. Obtain updated activity data and relevant mercury release informations from the different appropriate data source such as government agencies, industry players, and key focal persons, association and organizations; and,
3. And, calculation of mercury input and output using the Toolkit spreadsheet and drafting of relevant subsections and analysis of the report.

Mercury Inventory

A mercury inventory is one of the most critical information contained inside a Minamata Initial Assessment. It provides a snapshot of the country's national situation regarding the estimated annual volume of mercury and the different pathways that these can take on their way to the environment. Identifying the information sources of mercury is an important first step in establishing a country's mercury inventory. It helps map out the places where data can be collected to complete the inventory. The UNEP Toolkit Level 2 provides a list of possible sources of mercury a country may consider as part of its national inventory. The list is no way limiting and each country can include other sources relevant to the country that may not be in the proposed list.

The Department of Environment and Natural Resources conducted a national mercury inventory in 2008 and in 2015. These, however, need to be further refined using the updated UNEP Toolkit Level 2 version 1.4. The succeeding sections of this report will provide an assessment of the current 2018 Mercury Inventory.

A. Inventory Methodology

A.1 The UNEP Mercury Toolkit

First published in November 2005, the toolkit was intended to offer a methodology embedded with database to enable a consistent regional or national mercury inventory. The toolkit comes comprises of recommended procedures and compilation of data on mercury resources and emission inventories. This recommended methodology and framework using UNEP Toolkit ultimately intends to come up with comparable sets of mercury inventory that will enhance international co-operation and discussion when it comes to mercury management.

This inventory report made use of the latest UNEP Tool 2.0 ver. 1.4, which was published last 2017. The previous inventories of 2008 and 2015 was produced using the former version of the toolkit. The UNEP Toolkit 2.0, is a two-level assessment which includes 1) an overview level and, 2) a detailed assessment of sources. Moreover, the Level 2 assessment was designed to be adaptable to the differences of the region that would use the toolkit at the same time ensuring a positive identification of the significant mercury emission resources. However, it must be stress out that the toolkit is still just a screening tool and use to provide bulk quantification of sources rather than attaining a 100 per cent accuracy.

Both the 2015 and this current inventory are based on the Level 2 option. The toolkit also includes an Excel Spreadsheet, which has been used for this assessment.

A.2 Toolkit Methodology

The toolkit identified the potential major source categories[4] of mercury emissions which are as follows:

1. Extraction and use of fuels/energy sources
2. Primary (virgin) metal production
3. Production of other minerals and materials with mercury impurities
4. Intentional use of mercury in industrial processes
5. Consumer products with intentional use of mercury
6. Other intentional product/process uses

[4] These sources are identified on the Chapter 5 of the toolkit, thus number as 5.1, 5.2 and so on.

7. Production of recycled metals (secondary metal production)

8. Waste incineration

9. Waste deposition/landfilling and wastewater treatment

10. Crematoria and cemeteries

11. Identification of potential hot-spots

A.3 UNEP Toolkit Terminologies

The following are the key terminologies used in the toolkit:

Inputs: quantities of mercury brought into, or mobilised, within the country.

Outputs: quantities of mercury released into different environmental compartments of air, water, land, and releases in wastes or in products.

A.4 Estimation of Inputs and Outputs

Estimating the inputs and outputs starts with identification of the annual activity rate of a process or a mercury-containing good which can be based on the quantities of raw material used, annual production rate or population usage which is applicable. It is then multiplied by the mercury content of the input material.

The outputs are calculated using the available release information from the various environmental compartments from each mercury source. This information takes individual factors showing the proportion of mercury input distributed to the different environmental pathway. The pathways that are identified are land, air

The overall calculation of emission estimates is shown as:

*Estimated mercury release to each pathway = activity rate * input factor * output distribution factor for that pathway*

A.5 Toolkit Default Factors

UNEP Toolkit 2.0 also provides default inputs and output factors for some of the category sources . These default factors are peer-reviewed and are intended to be used when national data are not available. These input and output factors are ranges of values. This toolkit default factors have been employed for many of the current estimates.

A.6 Reference year

The reference year for this inventory is the 2018 calendar year, and the activity data for this year has been used as possible. However, earlier data not later than 2016 was also used and has been noted when necessary.

A.7 Reporting

The estimated inputs and outputs have been reported as kilogram mercury per year. Each estimate also comes with certainty assessment based on the following criteria:

Activity data:

- **High certainty**- when the assessment was based on a data that is a national, industry specific or comprehensive survey data;
- **Medium certainty**- when the data is limited in availability, or modified to account for certain factors
- **Low certainty**- when the data is not available, and the data is based on subjected assessment.

Input and output estimates

- **High certainty**- assigned if the mercury input and/or output factor or emission data is available for specific sources;
- **Medium certainty**- if the assigned mercury input and/or output factor or emission data was limited in availability for the source category.
- **Low certainty**- there is no available data for mercury input and/or output factor or emission data locally for source category.

A.8 Precision

The inputs and outputs have been calculated to 1-3 decimal places. However, the estimates have been rounded off when calculating overall totals to reflect uncertainties in the estimates. Thus, there might be a small and light discrepancies from the total shown and the sums of the displayed data.

A.9 Reservoir and Stocks

This report's highlights are the Philippines' annual mercury inputs and releases. However, there are also significant number of in-use stocks or reservoir of mercury and mercury-containing products. This is a special inventory since this reservoir might be still in use or still in user's premises without any disposal plan. Some of these would be mercury-containing medical and wall thermometer, sphygmomanometer, and medical other devices has been phased-out under "Administrative Order No. 21 on the Gradual Phase-out of Mercury-containing Devices in all Philippine Health Care Facilities". However, these reservoirs could not be accounted for any emission since they are still in encased within a product, an estimate on their breakage must be accounted. These reservoirs or stock have been noted on relevant points on this report and have been identified separately in the summaries.

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1. Extraction and Use of Fuel/Energy Sources

This source category covers the mercury release during the production and use of all forms of energy which would include use of fossil fuel, extraction and production of crude and mineral oil, and natural gas, use of biomass and geothermal power[5]. The sub-categories that includes power-generating stations fired by fossil fuels, biomass, natural gas and combustion of other fuels. Moreover, this would also include the use and production of petroleum-based products in transportation and domestic energy and heat production. The main environmental pathway of the mercury release from this source category are in air, water and wastes/residue. Notably, there can also be direct emission through land in domestic heating or use of fuels for cooking and heating which occurs when the residues are directly dumped on the ground.

Table 1.1 Toolkit Screening Matrix for Extraction and use of fuels/energy sources

Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
Coal combustion in large power plants	✓	•	•	•	✓	OW
Other coal combustion	✓	x	•	•	•	OW
Extraction, refining and use of mineral oil	✓	✓	•	•	•	PS/OW
Extraction, refining and use of natural gas	✓	✓	✓	x	✓	PS

[5] Based on the UNEP

Extraction and use of other fossil fuels	✓	•	•	x	•	OW
Biomass fired power and heat production	✓	•	•		•	OW
Geothermal power production	✓	x	x	x	x	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

1.1 Coal combustion in large power plants

In this inventory, large power plants are power-generating plants that has a capacity of 300MW[6]. As of 2018, coal-power plants generate a total of 51,932 GW of electricity. Coal power plants comprises 53% of the country's electricity source[7]. Most of these large coal power plants uses (Coal technologies used in the Philippines). Most of these powerplants are fuelled by coal that are 75% imported and 25%

Coal has been long used since the first industrial revolution as a main energy source because of its relatively high calorific value and its abundance in nature. There is various type of coal and its usage highly depends on the application's heat and economy requirements. Coal used in both mass heating and power generation varies depending on the technology on which the plant

[6] UNEP Toolkit 2.0 ver 1.4 (2017)
[7] Department of Energy.(2017).*2017 Power Statistics*

is operating[8] . Most of the coal used for power generation ranges from sub-bituminous to bituminous which has a calorific value of (caloric range for sub-bituminous and bituminous) which are largely imported from Indonesia, Vietnam and Australia[9] as raw coal. Locally, Semirara Mining Corporation's Unong Mine in the island of Semirara is accounted to the majority, 90%, of the locally mined sub-bituminous coal [10] (Ewart, 20003).

Mercury input for coal varies on their geographical sources. Imported coal from Indonesia, Australia and Vietnam have reported to have a mercury levels of 0.03 mg Hg/ kg coal, 0.032 mg Hg/ kg coal, 0.28 mg Hg/ kg coal respectively. Moreover, the locally- sourced coal has a mercury input of 0.04 mg Hg/kg coal[11]. Most of this mercury input upon combustion in large powerplant are emitted to the environment through the air and ash residue. The distribution on these pathways relies on the employed emission control and type of coal used, and for the Philippines most power plants uses electrostatic precipitator to control particulate emission from combustion. In this report, the recommended emission distribution that will be used as per UNEP toolkit will be 10% ash dumped in an ash reservoir and 90% to air.

Table 1.1 Input and Output Estimates for Coal Combustion in Large Power Plants

Subcategory	Activity Rate, ton/year	Mercury content, g Hg/ton Coal	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr				
				Air	Water	Land	Products	Sector specific disposal
Coal Consumption in Large Power Plants for electricity generation	26,172,894	0.03-0.28	1,522.61	453.59	178.63	-	671.99	218.40

[8] Site ka ng refernce backla
[9] Base on the *DOE 2017 Power Statistics* the importation shares for coal is 88.30% Indonesia, 6.29% Australia, 0.99% Vietnam and 2.31% from other country (Russia, Korea, China, Malaysia).
[10] Ewart, D. (2003). *Southeast Asia: Coal Review*
[11] UNEP Toolkit 2.0 ver 1.4 (2017)

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **HIGH** (Input factors used where based on published data for both local and imported coal)

Output Estimate: **LOW** (Based on toolkit)

1.2 Other Coal Combustion

This subcategory covers all other uses of coal, which includes the use of coal as energy source for smaller power generations and combustion plants from different sectors. These would include industrial boilers and combustion which uses either biomass or traditional fuel such coal. In this report, the considered fuel for the report. The report includes the coal importation consumed by the cement industries for power generation which will be accounted in this sub-category. Table __ shows the 2018 consumed coal for the industrial process and the cement industry. Since the usage of coal doesn't vary, the use and import share for the large power plants will also be applied for the import and use of the coal for the industrial use. Moreover, the mercury input for the coal in the large power plant also applies on this subcategory since the geographical source of the coal doesn't vary. The mercury content of the coal will be based on their geographical source and will use the respective mercury content of coal on that region. For the activity rate, 5% of consumed the country's total coal use was consumed by the various industry specific power generation. The output stream of the mercury in this sub-category will be based on the recommended mercury distribution, 95% air and 5% ash (land)[12]

Table 1.2 Consumed Coal per Sector 2017[13]

Coal Use	Coal Consumption Share%
Power Generation	80
Industrial Process	15
Cement Production	5

[12] UNEP Toolkit
[13] Base on DOE 2017 Power Statisctics.

Table 1.3 Input and Output Estimates for Other Uses of Coal

Subcategory	Activity Rate, ton/year	Mercury content, g Hg/ton Coal	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr				
				Air	Water	Land	Products	Sector specific disposal
Coal combustion in coal fired industrial boilers	6,164,772.73	0.03-0.28	358.636	106.84	42.07	-	158.28	51.44

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **HIGH** (Input factors used where based on published data for both local and imported coal)

Output Estimate: **LOW** (Based on toolkit)

1.3 Mineral oils - extraction, refining and use

This report subsection includes the mercury emission due to extraction, refining and use of mineral or petroleum oil. It encompasses the combustion of these products to provide heat, power, transportation and other key applications such as asphalt, chemical and polymer synthesis and lubrication production among others. Mineral oil, like other natural material, contain innate trace of mercury which is mobilized to the environment once they have been extracted and refined into its uses. Same as with coal, the mercury input for petroleum oil depends on its geographical origin.

Oil Extraction

Based on the Philippines in Figures (2018), the total oil production for the country is 213,292.8 ton of oil in 2016. Most of the country's oil field can be located off-shore. The local field has no available

mercury input data, thus the recommended mercury input for the toolkit that is applicable to the southeast regions were applied. Aside from the mercury from the mined oil itself, the toolkit also emphasizes the minor presence of mercury from the wastewater produced during the extraction. This wastewater is processed in an oil/water separator in which the mercury is released in waste discharge in trace amount. In the Philippine setting where there the oil fields are mainly off-shore, this is considered as a discharge to water.

Applying the last data from 2016 for the oil production and applying the annual rate of 24% to reflect the 2018 estimate, the activity rate of 264, 483.07-ton oil per year. The mercury input will be 2.0 mg Hg/t a total of 0.53 kg mercury per year. Moreover, for the wastewater being discharge annually at the pace of the given production rate is 2,248,106 tons/yr which release 337 kg. of mercury yearly, Indigenous oil production is locally refined and used, thus all the emission of mercury from extraction until use of these petroleum products.

Oil Refining

There are two big oil refineries in the Philippines, both of which refines raw crude oil that are both from the local oil field and those that are imported from other countries. In 2018 the estimated refinery input is 11,022,063.36 metric ton of oil per year. Local refineries have no available data on the mercury input of the raw materials. In this report the toolkit default material of 1.5- 2 mg Hg/t will be used. This account for the mercury input of 16.665 kg.

The UNEP Toolkit Indicates that over 87% of the mercury discharge is released into air and to the waste residues and by-products such as asphalt. There is no locally available data on the mercury release distribution for the local refineries, so for this report, the recommended toolkit output factors have been used: 25% to air, 1% to water, 36% general waste and 25% to sector specific disposal. The remaining 13% of the mercury input is distributed to the different refinery products such as petrol fuel and other petrol products and these are also accounted under the use of these products.

Use of Refined Petrol Products

The use of the of refined petrol products can either be burned ultimately as fuel, use as raw material for polymer and chemical synthesis and lubrication[14]. However, in this report, it assumes that majority of this products will be ultimately use as fuel and be burned, resulting to discharge of mercury to the air. The subclasses that will be considered is the industrial combustion facilities with a high degree of emission control. Use of the heavy oil for domestic heating and cooking are not prevalent in the Philippines thus it is not considered significant in this report. The activity rate for use of heavy oil as fuel for industrial use is 3,356,120 metric oil/ton.

Aside from imported crude oil for refining, the country also imports refined petroleum products such as LPG, Diesel, gasoline and lubricants[15]. These imports are mostly from middle east region, and together with the refined product produced locally composes the bulk of the fuels used in combustion on the transport sector. The estimated use of petroleum refined product for 2018 is 4,547, 303.57 ton gasoline, 1,133,258.55 ton LPG , 16,582,646.98 ton diesel, and 299,592.46 ton fuel oils.

Table 1.4 **Products and their Activity and Mercury Content**

Petroleum Product	Activity rate (tons/year)	Mercury Input Factor (mg Hg/ton)	Mercury Input (Kg Hg/year)
Gasoline	4,547, 303.57	1.5	6.82
LPG	1,133,258.55	1.32	1.50
Diesel	16,582,646.98	0.4	6.63
Kerosene	71,130.87	0.04	0.0028
Fuel Oils	299,592.46	0.67	0.20
Totals	22,633,902.41	-	15.15

The domestic petroleum fuel consumption locally is a blend of locally produced and imported products. However, there is no data of available of the mercury content for this imported refined products, but it would be reasonable to assume that it would have similar to those produced in-country.

[14] UNEP Toolkit 2.0 ver. 1.4 (2017)
[15] DOE Power Statistics 2017

Table 1.5 Summary of Estimates for the Subcategory Mineral oils - extraction, refining and use

Subcategory	Activity Rate, ton/year	Mercury content, mg Hg/ton	Annual mercury Input,	Annual Mercury Output, Kg/yr					
				Air	Water	Land	Products	General Waste	Sector Specific disposal
Extraction	264,483.07	-	337.74	191.32	304.14	33.77	2.70	6.00	23.28
Refining	11,022,063.36	-	16.67						
Use	25,990,022.59	-	212.98						
Totals	-		567.39						

Certainty Assessment

Activity data: **MEDIUM** (Based on national production and importation data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

1.4 Natural Gas- Extraction, Refining and Use

Natural gas is a type of fossil fuel that is usually extracted for mainly use as combustion fuel to produce electricity and heat. Mercury from natural gas is mobilised to the environment during its extraction, refining and combustion. Natural gas has a notable mercury concentration, which still varies depending on geographic location.

Gas Extraction, Processing and Use

Philippines has a sole natural gas field, the Malampaya Gas field, north of Palawan. The net gas consumption of natural gas in 2018 is estimated to be 3,964,569,203,21 [16]N cu.m, considered the projected change in project with annual average rate of 0.6%.

There is no existing data for the mercury content of the Philippines natural gas. However, the toolkit has existing data for other countries that are on the same region with the Philippines which is considered to be geographically comparable. Apply the mercury input for southeast Asia, the mercury input that is used is 100 µg Hg/N cu.m. gas which give a total mercury output from extraction of 793.79 kg for 2018 for the whole lifecycle[17].

As an industrial feedstock, using natural gas requires it to have a minimum amount of residual mercury and hydrogen sulphide. Consequently, the treatment for hydrogen sulphide effectively removes also mercury. Thus, the output factor that is employed in toolkit for refining of natural gas are appropriate for the local estimates. This assumes that 20% of mercury is discharged to air, 20% to water, 50% to product and 10% to waste in average. Moreover, the mercury product embedded in the refined products will be discharged into the air once burned.

Table 1.6 Summary of Estimates for the Subcategory Gas Extraction, Processing and Use

Subcategory	Activity Rate, ton/year	Mercury content, µg Hg/N cu.m. gas	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/yr				
				Air	Land	waste	product	Sector Specific Disposal
Extraction and refining	3,964,569,203,21	100	396.46	277.52	79.29	-	198.23	39.65
Use	3,964,569,203,21	0.22	0.87					

[16] DOE Power Statistics 2017
[17] See Annex 1 for the detail lifecycle breakdown

Certainty Assessment

Activity data: **MEDIUM** (Based on national production and importation data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

1.5 Other Fossil Fuels- Extraction and Use

This category includes the extraction and use of other fossil fuels such as peat and oil shale. There is no significant use of both fuel sources in the Philippines documented. There may be minimal domestic activity that uses these fossil fuels, but there activity rate and mercury is insignificant compared to other subcategory that is mentioned above. Hence this sub-category has not been assessed.

1.6 Biomass-fired Power and Heat Production

Wood and Other biomass contains trace amount of mercury that is taken up from the naturally-occurring mercury deposition from the soil and the atmosphere. Most of this mercury is being discharged once these biomass are used as combusted as fuels. This sub-category assesses the mercury released with the burning of wood and other biomass as an industrial and residential source of energy for electricity, heat and cooking

For of 2018, the estimated biomass consumed for electricity and energy production for the country is 19,198,799.27 tons[18]. This is an aggregated biomass of corn waste, sugar can bagasse and other local sourced biomass which is used as industrial fuel, charcoal from wood and coconut tree is separately assessed as the common local source of fuel for cooking. Moreover, it was estimated that the local consumption of charcoal is 2,150,958.33 tons

[18] Based on values in Department of Energy Power Statistics 2017

There is no published data available on mercury content of the biomass that are used in industrial combustion facilities, thus the toolkit default input factors have been used for this inventory. It is also assumed that all mercury is released into air upon combustion.

Table 1.7 Summary of Estimates for the Subcategory Biomass-fired Power and Heat Production

Subcategory	Activity Rate, ton/year	Mercury content, g Hg/ton	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg, yr			
				Air	Land	General Waste	Product
Biomass Combustion	19,198,799.27	0.03	575.96	834.08	-	-	-
Charcoal Combustion	2,150,958.33	0.12	258.12				

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

1.7 Geothermal Power Production and Use

Geothermal power plants produce energy by exploiting underground temperature on the area where there is an active geothermal or volcanic activity. In this subcategory, mercury is released through the discharge of the steam. The Philippines being situated on the volcanic belt of the pacific, have been known to have the 2nd largest production of geothermal energy. Local geothermal plants re-inject back into the grounds after use to maintain reservoir pressures. However, the significant presence of mercury is in the steam which are not captured by the re-injection process[19].

Geothermal energy generated 10,270 GW of electricity contributing 22% of the country's electricity demand in 2017[20]. The estimated 2018 generation for this reports the estimated production will be 10,985 GW accounting for the national AAR for the energy consumption sector.

The mercury content of geothermal fluids varies among the fields. For the Philippines, there is no existing published data for the mercury data for the active fields. This report utilized the suggested input factor for this subcategory which is 0.05 g Hg/MWh, thus the total mercury input is 549.29 kg of mercury. These mercury input is released through air with the distribution of 100% solely into the air. The mercury input and output for the subcategory is summarized in Table 1.8

Table 1.8 Summary of Estimates for the Subcategory Geothermal Power Production and Use

Subcategory	Activity Rate, MWeh	Mercury content,g Hg/MWh	Annual mercury Input, kg Hg/yr	Annual Mercury Output, Kg/yr			
				Air	Land	waste	product
Geothermal power production	10,985,819	0.05	549.29	549.29	-	-	-

Certainty Assessment

[19] Thain, 2016
[20] DOE Power Statistics 2017

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

Table 1.9 Summary for the Extraction and Use of Fuel/Energy Sources

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	General Waste Waste	Sector Specific Disposal
Coal – large power plants	1522.61	453.59	178.63	0.00	671.99	0.00	218.40
Coal combustion in coal fired industrial boilers	358.64	106.84	42.07	0.00	158.28	0.00	51.44
Other coal combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oil extraction, refining and use	561.20	191.32	304.14	33.77	2.70	6.00	23.28
Gas extraction, refining and use	594.69	277.52	79.29	0.00	198.23	0.00	39.65
Other fossil fuels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biomass fuel	834.08	834.08	0.00	0.00	0.00	0.00	0.00
Geothermal Power	549.29	549.29	0.00	0.00	0.00	0.00	0.00
Totals	**4420.50**	**2412.64**	**604.13**	**33.77**	**1031.19**	**6.00**	**332.76**

2. Primary (Virgin) Metal Production

This category covers mercury release from the mining and processing of metal-containing ores for the purpose of production of virgin metals[21]. The sub-categories and the primary release pathways are summarized in the table below

Table 2.1 Toolkit Screening Matrix for Primary (Virgin) Metal Production

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.2.1	Mercury Extraction	✓	✓	✓	✓	✓	OW
5.2.2	Gold and silver, using mercury amalgamation	✓	✓	✓	x	x	OW/PS
5.2.3	Zinc	✓	✓	✓	✓	✓	OW
5.2.4	Copper	✓	✓	✓	✓	✓	OW
5.2.5	Lead	✓	✓	✓	✓	✓	OW
5.2.6	Gold and silver, not using mercury	✓	✓	✓	✓	✓	OW
5.2.7	Aluminium	✓	x	•	x	✓	OW
	Other non-ferrous metals	✓	✓	✓	x	✓	OW
	Ferrous metals (iron & steel)	✓	x	x	x	•	OW

[21] UNEP 2017

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

2.1 Primary metals not produced in the Philippines

There is no significant primary metal production for the last 3 years for the following toolkit subcategories: Mercury, zinc, silver and lead.

2.2 Gold and Silver, Using mercury amalgamation

Recovery of gold using mercury amalgamation have been one of the traditional methods of mining gold from ores in the Philippines. Although, in 2015 the use of mercury in artisanal gold mining have been banned, it is still being practice by the artisanal miners because it is relatively cheap and less labour intensive than using cyanide.

Most of the small-scale miners in many areas of the Philippines used amalgamation to extract gold from the mined ores[22]. In this process, mercury is used to form amalgam with the free gold from the ores which will be burnt to separate the gold from the amalgam[23]. The process of burning the mercury to recover the gold from the amalgam emits mercury to the air which poses hazard not only to the workplace but to the community nearby. Its simplicity in application and low investment makes it the major option for small-scale miners that practice this livelihood as their daily subsistence[24]. Tailings and wastewater generated in this process are mainly disposed directly to the rivers and creeks which contains high concentration of heavy metals which includes mercury.

It is reported from USGS 2016 that the Philippine produces 49,480.7 kg of gold in 2016. Moreover, it was also reported that 70-80% of this production is from small-scale mining[25]. For this inventory the activity rate for 2018, the USGS 2016

[22] Israel & Asirot 2002; Velasquez- Lopez et al. 2010; Cortes-Maramba et al. 2006; Appleton et al. 1999
[23] Israel & Asirot 2002; Cortes-Maramba et al. 2006
[24] Israel & Asirot 2002; Hinton et al. 2003
[25] Cite presentation of BanToxic

data gold production will be adjusted using the AAR from the Philippine statistics authority for the mining industry which is 3.3%. Information from different reports and survey[26] that small-scale miners in the Philippines uses 5:1 ratio of mercury use to gold produced. Most of this added mercury are released to the environment through air, land and water. From the recent study published in 2018[27] mercury emission distribution in the local small-scale mining is 16.8% land, 0.21% water, 82.99% air.

Table 2.2 Summary of Estimates for the Subcategory Gold and Silver, Using Mercury Amalgamation

Subcategory	Activity Rate, kg/year	Mercury content, Kg Hg/Kg gold	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr			
				Air	Water	Land	product
Gold (and silver) extraction with mercury amalgamation processes	34,085.50	5	170,427.48	141,437.77	357.90	28,631.82	

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **HIGH** (Based on a survey on ASGM)

Output Estimate: **HIGH** (Based on a local published study on ASGM)

2.3 Gold and Silver, not Using Mercury Amalgamation

The estimation of emission of gold production not using mercury amalgamation is based on the USGS 2016 report on the country's gold production. The activity rate is computed through the toolkit conversion of the equivalent ore for the estimated 2018

[26] BANToxic MIA Technical Working Group Presentation February 12, 2019
[27] Samaniego, J & Tanchuling, M.A. (2018) Physico-chemical Characteristics of Wastewater from a Ball Mill Facility in Small-Scale Gold Mining Area of Paracale, Camarines Norte, Philippines

gold production. There is no existing data on the mercury content of ores in the country, thus the toolkit default mercury input for this subcategory will be use.

Table 2.3 Summary of Estimates for the Subcategory Gold and Silver, not Using Mercury Amalgamation

Subcategory	Activity Rate, ton/year (gold ores/year)	Mercury content, g Hg/t	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/yr			
				Air	Water	Land	product
Gold extraction and initial processing by methods other than mercury amalgamation	3,652,017.50	5.5	20,086.10	803.44	401.72	18,077.49	803.44

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **LOW** (Based on toolkit)

Output Estimate: **LOW** (Based on toolkit)

2.3 Copper Extraction

Ores containing copper can contain trace amount of mercury which are mobilized from rock material during the extraction of copper. Mercury is being release through gaseous stream when evaporated or in the wet stream depending on the technology employed.

The copper produced in 2016[28] is 88,697.43 tons. Based on the toolkit, the copper to ore ration of 3.58. There are no available regional data on the, mercury content for copper ores, hence the toolkit default input factor of 30 g Hg/ton was used in the estimation. The output emission will also employ the default factor of the toolkit which is 25% land, 25% water and 50% sector specific disposal for mining and concentrating and, 90% air and 10% sector specific disposal for production

Table 2.4 Summary of Estimates for the Subcategory Copper Extraction

Subcategory	Activity Rate, ton/year (Concentrate used)	Mercury content, g Hg/ton concentrate	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/ yr			
				Air	Water	Land	Sector Specific disposal
Mining and concentrating of copper	317,536.80	30	9526.10	-	2,318.53	2,381.53	4,763.05
Production of copper from concentrates	317,536.80	30	9526.10	4,667.79	190.52		4667.79

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **LOW** (Based on toolkit)

Output Estimate: **LOW** (Based on toolkit)

2.4 Primary Ferrous Metal Production

Iron and steel industry involve smelting iron ore to into molten or solid form through the use of combustion furnaces. These establishment may also cast ingots formed inti sheet, plates and into any shape and sizes. Mercury can be emitted from different points, however, to simplify, the whole extraction and processing unit was

[28] USGS 2016

treated as a single unit with pig-iron as the output. The main source of the mercury release in this sector is the concentration of mercury embedded on the different feed materials especially ore and lime.

In 2016, the Philippines produces 4,375,000 ton of pig iron[29]. For this estimation the mercury release accounted will be the mercury input due to raw materials mercury impurities only. The input factor used based on the toolkit is 0.05 g Hg/ton pig iron produced which will be released both on air and waste residue with a distribution factor of 95% air and 5% sector specific disposal

Table 2.5 Summary of Estimates for the Subcategory Primary Ferrous Metal Production

Subcategory	Activity Rate, ton pig iron produced/year	Mercury content, g Hg/ton	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr	
				Air	Sector Specific Disposal
Primary ferrous metal production	4,375,000	0.05	218.75	207.81	10.94

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

Table 2.6 Summary for the Primary (Virgin) Metal Production

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	General Waste	Sector Specific Disposal
Mercury	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[29] USGS 2016

Gold & silver, with mercury amalgamation	170427.48	141437.77	357.90	28631.82	0.00	0.00	0.00
Zinc extraction and initial processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Copper extraction and initial processing	19052.21	4667.79	2572.05	2381.53	0.00	0.00	9430.84
Lead extraction and initial processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gold & silver, without mercury	20086.10	803.44	401.72	18077.49	803.44	0.00	0.00
Aluminium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other non-ferrous metals - extraction and processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ferrous metals	218.75	207.81	0.00	0.00	0.00	0.00	10.94
Totals	**209784.54**	**147116.82**	**3331.67**	**49090.83**	**803.44**	**0.00**	**9441.78**

1. Production of Minerals and Materials with Mercury Impurities

This category source includes the mercury release from the production of minerals and related materials with mercury impurities. Mercury released from Pulp and Paper Production will not be assessed since it is already accounted on the different subcategories on this report. The primary release of the sub-categories are shown on the screening table below:

Table 3.1 Toolkit Screening Matrix for Production of Minerals and Materials with Mercury Impurities

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.3.1	Cement Production	✓	x	•	•	•	OW/PS
5.3.2	Pulp and Paper Production	✓	•	•	x	•	OW
5.3.3	Lime production and light-weight aggregate kilns	✓	x	x	✓	x	OW
5.3.4	Other Mineral and Materials	x	x	x	x	x	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

3.1 Cement Production

The principal raw materials that are used in cement production contains trace amount of mercury. Mercury can come from lime, and solid residues such as fly-ashes. The increase of usage of so-called waste products as feed materials may increase the total input of the mercury to the cement production. The primary release of mercury in this subcategory is emitted to the atmosphere, and trace level are embedded to the product.

The Philippines in 2018 has an estimated cement production of[30] 26,575,259 tons. From the 2012 Holcim Sustainability Report, it was reported that mercury emission in a cement production is 0.011g/ton[31] which is applicable for the region. Using the said input factor and the estimated activity rate, the sub-category produces 2,392 Kg of mercury per year.

The emission factor for the subcategory that was used were 40% air, 20% product and 40% Sector specific disposal. Most of the emission control used in cement industry employs electrostatic precipitator system which incorporate collected particulates into the system.

Table 3.2 Summary of Estimates for the Subcategory Cement Production

Subcategory	Activity Rate, ton cement produced/year	Mercury content, g Hg/ton produced	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg, yr		
				Air	Products	Sector Specific disposal
Cement production	26,575,259	0.09	239.77	956.71	478.35	956.71

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **HIGH** (Based on local major cement producer)

Output Estimate: **LOW** (Based on toolkit)

3.2 Lime and Light-weight Aggregate Production

[30] Based on the 2016 cement production reported by PSA and applied with AAR of 1.24 % to come up with 2018 estimates.
[31] Includes the mercury from the fuel used.

This subcategory covers the production of temperature-treated lime and aggregates from limestone, clay, shale or slate. There are numerous of lime kilns in the Philippines, but there is no significant production of the type of aggregates covered by the toolkit.

The activity rate is based on the estimated lime and production for 2018[32] of 9,010.17 tons. The input factor that was used is the same of that of 2008 and 2015 estimates from local industries which is 0.00005 kg Hg/ton lime produced. For the output factor, 90% in air and 10% as waste.

Table 3.3 Summary of Estimates for the Subcategory Lime and Light-weight Aggregate Production

Subcategory	Activity Rate, ton lime produced/year	Mercury content, kg Hg/ ton	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr	
				Air	General Waste
Lime production	9,010.17	0.00005	0.50	0.45	0.05

Certainty Assessment

Activity data: **MEDIUM** (Based on national data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

[32] Based on the 2016 data from PSA Philippine in Figures

3.3 Other materials and Minerals

There is notable source of mercury releases from mineral use have been identified for this inventory; volcanic cinder and tuff.

3.4 Volcanic Cinder and Tuff

Aside from sediments from quarry, some parts of the Philippines, usually near from active volcano or those which recently erupted, uses volcanic solid materials to create cinder and tuff. These are used as building materials in constructions of local building and house.

The activity rate is based on the estimated volcanic cinder and tuff produced for 2018[33] of 36,168,431.54 kg/year. The input factor that was is 0.00001 kg hg/ kg cinder. For the output factor it will have the same distribution factor with cement which is 90% in air and 10% product.

Table 3.4 Summary of Estimates for the Subcategory Volcanic Cinder and Tuff

Subcategory	Activity Rate, kg cinder and tuff produced /year	Mercury content, kg Hg/ Kg	Annual mercury Input,	Annual Mercury Output, Kg/yr	
				Air	Product
Volcanic cinders and tuff	36,168,431.54	0.00001	381.68	342.52	38.17

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **LOW** (Based on non-geographic data)

Output Estimate: **LOW** (Based on toolkit)

[33] Based on the 2016 data from PSA's Philippine in Figures 2018

Table 3.5 Summary for Production of Minerals and Materials with Mercury Impurities

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	General Waste	Sector Specific Disposal
Cement	2391.77	956.71	0.00	0.00	478.35	0.00	956.71
Pulp and paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lime	0.50	0.45	0.00	0.00	0.00	0.05	0.00
Other Minerals and Materials	381.68	342.52	0.00	0.00	38.17	0.00	0.00
Totals	**2773.95**	**1,299.68**	**0.00**	**0.00**	**516.52**	**0.05**	**956.71**

4.0 Intentional use of Mercury in Industrial Processes

Chlor-Akali plants were used for pulp and paper mills, until they were replaced with a modern system based on a membrane cell technology which does not involve mercury.

There is no data of the existence of Vinyl chloride monomers manufactured in the Philippines. Similarly, there is no manufacturing of acetaldehyde or two-part polyurethanes involving mercury catalysts.

5.0 Consumer Products with Intentional use of Mercury

This category includes mercury uses in a wide range of different consumer products. The various subcategories and the release pathways are summarized below:

Table 5.1 Toolkit Screening Matrix for Consumer Products with Intentional use of Mercury

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.5.1	Thermometers with mercury	✓	✓	✓	✓	✓	OW
5.5.2	Electrical switches, contacts and relays with mercury	✓	•	✓	✓	✓	OW
5.5.3	Light sources with mercury	✓	•	✓	✓	✓	OW
5.5.4	Batteries containing mercury	✓	•	✓	✓	✓	OW
5.5.5	Polyurethane with mercury catalyst	✓	•	✓	✓	✓	OW
5.5.6	Biocides and pesticides	✓	✓	✓	✓	✓	OW
5.5.7	Paints	✓	•	•	✓	•	OW
5.5.8	Pharmaceuticals for human and veterinary uses	✓	•	•	•	✓	OW
5.5.7	Cosmetics and related products	x	✓	x	✓	•	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

5.1 Mercury Thermometers

Mercury is used in numerous medical and industrial instruments both for measure and control functions. These can be easily identified by the presence if a silver bulb. In 2008, the Department of Health (DOH) implemented the gradual phase-out of mercury-containing devices in all Philippine health care facilities and institution through the issuance of Administrative Order No. 21. A complete phase out by 2010 was expected by 2010. The estimation would include the estimated stocks since 2015 by modifying the method used in the previous inventories.

This inventory includes medical thermometers, excluding industrial thermometers. There is no manufacturers of mercury thermometer identified in the country by this survey.

Stocks

It should be noted that the emission do occur while thermometers are in use or still in stock, unless the device breaks or indentions. Breakage can cause release of mercury into the air increasing the mercury level in the area, resulting to vulnerable populations. Mercury release due to breakage would find its way to different media, including air, land, wastewater and some are disposed as part of the solid waste[34]

Since the phase out of the mercury-containing devices on the medical facilities, there have been no significant import of these medical items. However, there are still existing on-site stocks of medical thermometers as survey on last mercury inventory last 2015. These are existing thermometers that are either still in use or for final disposal. Though it these stocks contains mercury, these are not considered mobilised until they are disposed. In estimating the activity rate from this subcategory, it was assumed that the average disposal and breakage of thermometers are at 5% of the outstanding yearly stock.

[34] UNEP Toolkit 2.0 2017

Using the reported stocks in 2015 for household medical thermometer and health facility[35], 2018 estimated stocks is 5,029,110 items. The toolkit indicates that a typical medical thermometer on average contains 1.0 grams of mercury per item. Considering the 5% disposal rate as the activity rate, the subcategory's mercury input is 75.81 kg for the medical, and 173.88 kg for the household.

For estimating outputs, it should be considered that those that are used in medical facilities and those on the household have a different output factor due to the general difference of the disposal mechanism for the sectors. Medical facilities tagged these as hazardous wastes and will be handles by a special treatment facility. However, those that are used in household are normally disposed as a domestic waste. Thus for the thermometers from the household, it will have an output factor of 20% air, 30% water, and 20%l land, and for the medical facilities, are 10% air, 30% water, 30% general wastes and 30% sector specific treatment respectively.

Table 5.2 Summary of Estimates for the Subcategory Mercury Thermometers with Mercury

Subcategory	Activity Rate, items/year	Mercury content, g Hg/item	Annual mercury Input, kg hg/year	Annual Mercury Output, Kg/ yr				
				Air	Water	Land	General Waste	Sector Specific Disposal
Thermometers with mercury	251, 456	1	251.46	42.36	75.91	34.78	74.91	22.75

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **MEDIUM** (Based on actual thermometer specification)

Output Estimate: **LOW**

[35] Mercury Inventory of the Philippines 2015.

5.2 Electrical and Electronic Switched, Contacts and Relays

Electrical switches and relays which contain trace of mercury have been used in years. These includes industrial electrical rectifiers, and mercury arc valves, that are used in power distribution, which has a significant volumes of mercury per unit. Although there are already available mercury-free alternatives for these unit, this electrical equipment has long service life which puts a number of them still in use. At consumer level, mercury can be seen in tilt switches, car boot light switches, ABS braking systems, electrical thermostat, flame sensors and bilge pumps for boats[36].

There are no availability data on the importation and sales of switches with mercury in the country. The activity rate that will be use in this report will use the population-based alternative methodology and an input factor of 0.02 g Hg/inhabitant as recommended by the Toolkit. For the output, the distribution factor which was used are 30% air, 40% land.30% as general wastes.

Table 5.3 Summary of Estimates for the Subcategory Electrical and Electronic Switched, Contacts and Relays with Mercury

Subcategory	Activity Rate, inhabitants (with electrification factor)	Mercury content, G Hg/inhabitant	Annual mercury Input, Kg/year	Annual Mercury Output, Kg/ yr		
				Air	Land	General waste
Electrical switches and relays with mercury (included thermostats)	90,883,293	0.02	1,817.87	545.30	727.07	545.30

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **LOW** (Based on Toolkit)

[36] UNEP Toolkit 2017

Output Estimate: **LOW** (Based on Toolkit)

5.3 Light Sources

Lighting has been one of the most prevalent use of mercury. Fluorescent tubes and. Compact fluorescent lamps, metal halides, mercury vapour, sodium and neon lamps[37]. Discharge lamps are usually used in street lightings. For the last years, there have been a rapid increase in the use of mercury-less compact fluorescent lamps and light-emitting diodes which contains less mercury to about a factor of 10 from the traditional mercury-containing lamps. According to Energy star, in 2016 the global lamp use reported by EnergyStar, 9% are linear fluorescent, 31% CFL, 15% LED, 32% halogen lamps and 13% Others.

The activity rate for this subcategory will be based on the reported 2010 lamp disposal rate of household and commercial lamp of 24.94 million lamps annually and applying the population growth rate to compensate as the correction factor. For this inventory, the calculated 2018 activity rate is 67, 839,690 items disposed. The output factor for the mercury release was based on the recommended Toolkit.

Table 5.4 Summary of Estimates for the Subcategory Light Sources with Mercury

Subcategory	Activity Rate, items disposed/year	Mercury content, mg Hg/item	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/ yr			
				Air	Land	General waste waste	Sector Specific disposal

Light sources with mercury	67, 839,690	(5-30)	973.50	121.69	87.61	762.23	1,96

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

5.4 Batteries

Mercury has been present to batteries to inhibit corrosion and gas production also serves as electrode for mercury oxide batteries. It has been used for batteries that are predominantly non-rechargeable. The battery types that contains mercury are the mercuric oxide, silver oxide, zinc air, silver oxide and alkaline button cells. These are usually found on compact devices that needs a compact source of energy such as calculators, watched, cameras and hearing aids.

In order to estimate the inputs from batteries, the import data was obtained for these types of batteries, and mercury quantities were calculated by multiplying the numbers of units by their respective average weights and by the mercury content of each cell. The estimated mercury input for all the battery types is 347.27 kg Hg/year.

Table 5.5 Summary of Estimates for the Subcategory Batteries with Mercury

Subcategory	Activity Rate, items tons/year	Mercury content,	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/yr			
				Air	Land	General Waste	Sector Specific Disposal
Batteries with mercury	69.36	-	347.27	26.05	26.05	293.31	1.87

Certainty Assessment

Activity data: **HIGH** (Based on Import data)

Input Estimates: **LOW** (Based on Toolkit data)

Output Estimate: **LOW** (Based on Toolkit data

5.5 Polyurethane with Mercury Catalyst

There is no published data on the production of polyurethane in the Philippines. On the other hand, there is a limited report of the use of products from polyurethane. There is no recent reported sales of or import of products from a process that uses mercury catalyst. Thus, in this report it was assumed that there is no significant mercury release from this subcategory.

5.6 Biocides and Pesticides

Since 1980's the Philippines has already regulated the use of mercury for biocide and pesticide formulation. However, this regulation doesn't prohibit the use of mercury compounds in formulation but only limit its level to not more than 0.2% by weight of the product[38]. Thus, for this inventory, yearly consumption reported in 2018 was be use as activity rate which is 44,226 kg biocide and pesticide/ year. Mercury input for this subcategory will be based on the conservative side of assuming a maximum content of permissible limit for Philippine use which is 88.45 kg Hg/ year.

Mercury is being mobilized to the environment once applied to the crops. This mercury will be disposed through land, air, and water. The output distribution factor from the toolkit default will be used in this inventory: 20% air, 10% water,20% land.

Table 5.6 Summary of Estimates for the Subcategory Biocides and Pesticides

Subcategory	Activity Rate, kg biocides imported/year	Mercury content, kg Hg/Kg biocide	Annual mercury Input, kg Hg/ year	Annual Mercury Output, Kg, yr			
				Air	Water	Land	product

[38] Mercury Report by Philippine Fertilizer and Pesticide Authority

Biocides and pesticides with mercury	44,226	0.002	88.45	17.69	8.85	17.69	-

Certainty Assessment

Activity data: **MEDIUM** (Based on National data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

5.7 Paints

The report in 2015 has not assessed mercury in paint due to lack pf significant release of mercury. It is believed that the current paint used in the country have no longer used.

5.8 Pharmaceuticals for Human and Veterinary Use.

Various pharmaceutical and veterinary products contain mercury-compound additives which serves mainly as preservative. This comes in form of Thiomersal. However, this will not be assessed in this report as this chemical is listed as exclusion given in the Annex 1 of the Minamata Convention.

5.9 Cosmetics and Cosmetics and Related Products

Skin lightening products, soap and eye whitening cosmetics are some of the cosmetic products that contains mercury in their formulation. Use of mercury-compounds for cosmetics is being permitted not exceeding 1.0 ppm[39]. However, there is also ubiquitous supply of unregulated skin products in the market that are smuggled from neighboring countries. Reports from monitoring from various environmental

[39] Philippine Food and Drug Administration

group and NGO shows that these unregulated products can have as much as 5,000 ppm mercury content[40].

The activity rate was be based on the import of cosmetic products[41] assuming that the rate of import will be the same as the turn-over rate of cosmetic consumption. In this estimation will be categorized in two aspects: regulated and unregulated. Regulated products would have a mercury content not exceeding the acceptable limit of 1.0 ppm. While unregulated products would have an average mercury content of 2,359 ppm. Due to the lack of data, the output factor that was employed is based on the toolkit default factors which is 95% to the water, and 5% land.

Table 5.7 Summary of Estimates for the Subcategory Cosmetics and Cosmetics and Related Products

Subcategory **Cosmetics and related products with mercury**	Activity Rate, kg import/year	Mercury content, kg Hg/kg cosmetics	Annual mercury Input,	Annual Mercury Output, Kg/yr	
				Water	Land
Regulated	45,819,831	0.000001	45.8198	38,848.89	1,623.63
Unregulated	13, 745,949	0.002359	32,426.6		

Certainty Assessment

Activity data: **MEDIUM** (Based on International Trade data)

Input Estimates: **MEDIUM** (Based on Local Reports)

Output Estimate: **LOW** (Based on Toolkit)

Summary for this Category

The estimated inputs and outputs for the consumer products category are summarised in Table 7-8, which shows that the most significant inputs are from Cosmetics and mercury switches and relays, lamps and batteries.

[40] *Philippine Star 2017, Daily Inquirer 2016*
[41] UNTRADE Import to the Philippines 2017

Table 5.8 Summary for Consumer Products with Intentional use of Mercury

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	Waste	Sector Specific Disposal
Thermometers with Mercury	249.70	42.36	74.91	34.78	-	74.91	22.74
Switches, Contacts and Relays	1817.67	545.30	0.00	727.07	-	545.30	0.00
Light Source	973.50	121.69	0.00	87.61	-	762.23	1.96
Batteries	347.27	26.05	0.00	26.05	-	293.31	1.87
Polyurethane with mercury catalyst	0.00	0.00	0.00	0.00	-	0.00	0.00
Biocides/pesticides	44.23	17.69	8.85	17.69	-	0.00	0.00
Paints	0.00	0.00	0.00	0.00	-	0.00	0.00
Pharmaceuticals	0.00	0.00	0.00	0.00	-	0.00	0.00
Cosmetics	32472.51	0.00	30848.89	1623.63	-	0.00	0.00
Total	**35904.87**	**753.08**	**30932.64**	**2516.82**	**0.00**	**1675.75**	**26.57**

6.0 Other Intentional Product/ Process

This category covers other mercury in other intentional products and processes. Primary pathways release of the subcategories are summarized in Table 6.1

Table 6.1 Toolkit Screening Matrix for Other Intentional Product/ Process

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach

5.6.1	Dental mercury amalgam fillings	•	✓	x	✓	✓	OW
5.6.2	Manometers and gauges	•	✓	•	✓	✓	OW
5.6.3	Laboratory chemicals and equipment	•	✓	x	✓	✓	OW
5.6.4	Mercury use in religious rituals and folklore	✓	✓	✓	✓	✓	OW
5.6.5	Miscellaneous product uses, mercury metal and other sources	✓	✓	✓	✓	✓	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

6.1 Dental Mercury Amalgam Fillings

Mercury have been used as component of dental amalgam which is typically 45-50% by weight. Although there are already non-mercury alternatives, mercury amalgams are still in used and preferred due to its cheaper price.

There are no available data on total usage of mercury from dental clinics, thus the activity rate that was used is based on the recommended alternative by the toolkit using the population. However, it should be noted that for each life cycle, there will be different activity rate which is based on the different as shown on the table _.

The mercury input for the estimation used is 0.027 g Hg/inhabitant, which incorporates also the correction factor which is the ratio of the country's dental

personnel density and the reference[42] country's dental personnel density. Moreover, the output factors that was used are based on the mercury inputs with dental fillings at different times for the different life cycle phases of the amalgam fillings accounting the long lifetime of amalgam fillings.

Table 6.2 Summary of Estimates for the Subcategory Dental Mercury Amalgam Fillings

Subcategory	Activity Rate, Population	Mercury content, g Hg/Inhabitant	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/ yr					
				Air	Water	Land	Product	General Waste	Sector Specific Disposal
Preparation of Amalgam Filling	100,981,437	0.027	2,754.46	55.09	803.26	110.18	1,735.45	771.30	110.18
Use of Filling	97,721,492	0.016	1,599.46						
Disposal	85,859,097	0.016	1,377.20						

Certainty Assessment

Activity data: **MEDIUM** (Based on National Data and updated Correction factor)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

6.2 Manometers and Gauges

This subcategory is concern with the use of mercury in sphygmomanometer and barometers. However, this excludes industrial pressure measurements.

This device is included in the mercury-containing device phase-out; thus it is assumed that there are no significant import of sphygmomanometer that uses

[42] Denmark was used as reference country as per UNEP Toolkit 2017

mercury. However, there is the existence of stocks that are either still in use or for disposal. In 2015 inventory, it was reported that the country has a stock of 99, 321 item sphygmomanometers. The activity rate used in this estimate is assumed 5% disposal rate from the stocks which is 4,966 items/yr. Each sphygmomanometer contains on an average 75 grams of mercury. The output distribution employed on this subcategory was adapted from the default factor from the toolkit.

To account for other manometers and gauges, the report used the recommended method of calculating the mercury input based on the population. The default toolkit mercury input of 0.005 g Hg/inhabitant was used.

Table 6.3 Summary of Estimates for the Manometers and Gauges

Source	Activity Rate,	Mercury content, g Hg/item	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/yr			
				Air	Water	General waste	Sector specific disposal
Use and disposal of medical blood pressure gauges (items disposed/year)	4,966	75	372.46	37.25	111.74	111.74	111.74
Use and disposal of other manometers (population)	100, 981,437	0.005	504.91	50.49	151.47	151.47	151.47

Certainty Assessment

Activity data: **MEDIUM** (Activity rate is based on National Data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

6.3 Laboratory Chemicals and Equipment

Mercury is used in laboratories in both instruments, reagents and catalysts. This includes equipment such as blood gas analyzers, mercury electrodes, blood lead analyzers, mercury drop electrode, centrifuges, electron microscope, thermostats, thermometers, manometers and mercury lamps for atomic absorption spectrophotometers and equipment. Output pathway of some of this mercury is released to air through laboratory's vents. Moreover, some of the mercury can also be released through wastewater or disposed as hazardous or municipal waste[43].

The estimate for this l subcategory the default calculation from the UNEP which is based on the population. For the activity rate, the 2018 Philippine population with accesses to electricity of 90% is employed and an input be factor of 0.04 g Hg/inhabitant.

Without an existing local distribution for the output factor for the release from the use of mercury in laboratory chemicals and equipment, the default toolkit output of 20% air, 30% water, 20% land, and 30% general waste.

Table 6.4 Summary of Estimates for the Laboratory Chemicals and Equipment

Source	Activity Rate, population	Mercury content, g Hg/inhabitant.	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/ yr			
				Air	Water	Land	General waste
Laboratory chemicals and equipment with mercury	90,883,293	0.04	3,635.33	727.07	1,090.60	727.07	1,090.60

Certainty Assessment:

Activity data: **MEDIUM** (based on National Data)

[43] UNEP 2017

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

6.4 Mercury use in religious rituals and folklore medicine

According to the UNEP Toolkit, mercury has bee also used in certain cultural and religious practices as amulet. However, there are no significant report or study in the country of cultural activities that includes the use of mercury for ritualistic activities.

6.5 Miscellaneous product uses and other sources

In the 2015 inventory it was considered under this subcategory the lighting used for light houses. However, in this inventory, the lighthouses are already included in the lighting with mercury subcategory. There are also other products that have potentially mercury emission, however there are no existing reports or import and use data from these products.

Table 6.5 Summary for Other Intentional Product/ Process

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	Waste	Sector Specific Disposal
Dental Mercury Amalgam Filling	3585.47	55.09	803.26	110.18	1735.45	771.30	110.18
Manometer Gauges	877.36	87.74	263.21	0.00	0.00	263.21	263.21
Laboratory Chemicals and Equipment	3635.33	727.07	1090.60	727.07	0.00	1090.60	0.00
Mercury metal use in religious rituals and folklore medicine	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous product uses, mercury metal uses, and other sources	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**8098.16**	**869.90**	**2157.07**	**837.24**	**1735.45**	**2125.11**	**373.38**

7. Production of Recycled Metals (Secondary Metal Production)

This category covers mercury releases from the production of recycled metals. The various sub-categories and the primary release pathways are summarized in Table 7.1

Table 7.1 Toolkit Screening Matrix for Production of Recycled Metals (Secondary Metal Production)

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.7.1	Recycled Mercury	✓	✓	✓	✓	✓	OW
5.7.2	Ferrous Metals	✓	•	•	x	•	OW
5.7.3	Other recycled	✓	•	•	x	•	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

7.1 Recycled Mercury

In the Philippines there are no known possible source under this subcategory and is not included in the mercury inventory. However, there may be informal processes of recycling mercury especially in ASGM, but no available data for the estimation.

7.2 Ferrous Metals (Secondary Steel)

The activity data on this subcategory will be based on the average scrap imports that for 2014-2015 of the country as reported which is 14,154, 493.33 kg/year[44]. The input factor will also consider the recommended value of the toolkit of 0.0011 g Hg/Kg scrap due to lack of local data. For the recycling of metals and steel, the suggested pathway distribution factor is 33% air, 34% land, 33% general waste.

Table 7.2 Summary of Estimates for Ferrous Metals (Secondary Steel)

Subcategory	Activity Rate, kg/year	Mercury content, g Hg/Kg scrap	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/ yr		
				Air	Land	General waste
Production of recycled ferrous metals (iron and steel)	14,154, 493.33	0.0011	15.57	5.14	5.29	5.14

Certainty Assessment

Activity data: **HIGH** (Based on National Import Data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

7.3 Production of Other Recycled Metals

This subcategory covers the recycling of aluminium, zinc and other non-ferrous metals. However, little is known about the mercury input and output factors of these activities globally, which also applies to the local context.

For the 2018 inventory, the activity data is based on the average scrap imports that for 2014-2015 of the country as reported which is 198,987.50 kg[45]. The input and output factor that was considered in this inventory is from the Toolkit which

[44] activity rate: average scrap import from 2014-2016 based on the MIRDC response
[45] activity rate: average scrap import from 2014-2016 based on the MIRDC response

are 0.0011 g Hg/kg scrap, 30% air, 10% water,30% general waste, 30% sector specific disposal respectively.

Table 7.3 Summary of Estimates for Production of Other Recycled Metals

Sub-category	Activity Rate, ton/year	Mercury content, g Hg/Kg scrap	Annual mercury Input, Kg Hg/year	Annual Mercury Output, Kg/ yr				
				Air	Water	Land	General Waste	Sector specific disposal
Production of other recycled metals	198,987.50	0.0011	0.22	0.07	0.02	-	0.07	0.07

Certainty Assessment

Activity data: **HIGH** (Based on National Import Data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

7.4 Summary for this category

The estimated inputs and outputs for the metal recycling category are summarised in Table 9-2.

Table 7.4 Summary for Other Intentional Product/ Process

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	General Waste	Sector Specific Disposal
Production of recycled mercury ("secondary production")	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Production of recycled ferrous metals (iron and steel)	15.57	5.14	0.00	5.29	0.00	5.14	0.00
Production of other recycled metals	0.22	0.07	0.02	0.00	0.00	0.07	0.07
Total	**15.79**	**5.20**	**0.02**	**5.29**	**0.00**	**5.20**	**0.07**

8. Waste Incineration

This category covers mercury releases from the incineration of different types of wastes. The Philippine Clean Air Act of 1999 prohibits the of incineration of municipal, biomedical and hazardous wastes, thus it is assumed that there is insignificant activities that are under this category and was not considered for assessment.

9. Waste Deposition/Landfilling and Wastewater Treatment

This category includes the mercury releases from disposal of solid and liquid wastes by landfilling, dumping, or discharge to wastewater treatment systems. The primary releases from each of the sub-categories are summarized in Table 9.1

Table 9.1 Toolkit Screening Matrix for Waste Deposition/Landfilling and Wastewater Treatment

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.9.1	Controlled landfills/deposits	•	•	✓	x	✓	OW
5.9.2	Diffuse deposition with some control	•	✓	✓	x	✓	OW
5.9.3	Informal local disposal of industrial wastes	✓	✓	✓	x	x	OW

5.9.4	Informal dumping of general waste	✓	✓	✓	x	x	OW
5.9.5	Wastewater treatment systems	•	✓	✓	x	•	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

9.1 Controlled landfill/deposition

In a municipal waste stream, the mercury can come from four main sources: intentional used mercury in spent products, mercury impurities in bulk materials, mercury as anthropogenic trace pollutant in a bulk materials and trace level of mercury contamination of food wastes. In the Philippines, most of the municipal waste are disposed in a controlled landfill.

To estimate the mercury input from this category, the activity rate considered is the total waste disposed yearly to a landfill. Based on the report of Solid Waste Management Association, the country has an average disposal of 54,037.52 tons/year of waste collected to the different controlled landfill which is 70% of the total waste production of the country. The mercury composition of these waste stream has no information available, thus the toolkit factors have been used.

Table 9.2 Summary of Estimates for Controlled landfill/deposition

Subcategory	Activity Rate, ton/year	Mercury content, g Hg/ton waste	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/ yr			
				Air	Water	Land	Sector specific disposal

Controlled landfills/deposits	37,826.26	10	378.26	37.09	37.09	296.71	7.38

Certainty Assessment

Activity data: **MEDIUM** (Based on National Data)

Input Estimates: **LOW** (Based on Toolkit)

Output Estimate: **LOW** (Based on Toolkit)

9.2 Informal Disposal and Dumping

The activity rate used in this is reported estimated uncollected municipal waste which is 8,570.20 tons/year[46] which represent 30% of the total municipal waste production of the Philippines. The mercury input and output factor employed is based on the UNEP default factor.

Table 9.3 Summary of Estimates for Informal Disposal and Dumping

Subcategory	Activity Rate, ton/year	Mercury content, g Hg/ton waste	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg, yr			
				Air	Water	Land	General waste
Informal dumping of general waste	8,570.20	10	85.70	8.57	8.57	68.56	-

Certainty Assessment

Activity data: **MEDIUM** (Based on National Data)

Input Estimates: **LOW** (Based on Toolkit)

[46] based on the report of Solid Waste Management Association of the Philippines

Output Estimate: **LOW** (Based on Toolkit)

9.3 Wastewater Treatment Systems

The amount of mercury- containing wastes that are discharged to the system and the concentration of mercury in those wastes are the most important factors determining releases of mercury from wastewater. The origin of mercury in wastewater can be attributed to two main source groups: 1) intentionally used mercury in products and processes (such as from dental amalgams, spillage from thermometers and other devices, and industrial discharges); and 2) atmospheric mercury washed out by precipitation and carried in storm water. Thus, water treatment is an intermediate mercury release source where mercury is re-distributed to water, land and air[47]

The estimated total volume of municipal wastewater generated for 2018 is based on 2010 survey[48] with a factor for country's population growth. Due to the lack of local data, default toolkit input factor of 1.0 mg Hg/cu.m. wastewater was used. Moreover, the emission factor output considered a wastewater treatment process that both includes mechanical and biological treatment. The output factors will be 50% water, 30% general waste, 20% Sector specific disposal.

Table 9.4 Summary of Estimates for Wastewater Treatment Systems

Sub-category	Activity Rate, cu.m/year	Mercury content, mg Hg/cu.m	Annual mercury Input, kg Hg/year	Annual Mercury Output, Kg/ yr			
				Air	Water	Land	Sector specific disposal.
Waste water system/treatment	7,593,398,000	1.0	7,593.40	-	3,796.70	2,278.02	1,518.68

[47] UNEP 2017
[48] Mogol, et. al., 2010

Certainty Assessment

Activity data: **MEDIUM** (Based on National Data)

Input Estimates: **LOW** (based on Toolkit)

Output Estimate: **LOW** (based on Toolkit)

Table 9.5 Summary for Other Intentional Product/ Process

Subcategory	Mercury Input, Kg/year	Mercury Output Kg/yr					
		Air	Water	Land	Product	Waste	Sector Specific Disposal
Controlled landfills/deposits	378.26	37.09	37.09	296.71	0.00	0.00	7.38
Diffuse disposal under some control	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Informal local disposal of industrial production waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Informal dumping of general waste	85.70	8.57	8.57	68.56	0.00	0.00	0.00
Waste water system/treatment	7593.40	0.00	3796.70	0.00	0.00	2278.02	1518.68
Total	**8057.36**	**45.66**	**3842.36**	**365.27**	**0.00**	**2278.02**	**1526.06**

10. Crematoria and Cemeteries

This category includes the releases from burial and cremation of human bodies. The various sub-categorise and the primary pathways are summarised in Table 10.1

Table 10.1 Toolkit Screening Matrix for Crematoria and Cemeteries

Toolkit Chapter	Sub-category	Air	Water	Land	Product	Waste/ Residue	Main Approach
5.1.1	Crematoria	✓	x	x	x	✓	OW
5.1.2	Cemeteries	x	x	✓	x	x	OW

Note: ✓ - strong presence • - minor presence x - no presence

PS - Point Source by Point Source Approach

OW – National/ Overview Approach

10.1 Crematoria and Cemeteries

The sources of the mercury from cemeteries and cremation are from the mercury present on the corpses, mainly due to dental amalgam filling. In a cemetery, mercury is mainly released on the land, while the burning process of cremation emits the mercury into the air.

The activity rate will be based on the number of Filipinos with dental caries, average dental restoration per individual and death rate of 6 deaths per 1000 population. 87.4% of Filipinos have dental carries and 50% of the total dental restoration employs mercury amalgamation[49].

In 2016, it is estimated that 40% of urban-dwelling Filipino preferred cremation. There are no local data for the, mercury inputs for this subcategory, thus 2.5 g Hg/corpse input factor from toolkit was used for this estimation. Moreover, the default output factors from the toolkit are also employed.

Table 10.2 Summary of Estimates for Crematoria and Cemeteries

[49] Based on the 2011 National Monitoring and evaluation Dental Survey by DOH

Subcategory	Activity Rate, corpse/year	Mercury content, g Hg/corpse	Annual mercury Input,	Annual Mercury Output, Kg/yr			
				Air	Water	Land	General Waste
Cemeteries	471,508	2.5	145.10	145.10			
Cremation	58,038	2.5	1178.77			1,178.77	

Certainty Assessment

Activity data: **MEDIUM** (based on National Data)

Input Estimates: **LOW** (based on Toolkit)

Output Estimate: **LOW** (based on Toolkit)

11. Summary and Discussion

A summary of the estimated mercury inputs and outputs for the Philippines from the different category source is shown below:

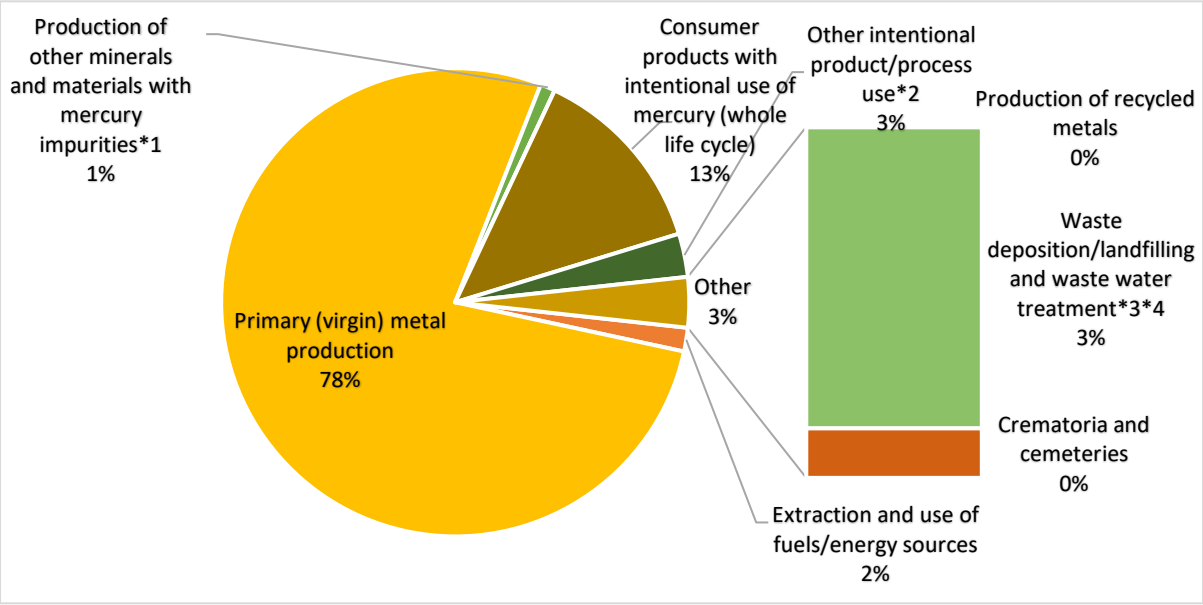

Figure 11.1 Philippine Mercury Inputs 2018.

The mercury input in the country is greatly dominated by the production of virgin metals, especially the extraction of gold through the use of mercury in ASGM. It is followed by the intentional use of mercury in consumer products, with a large part of it from the large import volume and consumption of whitening and bleaching products. However, there are still significant stock mercury that is not reflected in this inventory which are largely from consumer products such as thermometer and pressure meters that must be accounted. These activities that contributes majority of the release also dictates how mercury will be mobilised.

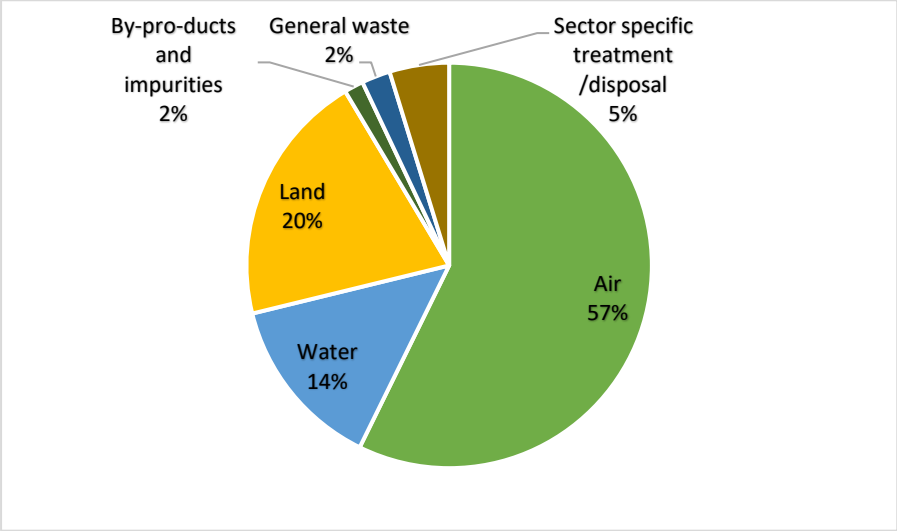

Fig. 11.2 Mercury Release Distribution for the Philippines 2018

In this report most, anthropogenic release of mercury is emitted into the air and land. It is also notable that only a trace amount of mercury is being handled via sector spefic treatment, given that mercury is considered as one of the most toxic element. With mercury mainly released into the air can increase its possibility of entering into human food chain, which can pose threat to human health.

The emission or output profile of the mercury in the country is summarized in the figure below. Predominantly, mercury from anthropogenic processes is being released to the environment through the air and land. The inventory output key points are as follows:

- The outputs to air are dominated by the primary virgin metal production, especially the ASGM. Other notable contributors are by fuel and energy sources and production of mineral material.
- Consumer products containing mercury makes almost half of the mercury output to water. Primary metal production, and waste deposition and water treatment contribute the other half of the emission.
- Emission on land is heavily dominated by the primary virgin metal production. Lack of mine tailing proper treatment and disposal deposits the used mercury directly on land.
- The outputs via product are mostly from the use of dental amalgam but with significant contribution from fuel/energy use and production of other minerals.

- The output to general waste is mostly from waste deposition and water treatment, and other product/process use category.

Many of estimates for 2018 report show changes from that of the 2015 report. Some of these changes are due to variation in local commercial or industrial activity, population and policies that have taken place that could affect the use of mercury and mercury-containing products. However, there are notable specific changes that can be heavily attributed to these changes. These are:

- Changes in Energy Production and Use: The increase in use of renewable energy such as solar and wind energy to the country's energy and electricity production lowers the dependence of some region to coal power plants. As of 2017, 15% of the annual electricity consumed in the country is from renewable sources. Moreover, the decrease in operation of the country's sole natural gas production from 2016, also significantly lowers the mercury input on this source category
- Availability of Mercury-use Studies in ASGM: there have been numerous local studies of mercury use to artisanal gold mining which deals with quantification of mercury use and estimation of releases to the environment in major mining areas. This availability of local data and estimates were used in the 2018 report which increases the certainty for this major source of mercury emission in the country compared to previous estimates.
- Inclusion of Estimates of Consumer Goods from Informal Markets: Although, there is a major phase-out of mercury-containing health devices, which is noted as the top consumer product with mercury, the current report considered the presence of smuggled cosmetic products that contains severely high concentration of mercury in its formulation. these products enter to the country in significant volume and can be easily accessed due to its cheap price and loose regulation.
- Reduction in Mercury Use in Lighting: Through government intervention, there has been a significant switch from highly mercury-based Fluorescent lights to CFL's. This switch marked down the contribution of mercury output from this particular source, however stocks of mercury from obsolete Fluorescent lights is still significant.

- Increase of alternative burial options: There are now numerous crematoria in the Philippines which makes the option more available to the public. The increase in landscape for burial also alters the emission pathway of mercury by significantly increasing the emission on this category through air.

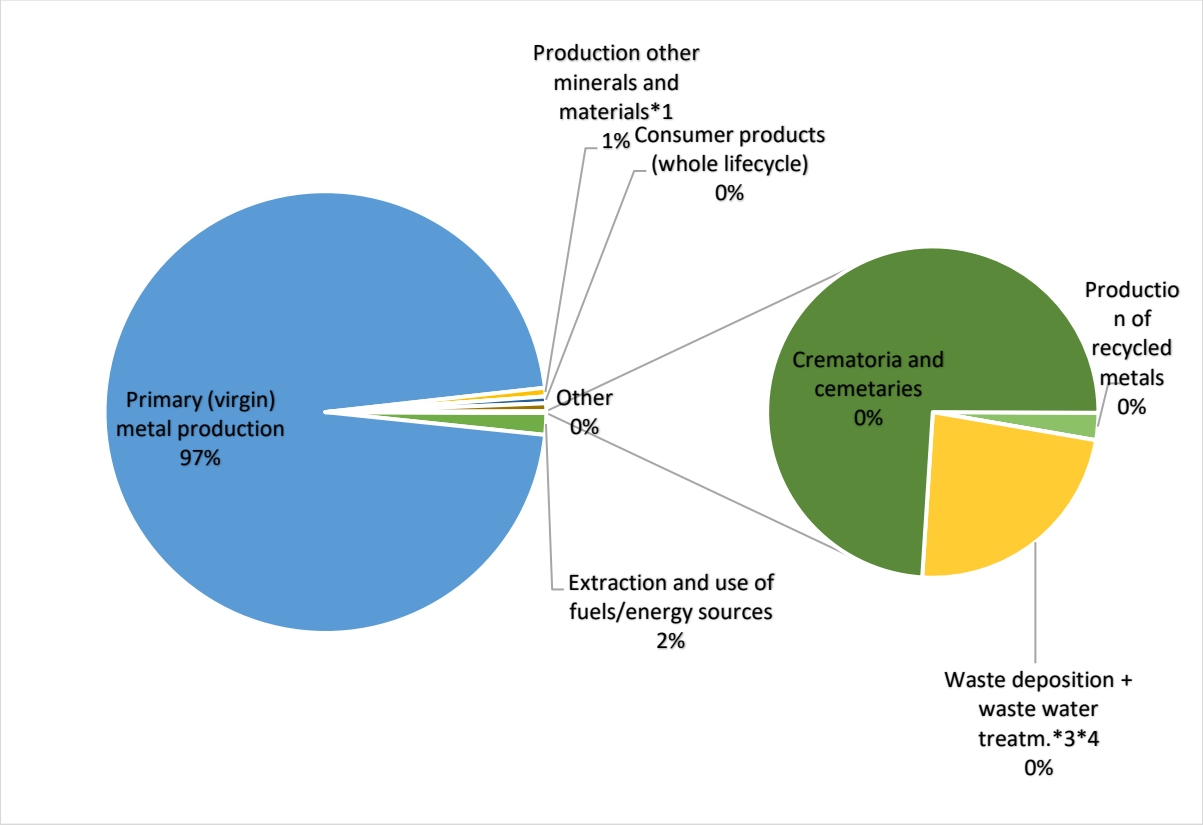

Fig 11.3 Mercury Release to Air, 2018

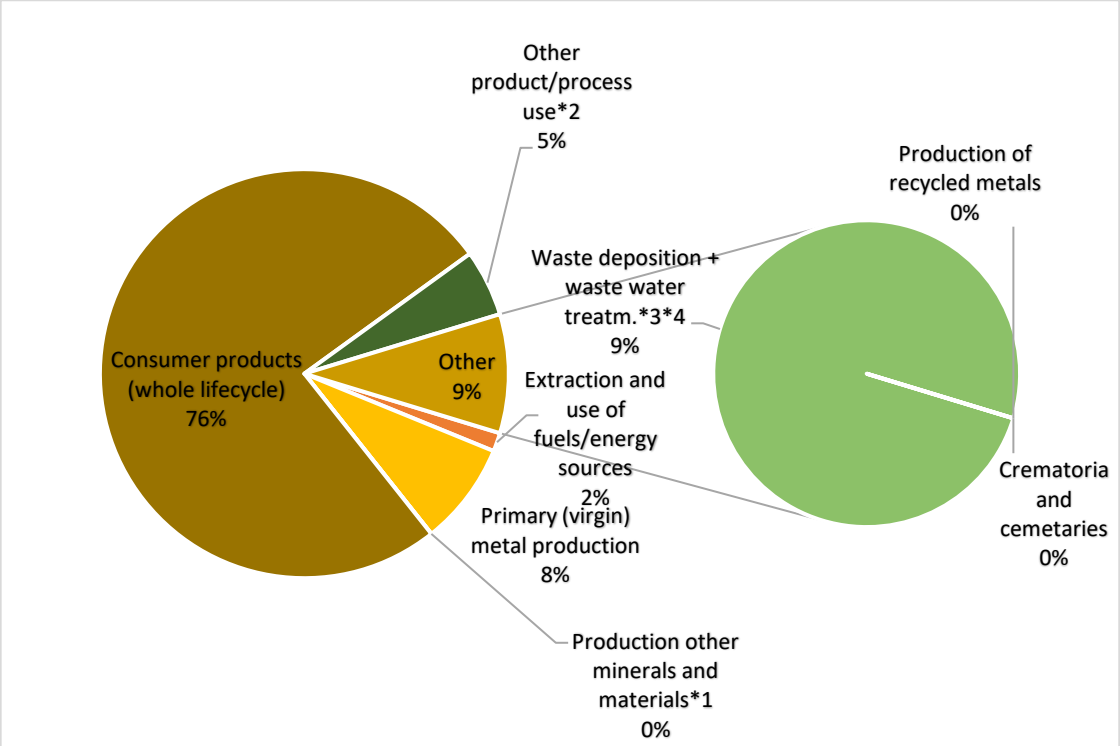

Fig 11.4 Mercury Release to Water, 2018

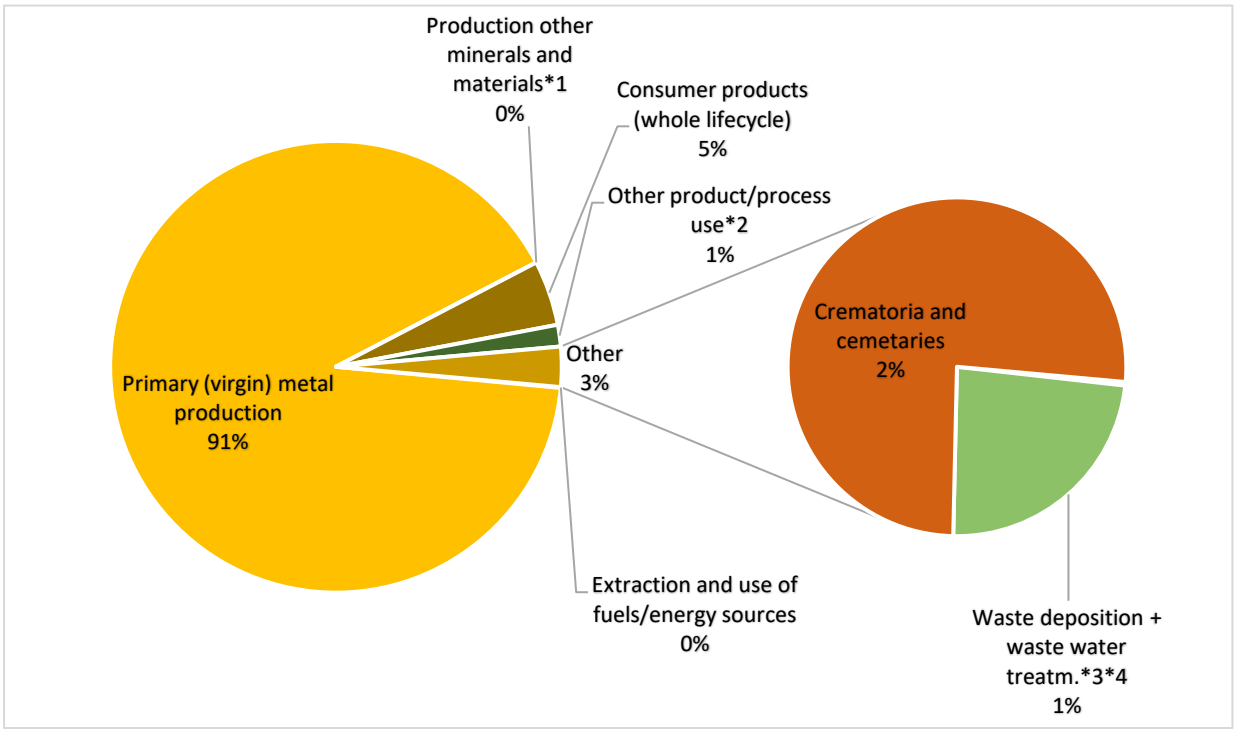

Fig 11.5 Mercury Release to Land, 2018

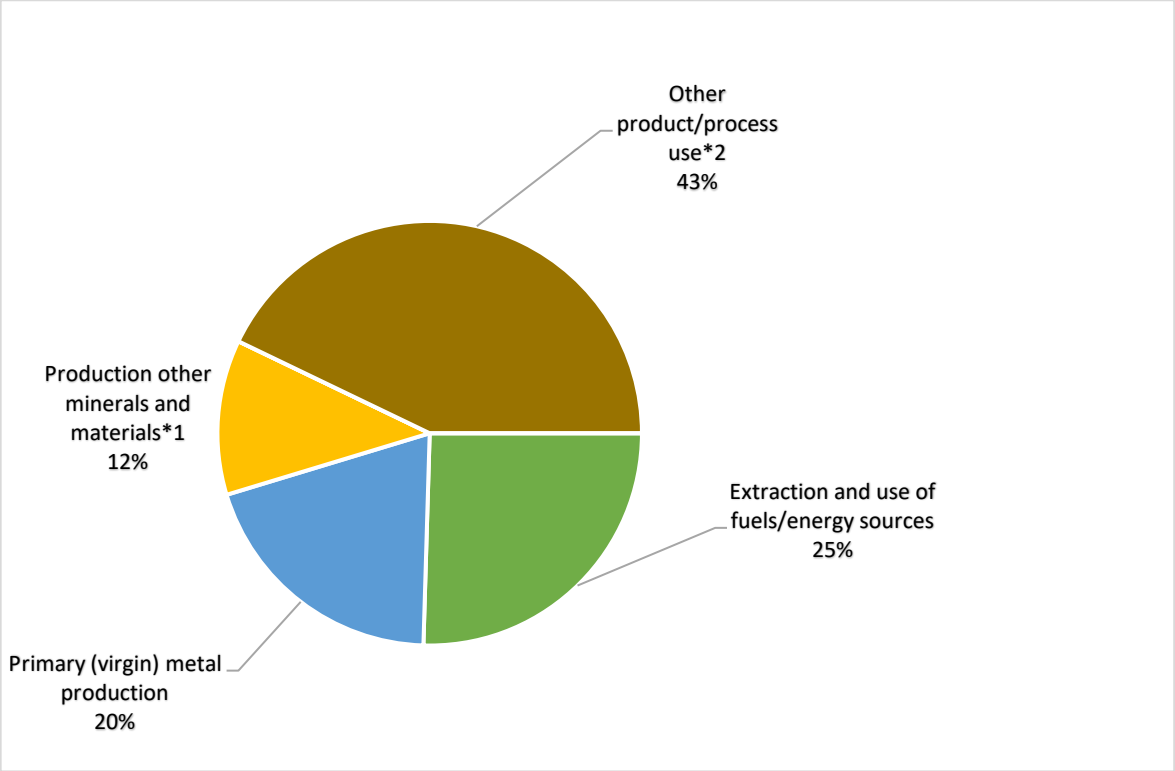

Fig 11.5 Mercury Release to Products, 2018

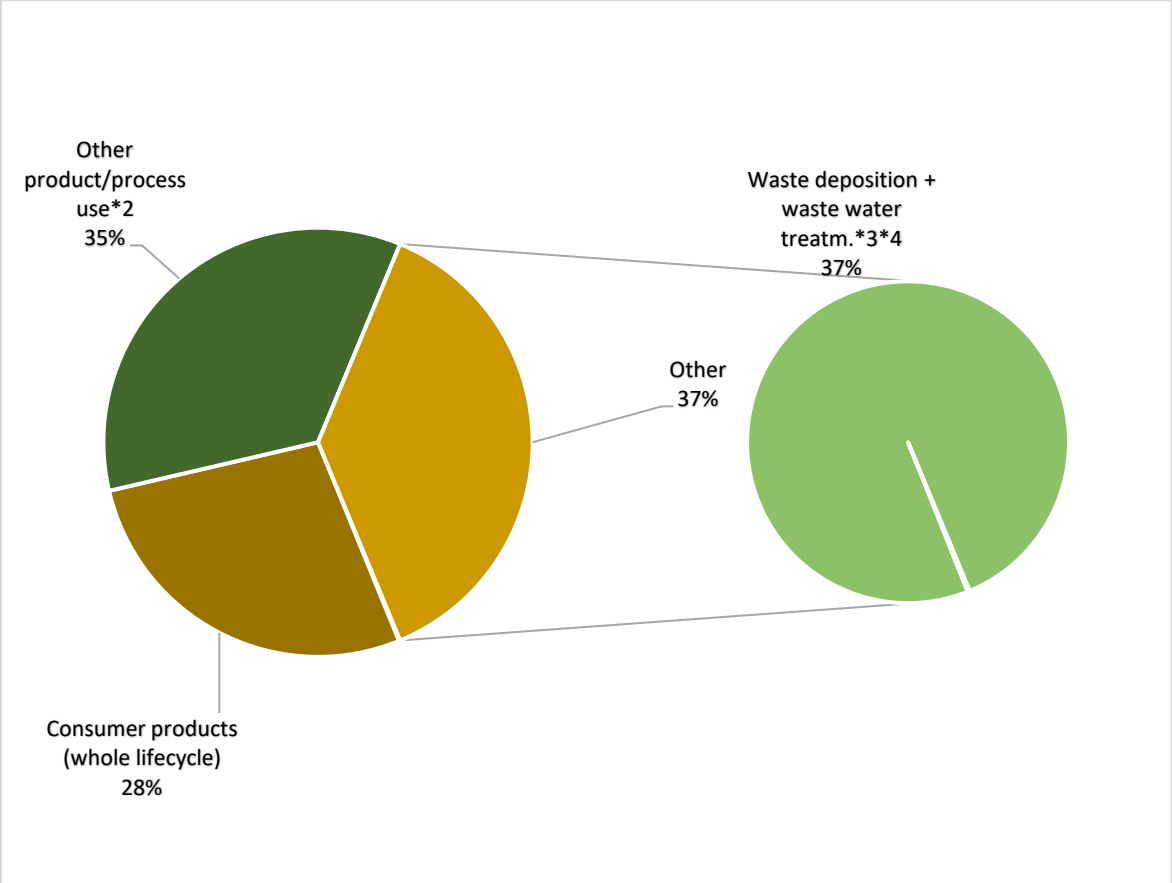

Fig 11.6 Mercury Release to Waste, 2018

ANNEX 1. List of Detail Calculation

1. Extraction and Use of Fuels / Energy Sources											
1.1 Coal Combustion in Powerplants											
Life Cycle		**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
					Air	**Water**	**Land**	**General Waste**	**Special**	**Products**
01	Extraction (local source: sub-bituminous)	6,543,224.50	0.04	261.73						261.73
02	Washing	6,543,224.50	0.04	261.73		54.96				206.77
03	Combustion (Level1)			144.74	108.55				36.18	
04	Combustion (Level II)			62.03	31.01				31.01	
05	Extraction (imported: Indonesia bituminous)	19,629,670.50	0.03	588.89						588.89
06	Washing	19,629,670.50	0.03	588.89		123.67				465.22
07	Combustion (Level1 - 70%) c/o UNEP/AMAP			325.66	244.24				81.41	

08	Combustion (Level II - 30%)			139.57	69.78				69.78	
	TOTAL				**453.58**	**178.63**	**0.00**	**0.00**	**218.38**	

Units	01	MT/yr	mg/kg	kg/yr						kg/yr
	02					kg/yr				kg/yr
	03				kg/yr				kg/yr	
	04				kg/yr				kg/yr	
	05	MT/yr	mg/kg	kg/yr						kg/yr
	06					kg/yr				kg/yr
	07				kg/yr				kg/yr	
	08				kg/yr				kg/yr	

Reference	01	2017 DOE Key Statistics	UNEP Level 2							100%
	02					21% - UNEP Toolkit Level 2				79%
	03			70% - UNEP / AMAP	75% - UNEP Toolkit				25%	
	04			30% - UNEP / AMAP	50% - UNEP Toolkit				50%	
	05	2017 DOE Key Statistics	UNEP Level 2							100%

	06					21% - UNEP Toolkit Level 2				79%
	07			70% - UNEP / AMAP	75% - UNEP Toolkit				25%	
	08			30% - UNEP / AMAP	50% - UNEP Toolkit				50%	

1. Extraction and Use of Fuels / Energy Sources

1.2 Coal Combustion in Coal-fired Boilers

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Extraction (local source: sub-bituminous)	1,541,193.18	0.04	61.65						61.65
02	Washing	1,541,193.18	0.04	61.65		12.95				48.70
03	Combustion (Level1)			34.09	25.57				8.52	
04	Combustion (Level II)			14.61	7.31				7.31	
05	Extraction (imported: Indonesia bituminous)	4,623,579.55	0.03	138.71						138.71

06	Washing	4,623,579.55	0.03	138.71		29.13				109.58
07	Combustion (Level1 - 70%) c/o UNEP/AMAP			76.71	57.53				19.18	
08	Combustion (Level II - 30%)			32.87	16.44				16.44	
	TOTAL				**106.85**	**42.08**	**0.00**	**0.00**	**51.45**	

Units	01	MT/yr	mg/kg	kg/yr						kg/yr
	02					kg/yr				kg/yr
	03				kg/yr				kg/yr	
	04				kg/yr				kg/yr	
	05	MT/yr	mg/kg	kg/yr						kg/yr
	06					kg/yr				kg/yr
	07				kg/yr				kg/yr	
	08				kg/yr				kg/yr	

Reference	01	2017 DOE Key Statistics	UNEP Level 2							100%
	02					21% - UNEP Toolkit Level 2				79%
	03			70% - UNEP / AMAP	75% - UNEP Toolkit				25%	

	04			30% - UNEP / AMAP	50% - UNEP Toolkit				50%	
	05	2017 DOE Key Statistics	UNEP Level 2							100%
	06					21% - UNEP Toolkit Level 2				79%
	07			70% - UNEP / AMAP	75% - UNEP Toolkit				25%	
	08			30% - UNEP / AMAP	50% - UNEP Toolkit				50%	

1. Extraction and Use of Fuels / Energy Sources

1.3 Mineral Oil Extraction, Refining, and Use

Life Cycle		Activity Rate	Input Factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Extraction of Crude Oil	264,483.07	2.00	0.53						0.53
02	Production of Produced Water	2,248,106.11	150.00	337.75		303.97	33.77			

Philippine Mercury Inventory Report 2018:

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03	Refining of Extracted Crude Oil			0.53	0.13	0.01		0.19	0.13	0.07
04	Refining of Imported Crude Oil	10,757,580.29	1.50	16.14	4.03	0.16		5.81	4.03	2.10
05	Combustion of Total Oil			2.17	2.17					
06	Imported Petroleum Products (LPG)	1,133,228.55	1.30	1.50	1.50					
07	Imported Petroleum Products (gasoline)	4,547,303.57	1.50	6.82	6.82					
08	Imported Petroleum Products (aviation/kerosene)	71,131.87	0.04	0.003	0.003					
09	Imported Petroleum Products (diesel)	16,582,646.98	0.40	6.63	6.63					
10	Imported Petroleum Products (fuel oils)	299,592.46	0.67	0.20	0.20					
11	Imported Petroleum Products (coke)	9,219,964.00	20.00	184.40	184.40					
	TOTAL				**205.883**	**304.14**	**33.77**	**6.00**	**4.16**	

Units	01	MT/yr	mg/MT	kg/yr						kg/yr
	02	MT/yr	mg/MT	kg/yr		kg/yr		kg/yr		
	03			kg/yr	kg/yr	kg/yr		kg/yr	kg/yr	kg/yr
	04	MT/yr	mg/MT	kg/yr	kg/yr	kg/yr		kg/yr	kg/yr	kg/yr

	05			kg/yr	kg/yr					
	06	MT/yr	mg/MT	kg/yr	kg/yr					
	07	MT/yr	mg/MT	kg/yr	kg/yr					
	08	MT/yr	mg/MT	kg/yr	kg/yr					
	09	MT/yr	mg/MT	kg/yr	kg/yr					
	10	MT/yr	mg/MT	kg/yr	kg/yr					
	11	MT/yr	mg/MT	kg/yr	kg/yr					

Reference	01	2017 DOE Key Statistics	UNEP Level 2							
	02	2017 DOE Key Statistics	UNEP Level 2			90% - Chevron Thailand		10% - Chevron Thailand		
	03				25% - UNEP Toolkit 2	1% -UNEP Level 2		36% - UNEP Level 2	25% - UNEP Level 2	13% - UNEP Level 2
	04	2017 DOE Key Statistics	UNEP Level 2		25% - UNEP Toolkit 2	1% - UNEP Level 2		36% - UNEP Level 2	25% - UNEP Level 2	13% - UNEP Level 2
	05				100% - UNEP Toolkit 2					

	06	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						
	07	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						
	08	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						
	09	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						
	10	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						
	11	2014 - 2017 BOC data	UNEP Level 2		100% - UNEP Toolkit 2						

1. Extraction and Use of Fuels / Energy Sources

1.4 Extraction and Refining of Natural Gas

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Extraction and Refining of NG	3,964,569,203.21	100.00	396.46	79.29	79.29			39.65	198.23

02	Combustion of NG			198.23	198.23					
	TOTAL				**277.52**	**79.29**	**0.00**	**0.00**	**39.65**	

Units	01	m3/yr	microgram/m3	kg/yr	kg/yr	kg/yr			kg/yr	kg/yr
	02			kg/yr	kg/yr					

Reference	01	2017 DOE Key Statistics	UNEP Level 2		20% - UNEP Toolkit 2	20% - UNEP Toolkit 2			10% - UNEP Toolkit 2	50% - UNEP Toolkit 2
	02	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2					

1. Extraction and Use of Fuels / Energy Sources

1.5 Other Fossil Fuels

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Combustion	1,019.00	117.00	0.119	0.119					
	TOTAL				**0.119**	**0.00**	**0.00**	**0.00**	**0.00**	

Unit	01	MT/yr	mg/m3	kg/yr	kg/yr					

Refere	01	2014 - 2017 BOC data	UNEP Level 2		100% - UNEP Toolkit 2					

1. Extraction and Use of Fuels / Energy Sources

1.6 Biomass-fired Power and Heat Production

	Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Combustion of Biomass (except charcoal)	19,198,799.27	0.03	575.96	575.96					
02	Combustion of Biomass (charcoal)	2,150,958.33	0.12	258.12	258.12					
	TOTAL				**834.08**	**0**	**0.00**	**0.00**	**0**	

Unit	01	MT/yr	g/MT	kg/yr	kg/yr	kg/yr			kg/yr	kg/yr
	02	MT/yr	g/MT	kg/yr	kg/yr					

Refere	01	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2					

	02	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2						

1. Extraction and Use of Fuels / Energy Sources

1.7 Geothermal

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Power Generation	10,985,819.00	0.050	549.29	549.29					
	TOTAL				**549.29**	**0.00**	**0.00**	**0.00**	**0.00**	

Units	01	MWh/year	g. Hg/MWh	kg/yr	kg/yr					

Refere	01	2017 DOE Key Statistics	UNEP Level 2		100% - UNEP Toolkit 2					

2. Primary Virgin Metal Production

2.1 Mercury Extraction and Initial Processing

Life Cycle	Activity Rate			Output Distribution Factor

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			Input factor	Hg Input	Air	Water	Land	General Waste	Special	Products
01										
02										
	TOTAL				0	0	0.00	0.00	0	

Unit	01									
	02									

Refe	01									
	02									

2. Primary Virgin Metal Production

2.2 Gold and Silver Extraction using Mercury Amalgamation Process

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Gold Extraction (from whole ore)	34,085.50	5.00	170,427.48	141,437.77	357.897715	28,631.82			

	TOTAL				141,437.77	357.90	28,631.82	0.00	0.00	
Unit	01	kg/yr	kg/kg	kg/yr	kg/yr	kg/yr	kg/yr			
Referenc	01	2018 GFMS Gold Survey (90% - assumption_	BAN Toxics		83.99% - Samanego et.al	0.21% - Samanego et. Al	16.8% - Samanego et. Al.			

2. Primary Virgin Metal Production

2.3 Zinc Extraction and Initial Processing

	Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Production of Zinc from Concentrates (Smelting)	N/A								
	TOTAL									
U	01									
R	01									

2. Primary Virgin Metal Production

2.4 Copper Extraction and Initial Processing

	Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Production of Copper from Concentrates (Smelting)	317,536.80	30.00	9,526.10	4,667.79	2572.53	2381.53		9,430.84	
	TOTAL				**4667.79**	**2572.53**	**2381.53**	**0.00**	**9430.84**	
Unit	01	MT/yr	g/MT	kg/yr						
Refere	01	2016 USGS	UNEP Toolkit 2		49% - UNEP Toolkit 2	2% - UNEP Toolkit 2			49% - UNEP Toolkit 2	

2. Primary Virgin Metal Production

2.5 Lead Extraction and Initial Processing

Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
				Air	Water	Land	General	Special	Products

								Waste		
01	Production of Lead from Concentrates (Smelting)	N/A								
	TOTAL									

U	01									

R	01									

2. Primary Virgin Metal Production

2.6 Gold Extraction and Initial Processing by Methods Other Than Mercury Amalgamation

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Gold Extraction (whole ore)	3,652,017.50	5.50	20,086.10	803.44	401.72	18,077.49			803.44
02										
	TOTAL				803.44	401.72	18077.49	0.00	0.00	803.44

Units	01	MT/yr	g/MT	kg/yr	kg/yr	kg/yr	kg/yr			kg/yr
	02									

Reference	01	Basis: GFMS Gold Survey 2018	UNEP Toolkit 2017		4%-UNEP Toolkit 2017	2%-UNEP Toolkit 2017	90%-UNEP Toolkit 2017			4%-UNEP Toolkit 2017
	02									

2. Primary Virgin Metal Production

2.7 Aluminium Extraction and Initial Processing

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Aluminium extraction and initial processing	N/A								
02	/Alumina production from bauxite and alumina	N/A								
	TOTAL				**0**	**0**	**0.00**	**0.00**	**0**	

Unit	01									
	02									

Refe	01									
	02									

2. Primary Virgin Metal Production

2.8 Other non-ferrous metals - extraction and processing

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	N/A									
02										
	TOTAL				0	0	0.00	0.00	0	

Unit	01									
	02									

Refe	01									
	02									

2. Primary Virgin Metal Production

2.9 Primary ferrous metal production

Life Cycle	Activity Rate			Output Distribution Factor

			Input factor	Hg Input	Air	Water	Land	General Waste	Special	Products
01	Primary ferrous metal production (Pig Iron)	4,375,000.00	0.05	219.75	207.81				10.94	
02										
	TOTAL				**207.81**	**0**	**0.00**	**0.00**	**10.94**	

Units	01	MT/yr	g Hg/MT	kg/yr	kg/yr				kg/yr	
	02									

Reference	01	Philippines in Figures 2018 (2016 data)	UNEP ToolKit Reference 2017		95%-UNEP ToolKit Reference 2017				5%-UNEP ToolKit Reference 2017	
	02									

3. Production of other minerals and materials with mercury impurities

3.1 Cement Production

Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
				Air	Water	Land	General Waste	Special	Products

01	Cement Production	26,575,250.00	0.09	2391.77	956.71				956.71	478.35
02										
	TOTAL				**956.71**	**0**	**0.00**	**0.00**	**956.71**	**478.35**

Units	01	MT/yr	g/MT	Kg/yr	Kg/yr				Kg/yr	Kg/yr
	02									

Reference	01	USGS 2016	Holcim Data 2015		40%-UNEP Toolkit 2.0 Reference 2017				40%-UNEP Toolkit 2.0 Reference 2017	20%-UNEP Toolkit 2.0 Reference 2017
	02									

3. Production of other minerals and materials with mercury impurities

3.2 Pulp and Paper Production

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Pulp and paper production	N/A								
02										

	TOTAL				-	0.00	-	0.00	0.00	

Unit	01									
	02									

Refe	01									
	02									

3. Production of other minerals and materials with mercury impurities

3.3 Production of lime and light weight aggregates

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Lime Production	9,010.17	0.06	0.50	0.45			0.05		
02	Light Weight aggregarte Kilns	N/A								
	TOTAL				0.45	0	0.00	0.05	0	

Unit	01	MT/yr	g/MT	Kg/yr	Kg/yr			Kg/yr		
	02	MT/yr	g/MT	Kg/yr	Kg/yr			Kg/yr		

Referenc	01	USGS 2015	UNEP Toolkit 2.0 Reference 2017		90%-UNEP Toolkit 2.0 Reference 2017			10%-UNEP Toolkit 2.0 Reference 2017		
	02	USGS 2015	UNEP Toolkit 2.0 Reference 2017		90%-UNEP Toolkit 2.0 Reference 2017			10%-UNEP Toolkit 2.0 Reference 2017		

3. Production of other minerals and materials with mercury impurities

3.4 Other minerals and materials

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Volcanic Cinder and tuff	38,162,432.54	0.01	381.68	343.52					38.17
	TOTAL				**343.52**	**0**	**0.00**	**0.00**	**0**	**38.17**

U	01	Kg/yr	g Hg/Kg							

Referenc	01	USGS 2015	UNEP Toolkit 2.0 Reference 2017		90%-UNEP Toolkit 2.0 Reference 2017					10%-UNEP Toolkit 2.0 Reference 2017

5. Consumer products with intentional use of mercury

5.1 Thermometers with mercury

	Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Stock
01	Use									
02	Stock Thermometer with Mercury	5,029,110.00	1	5,029.11						5029.11
06	Disposal									
08	No separate collection. Informal waste handl. Widespread	173,882.00	1	173.882	34.87	52.16	34.78	52.16	0	

09	Separate collection. Waste handl. controlled	77,575.00	1	75.81	7.58	22.74	0	22.74	22.74	
	TOTAL				**42.45**	**74.9**	**34.78**	**74.90**	**22.74**	

Units	01									
	02	items/yr	g Hg/item	Kg/yr						
	06									
	08				kg/yr	kg/yr		kg/yr	kg/yr	

Reference	01									
	02	Calculated from Stocks in 2016 Mercury Inventory of 5916601 items with 3 year correction factor for the annual 5% disposal	UNEP Toolkit 2.0 Reference 2017							100%-UNEP Toolkit 2.0 Reference 2017
	06									
	08	These are the 5% diposed medical thermometers from household. Thermometer from household are assume to be 69.15 % from the 2016 Mercury Inventory stock			20%-UNEP Toolkit 2.0 Reference 2017	30%-UNEP Toolkit 2.0 Reference 2017	20%-UNEP Toolkit 2.0 Reference 2017	30%-UNEP Toolkit 2.0 Reference 2017		

	09	These are the 5% diposed medical thermometers from medical facilities. Thermometer from medical facilities are assume to be 30.85% from the 2016 Mercury Inventory stock			10%-UNEP Toolkit 2.0 Reference 2017	30%-UNEP Toolkit 2.0 Reference 2017		30%-UNEP Toolkit 2.0 Reference 2017	30%-UNEP Toolkit 2.0 Reference 2017	

5. Consumer products with intentional use of mercury

5.2 Electrical switches and relays with mercury (included thermostats)

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Use of Electrical switches and relays with mercury (included thermostats)	90,883,293.90	0.02	1,817.67						1,817.67
02	Disposal\ No separate collection. Informal			1,817	545.30		727.07	645.3	0	0

	Waste handl. Widespread			.67						
	TOTAL				**545.30**	**0.00**	**727.07**	**645.30**	**0.00**	

Units	01	inhabitants with electricity	g Hg/(y*inhabitant							
	02				Kg Hg/yr		Kg Hg/yr	Kg Hg/yr		Kg Hg/yr

Reference	01	90% electrification factor; number of philippine inhabitants as of 2018 PSA: Electrification Rate as per UNEP Toolkit 2.0 Ver 1.4	UNEP TOOLKIT 2.0 REFERENCE 2017							100%-UNEP TOOLKIT 2.0 REFERENCE 2017
	02				30%-UNEP TOOLKIT 2.0 REFERENCE 2017		40%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017		

5. Consumer products with intentional use of mercury
5.3 Electrical switches and relays with mercury (included thermostats)

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Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Use of light sources with mercury									
02	/Fluorescent tubes (double end)	6,105,572.00	10.00	61.06						61.05
03	/Compact fluorescent lamp (CFL single end)	21,030,303.90	5.00	105.15						105.15
04	/High pressure mercury vapour									
05	/High-pressure sodium lamps	8,819,159.00	30.00	264.57						0.57

06	/UV mercury lamps									
07	/Metal halide lamps	21,708,701.00	25.00	542.75						220.47
08	Disposal									
09	/No separate collection. Waste handl. Controlled			668.37	33.42			634.95		
10	/No separate collection. Informal waste handl. Widespread			292.05	87.61		87.61	116.82		
11	/Separate collection. Waste handl. Controlled			13.08	0.65			10.47	1.96	

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	TOTAL				**121.68**	**0.00**	**87.61**	**762.24**	**1.96**	

Units										
	01									
	02	items/yr	mg Hg/ item	Kg Hg/yr						Kg Hg/yr
	03	items/yr	mg Hg/ item	Kg Hg/yr						Kg Hg/yr
	04			Kg						
	05									
	06	items/yr	mg Hg/ item	Kg Hg/yr						Kg Hg/yr
	07	items/yr	mg Hg/ item	Kg Hg/yr						Kg Hg/yr
	08									
	09			Kg H	Kg Hg/yr			Kg Hg/yr		

				g/yr							
	10			Kg Hg/yr	Kg Hg/yr		Kg Hg/yr	Kg Hg/yr	Kg Hg/yr		
	11			Kg Hg/yr	Kg Hg/yr			Kg Hg/yr	Kg Hg/yr		

Reference	01									
	02	activity rate 2018 assumed: 67.8369 million lamps (Calculated, linearly from the innogy estimate of 24.94 million lamps discarded annually, 2010): assumed average popn growth1.72 population growth per year (2010-2015) (psa quick stat); 2016 lamp type use 9% lin. flourescent, 31%CFL, 15% LED, 32% halogen lamps, 13% others (Emergystar, 2016)	UNEP TOOLKIT 2.0 REFERENCE 2017							100%-UNEP TOOLKIT 2.0 REFERENCE 2017
	03		UNEP TOOLKIT 2.0 REFERENCE 2018							100%-UNEP TOOLKIT 2.0 REFERENCE 2017

	04									100%-UNEP TOOLKIT 2.0 REFERENCE 2017
	05									100%-UNEP TOOLKIT 2.0 REFERENCE 2017
	06	BOC Imporation data (2014-2017) average yearly import rate: item weight based on the Philip's HPL-N 250W E39/41 HG.SLV/12 model	UNEP TOOLKIT 2.0 REFERENCE 2019							100%-UNEP TOOLKIT 2.0 REFERENCE 2017
	07	activity rate 2018 assumed: 67.8369 million lamps (Calculated, linearly from the innogy estimate of 24.94 million lamps discarded annually, 2010): ssumed average popn growth1.72 population growth per year (2010-2015) (psa quick stat); 2016 lamp type use 9% lin.	UNEP TOOLKIT 2.0 REFERENCE 2017							100%-UNEP TOOLKIT 2.0 REFERENCE 2017

		flourescent, 31%CFL, 15% LED, 32% halogen lamps, 13% others (Emergystar, 2016)								
	08									
	09				5%-UNEP TOOLKIT 2.0 REFERENCE 2017			95%-UNEP TOOLKIT 2.0 REFERENCE 2017		
	10				30%-UNEP TOOLKIT 2.0 REFERENCE 2017		30%-UNEP TOOLKIT 2.0 REFERENCE 2017	40%-UNEP TOOLKIT 2.0 REFERENCE 2017		
	11				5%-UNEP TOOLKIT 2.0 REFERENCE 2017			80%-UNEP TOOLKIT 2.0 REFERENCE 2017	15%-UNEP TOOLKIT 2.0 REFERENCE 2017	

5. Consumer products with intentional use of mercury											
5.4 Batteries with mercury											
Life Cycle		**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
					Air	**Water**	**Land**	**General Waste**	**Special**	**Products**
01	Use of Batteries with Mercury									
02	\Mercury oxide (all sizes); also called mercury-zinc cells	N/A								
03	\Zinc-air button cells	0.12	12.00	1.46						1.46
04	\Alkaline button cells	69.15	5.00	346.74						346.74

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05	\Silver oxide button cells	0.01	4.00	0.05						0.05
06	\Alkaline, other than button cell shapes	0.08	0.25	0.02						0.02
07	Disposal									
08	\No separate collection. Waste handl. Controlled			238.42				238.42		
09	\No separate collection. Informal waste handl. Widespread			104.18	26.05		26.05	52.09		
10	\ Separate collection. Waste handl. Controlled			4.67				2.80	1.87	
	TOTAL				**26.05**	**0.00**	**26.05**	**293.31**	**1.87**	

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Units										
	01									
	02	N/A								
	03	MT/yr	Kg Hg/MT	Kg Hg/yr						Kg Hg/yr
	04	MT/yr	Kg Hg/MT	Kg Hg/yr						Kg Hg/yr
	05	MT/yr	Kg Hg/MT	Kg Hg/yr						Kg Hg/yr
	06	MT/yr	Kg Hg/MT	Kg Hg/yr						Kg Hg/yr
	07									
	08									
	09									
	10									

Reference										
	01									
	02									
	03	BOC Imporation data (2014-2017) average yearly import rate	UNEP TOOLKIT 2.0 REFERENCE 2017							100%
	04	BOC Imporation data (2014-2017) average yearly import rate	UNEP TOOLKIT 2.0 REFERENCE 2018							100%
	05	BOC Imporation data (2014-2017) average yearly import rate	UNEP TOOLKIT 2.0 REFERENCE 2019							100%
	06	BOC Imporation data (2014-2017) average yearly import rate	UNEP TOOLKIT 2.0 REFERENCE 2020							100%
	07									
	08							100%-UNEP TOOLKIT 2.0		

								REFERENCE 2017			
	09				25%-UNEP TOOLKIT 2.0 REFERENCE 2017		25%-UNEP TOOLKIT 2.0 REFERENCE 2017	50%-UNEP TOOLKIT 2.0 REFERENCE 2017			
	10							60%-UNEP TOOLKIT 2.0 REFERENCE 2017	40%-UNEP TOOLKIT 2.0 REFERENCE 2017		

5. Consumer products with intentional use of mercury											
5.5 Polyurethane with mercury catalysts											
Life Cycle		**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
					Air	**Water**	**Land**	**General Waste**	**Special**	**Products**	
01	Use of Polyurethane with	N/A									

	mercury catalysts										
02	Disposal										
03	\No separate collection. Waste handl. controlled										
04	\ No separate collection. Informal waste handl. widesprea d										
	TOTAL				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	

5. Consumer products with intentional use of mercury										
5.6 Biocides and pesticides with mercury										
Life Cycle	**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
				Air	**Water**	**Land**	**General Waste**	**Special**	**Products**

01	Use of Biocides and pesticides with mercury	44,226.00	0.002	88.45	17.6904	8.8452	17.69			
	TOTAL				**17.69**	**8.85**	**17.69**	**0.00**	**0.00**	**0**

Units	01	kg/yr	kg Hg/Kg	Kg Hg/yr						

Reference	01	FPA: 2015-2017 data, fungicides and pesticides	UNEP TOOLKIT 2.0 REFERENCE 2017		20%-UNEP TOOLKIT 2.0 REFERENCE 2017	10%-UNEP TOOLKIT 2.0 REFERENCE 2017	20%-UNEP TOOLKIT 2.0 REFERENCE 2017			

5. Consumer products with intentional use of mercury

5.7 Paints with mercury

Life Cycle	Activity Rate	Input factor	Hg Inp	Output Distribution Factor					
				Air	Water	Land	General Waste	Special	Products

				ut							
01	Use and Disposal of Paints with mercury	N/A									
02											
	TOTAL				**0.00**	**0.00**	**0.00**	**0.00**	**0**	

5. Consumer products with intentional use of mercury

5.8 Pharmaceuticals for human and veterinary uses

Life Cycle			Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	N/A									
02										
	TOTAL				**0**	**0**	**0.00**	**0.00**	**0**	

Unit	01									
	02									

P	01									

	02									

5. Consumer products with intentional use of mercury											
5.10 Cosmetics and related products with mercury											
Life Cycle		**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
					Air	**Water**	**Land**	**General Waste**	**Special**	**Products**
01	Use									
02	/Regulated	45,819,831.00	1	32426.69						32426.69
03	/Unregulated	13,745,949.30	2359	45.82						45.82
	Disposal			32477		30848.89	1623.63			

				2.51						
	TOTAL				**0**	**30848.89**	**1623.63**	**0**	**0**	**0**

Units	01									
	02	kg/yr	mg Hg/Kg	Kg/yr						kg/yr
	03	Kg/yr	mg Hg/Kg	kg/yr						kg/yr
	04			kg/yr		kg/yr	kg/yr			

Reference	01									
	02	UN Comtrade data 2016, 2017 and 2018 on cosmetics import	UNEP TOOLKIT 2.0 REFERENCE 2017							

	03	Uses smuggling rate for the ph of 30% (source:http://www.investphilippines.info/arangkada/media-watching-smuggling/) and applied to the countries identified to have supplied high mercury content product in the market such as china, thailand, malaysia, indonesia and pakistan	Average level: Ecowaste Coalition							
	04					95%-UNEP TOOLKIT 2.0 2017	5%-UNEP Toolkit 2.0 REFERENCE 2017			

6. Other intentional product/process use										
6.1 Dental mercury-amalgam fillings										
Life Cycle	**Activity Rate**	**Input factor**	**Hgl**	**Output Distribution Factor**						
				Air	**Water**	**Land**	**General Waste**	**Special**	**Stock**

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				input						
01	/Preparations of fillings at dentist clinics (share of current mercury supply for amalgam fillings)	100,981,437.00	0.0273	2754.70	55.09	385.66		661.13		1,652.82
02	/Use - from fillings in the mouth (releases from mercury supply for fillings 5-15 years ago)	97,721,492.00	0.0164	2,665.77		31.99				
03	/Disposal (releases from mercury supply for fillings 10-20 years ago)	85,859,097.00	0.0160	2,342.18		385.62	110.18	110.18	110.18	82.63
04										

05										
06										
07										
08										
09										
	TOTAL				**55.09**	**803.27**	**110.18**	**771.31**	**110.18**	

Units	01	Inhabitants	g Hg/yr-inhabitant	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr		Kg Hg/yr		Kg Hg/yr
	02	Inhabitants	g Hg/yr-inhabitant	Kg Hg/yr		Kg Hg/yr				
	03	inhabitants	g Hg/yr-	Kg H		Kg Hg/yr	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr

			inhabitant	g/yr						
	04									
	05									
	06									
	07									
	08									

Reference	01	Philippine population for 2018 as per Philippine Statistic Authority	UNEP TOOLKIT 2.0 REFERENCE 2017		20%-UNEP TOOLKIT 2.0 REFERENCE 2017	14%-UNEP TOOLKIT 2.0 REFERENCE 2017		24%-UNEP TOOLKIT 2.0 REFERENCE 2017		60%-UNEP TOOLKIT 2.0 REFERENCE 2017
	02	Average Population (2010-2015) Philippine Statistics Authority/	UNEP TOOLKIT 2.0 REFERENCE 2018			2%-UNEP TOOLKIT 2.0 REFERENCE 2017				
	03	Average Population (1999-2010) Philippine Statistics Authority//	UNEP TOOLKIT 2.0 REFERENCE 2019			28%-UNEP TOOLKIT 2.0 REFERENCE 2017	8%-UNEP TOOLKIT 2.0 REFERENCE 2017	8%-UNEP TOOLKIT 2.0 REFERENCE 2017	8%-UNEP TOOLKIT 2.0 REFERENCE 2017	6%-UNEP TOOLKIT 2.0 REFERENCE 2017

	04									
	05									
	06									
	07									
	08									
	09									

6. Other intentional product/process use

6.2 Manometers and gauges with mercury

	Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Use+disposal of medical blood pressure gauges	4,967.00	75.00	372.46	37.23	111.74		111.74	111.74	
02	Other Manometers	100,981,437.00	0.01	504.91	50.49	151.47		151.47	151.47	

	TOTAL				**87.72**	**263.21**	**-**	**263.21**	**263.21**	

Units	01	items/yr	g Hg/item	Kg Hg/yr	Kg Hg/yr		Kg Hg/yr	Kg Hg/yr		
	02	Inhabitants								
Reference	01	Calculated from Stocks in 2016 Mercury Inventory of 116,849 items with 3 year correction factor for the annual 5% disposal	UNEP TOOLKIT 2.0 REFERENCE 2017		10%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017		30%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017	
	02									

6. Other intentional product/process use

6.3 Laboratory chemicals and equipment with mercury

Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
				Air	Water	Land	General Waste	Special	Products

01	/Use and disposal of laboratory chemicals and other lanoratory equipment	100,981,437.00	0.04	3,635.33	727.07	1090.6	735.14	1090.6		
	TOTAL				**727.07**	**1,090.60**	**735.14**	**1,090.60**	**0.00**	

Units	01	Inhabitants	g Hg/yr-inhabitants	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr		

Reference	01	Activity rate estimation method based on the estimated yearly filling preparation. Population of the Philippines 106512074 is from https://www.worldometers.info/world-population/philippines-population/.	UNEP TOOLKIT 2.0 REFERENCE 2017		20%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017	20%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017		

6. Other intentional product/process use

6.4 Mercury metal use in religious rituals and folklore medicine

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	N/A									
	TOTAL				**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	
	01									
	01									

6. Other intentional product/process use

6.5 Miscellaneous product uses, mercury metal uses, and other sources

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Pigments	N/A								
	TOTAL				**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Units	01	MT/yr	Kg Hg/MT	Kg Hg/yr		Kg Hg/yr		Kg Hg/yr		Kg Hg/yr
Reference	01	Activity rate based on BOC data (2014-2017) average import.	UNEP TOOLKIT 2.0 REFERENCE 2017			10%-UNEP TOOLKIT 2.0 REFERENCE 2017		10%-UNEP TOOLKIT 2.0 REFERENCE 2017		80%-UNEP TOOLKIT 2.0 REFERENCE 2017

7. Production of recycled metals ("secondary" metal production)									
7.1 Production of recycled mercury ("secondary production")									
Life Cycle	**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**					
				Air	**Water**	**Land**	**General Waste**	**Special**	**Produ**

										cts
01	Production of recycled mercury ("secondary production")	N/A								
02										
	TOTAL				**0**	**0**	**0.00**	**0.00**	**0**	

Unit	01									
	02									

Refe	01									
	02									

7. Production of recycled metals ("secondary" metal production)

7.2 Production of recycled ferrous metals (iron and steel)

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Production of recycled	14,154,493.33	0.0011	15.	5.14		5.29	5.14		

	ferrous metals (iron and steel)			57						
02										
	TOTAL				**5.14**	**0.00**	**5.29**	**5.14**	**0.00**	

Unit	01	kg recycled/yr	g Hg/Kg							
	02									

Reference	01	Activity rate: average scrap import from 2014-2016 based on the MIRDC response:	UNEP TOOLKIT 2.0 REFERENCE 2017		33%-UNEP TOOLKIT 2.0 REFERENCE 2017		34%-UNEP TOOLKIT 2.0 REFERENCE 2017	33%-UNEP TOOLKIT 2.0 REFERENCE 2017		
	02									

7. Production of recycled metals ("secondary" metal production)

7.3 Production of other recycled metals

Life Cycle	Activity Rate	Input factor	Hg Input	Output Distribution Factor					
				Air	Water	Land	General Waste	Special	Products

01	Production of other recycled metals	198,987.50	0.0011	0.22	0.07	0.02		0.07	0.07	
	TOTAL									

Units	01	kg recycled/yr	g Hg/Kg	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr		Kg Hg/yr	Kg Hg/yr	

Reference	01	Activity rate: average scrap import from 2014-2016 based on the MIRDC response:	UNEP TOOLKIT 2.0 REFERENCE 2017		30%-UNEP TOOLKIT 2.0 REFERENCE 2017	10%-UNEP TOOLKIT 2.0 REFERENCE 2017		30%-UNEP TOOLKIT 2.0 REFERENCE 2017	30%-UNEP TOOLKIT 2.0 REFERENCE 2017	

8. Waste deposition/landfilling and waste water treatment										
8.1Controlled landfills/deposits										
Life Cycle	**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
				Air	**Water**	**Land**	**General Waste**	**Special**	**Produc**	

										ts
01	Controlled landfills/deposits	37,826.26	10.00	378.26	37.09	37.09	296.71		7.38	
02										
	TOTAL				**37.08865185**	**37.08865185**	**296.71**	**0.00**	**7.37612148**	

Units	01	MT/yr	g Hg/MT	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr	Kg Hg/yr		Kg Hg/yr	
	02									

Reference	01	Activity rate: based on the report of solid waste management association of the Philippines.70% are collected and 1.93% of them are spcial hazardous and out of the 27% recyclables, 4.22% are glass and 2.31% are metals.	UNEP TOOLKIT 2.0 REFERENCE 2017		9.81%-UNEP TOOLKIT 2.0 REFERENCE 2017	9.81%-UNEP TOOLKIT 2.0 REFERENCE 2017	78.4%-UNEP TOOLKIT 2.0 REFERENCE 2017		1.95%-UNEP TOOLKIT 2.0 REFERENCE 2017	
	02									

8. Waste deposition/landfilling and waste water treatment

8.2 Diffuse disposal under some control

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	N/A									
02										
	TOTAL				-	0.00	-	0.00	0.00	

Unit										
	01									
	02									

Refe										
	01									
	02									

8. Waste deposition/landfilling and waste water treatment

8.3 Informal local disposal of industrial production waste

	Activity Rate			Output Distribution Factor

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Life Cycle			Input factor	Hg Input	Air	Water	Land	General Waste	Special	Products
01	N/A									
	TOTAL				**0**	**0**	**0.00**	**0.00**	**0**	
	01									
	01									

8. Waste deposition/landfilling and waste water treatment										
8.4 Informal dumping of general waste										
Life Cycle	**Activity Rate**	**Input factor**	**Hg Input**	**Output Distribution Factor**						
				Air	**Water**	**Land**	**General Waste**	**Special**	**Products**	

01	Informal dumping of general waste	8,570.18	10.00	85.70	8.57	8.57	68.56			
	TOTAL				**8.570179385**	**8.570179385**	**68.56**	**0.00**	**0**	

Units	01	MT/yr	Kg Hg/MT	kg Hg/yr	kg Hg/yr		kg Hg/yr			
Reference	01	ctivity rate: based on the report of solid waste management association of the Philippines.70% are collected and 1.93% of them are spcial hazardous and out of the 27% recyclables, 4.22% are glass and 2.31% are metals.	UNEP TOOLKIT 2.0 REFERENCE 2017	10%-UNEP TOOLKIT 2.0 REFERENCE 2017	10%-UNEP TOOLKIT 2.0 REFERENCE 2017	80%-UNEP TOOLKIT 2.0 REFERENCE 2017				

8. Waste deposition/landfilling and waste water treatment				
8.5 Waste water system/treatment				
	Activity Rate			**Output Distribution Factor**

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	Life Cycle		Input factor	Hg Input	Air	Water	Land	General Waste	Special	Products
01	Wastewater system/treatment	7,593,398,000.00	1.00	7,593.40		3796.70		2278.02	1,518.68	
	TOTAL				**0.00**	**3796.70**	**0.00**	**2278.02**	**1518.68**	

Units	01	cu.m./yr	mg Hg/cu.m	Kg Hg/yr						

Reference	01	Activity rate: based on the 2011 data of Mogol et.al (2011) and extrapolated using the 2010-2018 average population rate of 1.72%.	UNEP TOOLKIT 2.0 REFER			50%-UNEP TOOLKIT 2.0 REFERE		30%-UNEP TOOLKIT 2.0 REFER	20%-UNEP TOOLKIT 2.0 REFERE	

			ENCE 2017			NCE 2017		ENCE 2017	NCE 2017	

10. Crematoria and Cemetaries

10.1 Crematoria/Cremation

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Cremation	58,038.00	2.50	145.1	145.1					
02										
	TOTAL				**145.1**	**0**	**0.00**	**0.00**	**0**	

Units	01	no. of coprse cremated /yr	g Hg/corpse	Kg/yr	kg/yr					
	02									

Reference	01	Activity rate estimation method based on the estimated yearly filling preparation. Population of the Philippines100981437 PSA (August 2015 data (is from https://www.worldomet	UNEP TOOLKIT 2.0 REFERENCE 2017		100%-UNEP TOOLKIT 2.0 REFERENCE 2017					

		ers.info/world-population/philippines-population/). Based on the 2011 National Monitoring and evaluation Dental Survey by DOH, 87.4% of the Filipinos have dental caries and with an average of 2.0 DMFT (Decayed Missing Filled Teeth). Furtherrmore PSA average death rate is 6/1000 for 2010-2015. As per preseference, 40% of the urban greater manila and calabarzon prefered cremation.								
	02									

10. Crematoria and Cemetaries

10.1 Cemeteries

Life Cycle		Activity Rate	Input factor	Hg Input	Output Distribution Factor					
					Air	Water	Land	General Waste	Special	Products
01	Cemeteries	471,508.00	2.50	1,178.77			1,178.77			

02										
	TOTAL				**-**	**0.00**	**1,178.77**	**0.00**	**0.00**	

Units	01	no. of corpses burried/yr	g Hg/corpse	Kg Hg/yr						
	02									

Reference	01	Based on 2018 estimated Philippine pop'n (Philippine Statistics Authority):Based on the 2011 National Monitoring and evaluation Dental Survey by DOH, 87.4% of the Filipinos have dental caries and with an average of 2.0 DMFT (Decayed Missing Filled Teeth). Furtherrmore PSA average death rate is 6/1000 for 2010-2015. As per preseference, 40% of the urban greater manila and	UNEP TOOLKIT 2.0 REFERENCE 2017				100%-UNEP TOOLKIT 2.0 REFERENCE 2017			

		calabarzon prefered cremation.								
	02									

ANNEX II