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2019



Minamata Convention Initial Assessment (MIA) in Nepal



GLOBAL ENVIRONMENT FACILITY
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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Government of Nepal
Ministry of Forests and Environment
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Abbreviations and Acronyms

ADB	Asian Development Bank
APCs	Air Pollution Controls
APHIN	Association of Private Health Institute Nepal
BDS	Bachelor of Dental Surgery
BPKIHS	B.P. Koirala Institute of Health Sciences
BRI	Biodiversity Research Institute
BS	Bikram Sambat (Nepali Calendar)
CBS	Central Bureau of Statistics
CDC	Central Department of Chemistry
CDES/TU	Central Department of Environmental Science/ Tribhuvan University
CEPHED	Center for Public Health and Environmental Development
CFL	Compact Fluorescent Lamp
CMC	Chitwan Medical College
CMS	College of Medical Science
CTEVT	Council for Technical Education and Vocational Training
DDA	Department of Drug Administration
DHM	Department of Hydrology and Meteorology
DOAA	Department of Ayurved and Alternative Medicine
DOAgr	Department of Agriculture
DOArch	Department of Archaeology
DOC	Department of Customs
DOE	Department of Environment
DOEd	Department of Education
DOI	Department of Industry
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply & Sewerage
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Rule
EU	European Union
FHAN	Federation of Handicraft Associations of Nepal
FNCCI	Federation of Nepalese Chamber of Commerce and Industry
FY	Fiscal Year
GDP	Gross Domestic Product

GEF	Global Environment Facility
GON	Government of Nepal
HA	Health Assistant
HCI	Health Care Institute
HCW	Health Care Waste
Hg	Mercury
HWMP	Hazardous Waste Management Policy
HWMR	Hazardous Waste Management Regulation
ICIMOD	International Centre for Integrated Mountain Development
IEA	Industrial Enterprises Act
IEE	Initial Environment Examination
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilo gram
Kl	Kilo Liter
KU	Kathmandu University
KUKL	Kathmandu Upatyaka Khanepani Limited
LGOA	Local Government Operation Act
LPCD	Liters per Capita per Day
LPG	Liquefied Petroleum Gas
mamsl	Meters above mean sea level
MBBS	Bachelor of Medicine and Bachelor of Surgery
MDS	Master of Dental Surgery
MEAs	Multilateral Environmental Agreements
MIA	Minamata Convention Initial Assessment
MOALD	Ministry of Agriculture and Livestock Development
MOCIT	Ministry of Communication and Information Technology
MOFAGA	Ministry of Federal Affairs and General Administration
MOFE	Ministry of Forests and Environment
MOF	Ministry of Finance
MOHP	Ministry of Health and Population
MOICS	Ministry of Industry, Commerce and Supplies
MOPE	Ministry of Population and Environment
MOPPW	Ministry of Physical Planning and Works
MOUD	Ministry of Urban Development
MOWS	Ministry of Water Supply
MSW	Municipal Solid Waste
MT	Metric Ton
NBSM	Nepal Bureau of Standards and Metrology
NDA	Nepal Dental Association
NEA	National Executing Agency
NHPC	National Health Professional Council
NHRC	Nepal Health Research Council
NIP	National Implementation Plan
NMC	Nepal Medical Council

NPR	Nepali Rupees (Nepalese currency)
NORAD	Norwegian Agency for Development Cooperation
NSC	National Steering Committee
NWG	National Working Group
POPs	Persistent Organic Pollutants
PPM	Parts per Million
PM	Particulate Matter
PU/PUR	Polyurethane
RoHS	Restrictive of Hazardous Substances
SACEP	South Asia Co-operative Environment Programme
SMS	School of Medical Science
SWM	Solid Waste Management
SWMA	Solid Waste Management Act
SWMR	Solid Waste Management Rule
SWMTSC	Solid Waste Management Technical Support Center
T	Tons
TOE	Tons of Oil Equivalent
TU	Tribuvan University
UN	United Nations
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USA	United States of America
USFDA	United States Food and Drug Administration
WHO	World Health Organization
WWTP	Wastewater Treatment Plant
Y	Year

Executive Summary

I. Results from the National Mercury Inventory

Mercury inventory for Nepal was prepared using the "*Toolkit for identification and quantification of mercury releases, Level 1*" made available by the Chemicals Branch of the United Nations Environment Programme (UN Environment Chemicals). This inventory was developed on the Toolkit's Inventory Level 1. The inventory has identified several key sectors that are responsible for emissions and releases of mercury in Nepal.

Total release of mercury in Nepal for the base year 2016/17 is estimated to be 19615 Kg Hg/y, which includes 6,790 Kg Hg/y from different source categories identified in UNEP Toolkit spreadsheet and 12825 Kg Hg/y from gold plating. Gold plating could not be included as potential mercury sources in the quantitative inventory as this is not identified in the UNEP toolkit, but it is included under miscellaneous mercury sources. The gold plating (gold-mercury amalgam) is identified as the highest contributor in releasing mercury in Nepal followed by such (2,476 Kg Hg/y) from use and disposal of mercury-added. Waste incineration and open burning, and informal dumping of general waste were also significantly releasing mercury, 998 Kg Hg/y and 931 Kg Hg/y, respectively. The energy consumption contributed 904 Kg Hg/y, while crematoria and cemeteries contributed 512 Kg Hg/y. Mercury releases from other materials production such as cement, pulp and paper production is estimated to be 389 Kg Hg/y. The wastewater system/treatment and application, use and disposal of dental amalgam fillings contributed 368 Kg Hg/y and 114 Kg Hg/y, respectively.

The releases of mercury are described in four different output pathways: i) air, ii) water, iii) land, and iv) others. The 'others' category includes by products and impurities, general waste and sector specific waste treatment/disposal.

The total estimated mercury emission to air is found to be 3,550 kg Hg/y excluding that from the gold plating. The individual mercury release sub-categories contributing with the highest mercury releases to the atmosphere are:

Miscellaneous (gold plating in case of Nepal)	:	12184 Kg
Open fire waste burning	:	774 Kg
Biomass fired power and heat production	:	739 Kg
Crematoria	:	465 Kg
Informal dumping of general waste	:	466 Kg
Cement Production	:	288 Kg
Medical blood pressure gauges	:	246 Kg
Incineration / Burning of medical waste	:	224 Kg
Thermometers	:	98 Kg

Similarly, the total estimation of mercury emission to water was 1,250 Kg Hg/y. The main sources of the mercury release in water are application, use and disposal of dental amalgam fillings, use and

disposal of other products, informal dumping and wastewater system/treatment. The water discharged from gold plating practices is also calculated to release 385 Kg Hg/y.

Mercury release to land is estimated to be 460 Kg Hg/y. The major sources of mercury emission to land are informal dumping of general waste, use and disposal of other products (thermometer), crematoria and cemeteries, production of recycled metals and application, use and disposal of dental amalgam fillings. Solid residues from gold plating are disposed of on land after extraction of traces of gold and this is calculated to release 257 Kg Hg/y to the land.

Mercury releases associated with other output pathways for by products and impurities, general waste and sector-specific waste treatments/disposal is estimated to be 1,520 Kg Hg/y. General waste, also called municipal waste in some counties, is the primary contributor of this category. The mercury sources to waste are consumer products with intentional mercury content (batteries, thermometers, fluorescent tubes, etc.) as well as high volume wastes like printed paper, plastic, etc., with traces of mercury in them.

Small quantities of mercury and mercury compounds were found in Nepal during the field survey while preparing the inventory as follows:

- Stockpiles of 30.11 Kg of elemental mercury and 110 Kg of Kajali (mercurous sulphide) are available with Singhadurbar Vaidyakhana.
- Nepal Army, Ministry of Defence, is found to have stored about 14 Kg of mercury and mercury compounds in 2018.
- Bir Hospital Dental Department has 200 Dental mercury amalgam capsules stored safely. This gives about 0.24 Kg of mercury: 200 capsules *1200 mg Hg/capsule.

II. Policy, Regulatory and Institutional Assessment

Nepal is a signatory of the Minamata Convention. A national situation analysis prior to ratification is carried out including the identification of existing relevant domestic legislations and legal or administrative actions that may be needed. Some policies and regulations are present though not directly related to mercury, as follows:

- The (draft) hazardous waste management regulations address the mercury as hazardous waste among other wastes.
- The (draft) hazardous waste management policy obliges registration of all persons or institutions dealing with hazardous wastes and requires making it obligatory and responsible for environmentally sound management of such wastes.
- Draft of new Pesticide Act has made provisions of banning the mercury containing pesticides and fungicides, listed by Rotterdam Convention under Prior Informed Consent (PIC) procedures..

The followings are the outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the convention's provision.

- Ministry of Health and Population's circular on banning import, purchase and uses of mercury containing equipment should be effectively implemented by making it mandatory through gazette notification. (**Art 4**)

- Incinerator standards should be effectively implemented and periodic stack emission monitoring should be carried out; open burning of all kind of wastes should be prohibited. **(Art 8)**
- Hazardous waste incineration plant with suitable technology should be installed and such plant should comply with the given national standard. **(Art 8)**
- The stack emission limits of the mercury should be established for the cement clinker production industries and the quality of pet coke (lowest concentration of mercury) should be ascertained. Mercury emission inventory for all cement clinker production industries should be developed. **(Art 8)**
- The best available technology should be introduced to control mercury emission and release, focusing on gold plating activity. **(Art 8 & 9)**
- Detail inventory of hazardous wastes should be prepared and environment friendly managements of different types of such wastes should be carried out. **(Art 11 & 19)**
- Sites contaminated by mercury, its wastes and compounds within the country should be identified. Regulatory system should include the provision of penalizing individuals or institutions responsible for contaminating local environments by emitting or releasing mercury waste and its compounds. **(Art 12)**
- Institutional capacity should be strengthened for an effective public information and awareness raising on hazardous waste management. **(Art 14 & 18)**
- Technical and medical education system of Nepal should focus on mercury free theory, practical and examination system. For this, the curricula of medical, dental, general sciences and schools (BDS, MBBS, MDS, MD, and General Sciences) should be updated and improved by avoiding the use of mercury and mercury compounds academic and research sectors. **(Art 16 & 18)**
- Right to information and occupational safety and health provided by the Constitution and other legislations should be ascertained. **(Art 16, 17, & 18)**
- Curricula of secondary and higher level education should include hazardous waste management, including management of mercury and its wastes. **(Art 18)**

Ministry of Forests and Environment, lead institution to implement the Minamata Convention, carried out an assessment of existing national institutions and stakeholders, their roles and an analysis of possible gaps, such as capacities and institutions needed for the implementation of this convention in Nepal..

The gaps identified at national level need to be addressed to meet the provisions as follows:

- Relevant ministries should develop policy, laws or issue gazette notification to ban manufacture, import, and export of products listed in Part I of Annex A (Mercury based Medical equipment's, e.g. Thermometer, Sphygmomanometer, etc.) and departments and academia, including schools, colleges and research institutes, should implement decisions made to manufacture, import, use and export of such products and phase down or even phase out the use of dental amalgam. **(Art 4, 16 & 18)**
- Local and provincial governments should be strengthened for the construction of sewerage and waste water treatment facilities to reduce mercury release into the environment. **(Art 9)**
- Hazardous waste management policy, regulations, plans and programs at central, provincial and local levels need to be developed and implemented. **(Art 11)**
- Capacity of responsible human resources in concerned agencies and stakeholders, including in academic institutions and NGOs, should be built. **(Art 14)**

- Institutional strengthening policy of the Government should focus on retaining the institutional memory and human resources capacitated in this sector with right capacity in the right position, ultimately contributing in the effective implementation of the convention. **(Art 14)**
- Department of Drug Administration should help, facilitate and even effectively implement the standards on mercury in Ayurvedic medicine, and do the periodic monitoring of the mercury in Ayurvedic medicines. **(Art 16)**
- Academia and research institutes including laboratories should be strengthened to generate the information on the significance of mercury and its adverse impacts on the environment and human health and share it. **(Art 18 &19)**
- Detail study on situation of hazardous wastes and their management, especially substances containing mercury or consisting of or contaminated with mercury or products, should be carried out by concerned agencies. **(Art 18)**
- Concerned agencies should carry out regular monitoring of mercury, mercury based chemicals, products and practices and associated release and emission to air, water and land. **(Art 19)**
- Populations (health care professionals, patients using Ayurvedic medicines, handicraft and gold plating workers, fish, fisher communities, hotelier, jewelers, laboratory personnel, person engaged in standardization and calibration of mercury based equipment) at risk due to exposure to mercury should be identified, regularly monitored, level of mercury exposure should be determined. **(Art 16 & 19)**

III. Priority areas for the implementation of the Convention

The priority areas are identified and implementation plan is developed as guided by the findings of policy, regulatory and institutional framework assessment and national mercury inventory. Six major objectives are developed to meet major obligations under the Minamata Convention.

- Ratification of Minamata Convention, its approval and implementation of its provisions.
- Reduction of the use, emission and release of mercury from mercury-added products, manufacturing processes, point and releases sources.
- Improvement of the interim storage of mercury, management of mercury wastes and contaminated sites.
- Access to financial resource, and building capacity, providing technical assistance and technology transfer.
- Protection of public health, and health of exposed populations
- Promotion of information exchange and awareness raising.

Introduction

Mercury is a natural element that is indestructible and persistent in nature. It is a liquid metal at ambient temperature. With low vapor temperature, it can transport across broad spatial scales. It is highly toxic in its organic form and can combine with various other metals to form amalgams. Once mercury accumulates in one species it can transfer from one species to another in a food chain by the process of biomagnification. It has severe impacts on environment and human health. In human, mercury affects the nervous, renal and cardiovascular systems. It has harmful effects on infants and unborn children. The global transport of mercury in the environment requires global action and co-operation to tackle the problem of mercury pollution. Consequently, a mercury programme was established to address these concerns (UNEP, 2017).

The Minamata Convention on Mercury is the first global agreement started with the primary objective to protect human health and environment from the adverse effects of use and releases of mercury and mercury compounds. The convention includes a range of measures to meet that objective. Measures include controlling on supply and trade of mercury (Hg), phasing out of Hg in commercial products, regulations for artisanal and small-scale gold mining, and controlling measures on emissions to air and release to water and soil. Further, there are also recommendations on environmentally sound storage of mercury and on mercury waste management and guidance on contaminated sites. Emissions and releases of mercury each have a special article, with actions to reduce levels of mercury allowing nations to accommodate their own development plans (UNEP, 2013c).

Minamata Convention Initial Assessment (MIA)

Nepal signed the Minamata Convention on Mercury on 10 October, 2013. Nepal is in the process of ratification of the convention and Government of Nepal initiated it with the baseline inventory on the use and emissions/releases of mercury. Also, identifying institutional and legal gaps and establishing national coordination on mercury is significant. An agreement was signed between the then Ministry of Population and Environment (MOFE) (Now Ministry of Forests and Environment), Government of Nepal and United Nations Industrial Development Organization (UNIDO) on 5 December, 2016 to start a project entitled '**Enabling Activities to Conduct Minamata Convention Initial Assessment (MIA) in Nepal**'. The overall objective of the project is to strengthen Nepal's national capacity to fulfill the obligations under the Minamata Convention and promote effective implementation of its provisions.

The project is funded by the Global Environment Facility (GEF) with the technical support from UNIDO and Biodiversity Research Institute (BRI) as an implementation agency of UNIDO. The main objective of the MIA project is to deliver four outputs, which are as follows:

- Output 1: Identify Institutional gaps and establish national coordination on mercury;
- Output 2: Review of existing mercury related regulations and identification of needed policy reform to prepare for implementation of the convention;

- **Output 3:** Establish national mercury profile based on the initial inventory and identify key sectors for intervention to reduce, and where possible eliminate, mercury use, release, and emissions;
- **Output 4:** Dissemination of information among relevant stakeholder groups (academia, public and private sectors, and civil society).

The MOFE as national executing agency (NEA) is responsible for organizing different workshops and trainings as part of the project activities, involving the widest possible range of stakeholders (government institutions, industry and industrial associations, NGOs, academia, women group, municipalities, including others). For this, MOFE identified the potential stakeholders (**Annex 1: Table 1**) to get a full understanding of an integrated approach needed for preparing the MIA in Nepal. An inception workshop was held on 2 April, 2018 in Kathmandu to inaugurate the MIA project, inform all concerned ministries and stakeholders about the convention and the project. The list of participants of the workshop is attached in **Annex 1: Table 2**. A 9-member National Steering Committee (NSC) was formed in 2071 BS (2014) to manage and facilitate the MIA project (**Annex 1: Table 3**). The structure of the committee is as follows:

Joint Secretary, Biodiversity and Environment Division, MOFE	Chair
Under Secretary, Environment Standard and Monitoring Section, MOFE	Member (Focal Point)
Representative, Ministry of Health and Population	Member
Representative, Ministry of Finance	Member
Representative, Ministry of Industry, Commerce and Supplies	Member
Representative, Department of Environment	Member
Representative, National Health Research Council	Member
Representative, Federation of Handicraft Association Nepal	Member
Expert, NPC for MIA	Member

Further, three National Working Groups (NWG) were formed on 2 April, 2018 after the inception workshop in the presence of Joint Secretary, member of NSC, MIA team and experts from BRI (**Annex 1: Table 4**). The Terms of Reference were developed as follows to support the work of MIA project.

1. Representatives from concerned organizations should be present in the meeting of working groups organized by MOFE.
2. Concerned representatives should support and facilitate data collection.
3. Assist in writing letters to affiliated units for providing information and data.
4. Facilitate and correspond with to affiliated units when sectoral experts visit those units for data collection.
5. Members of concerned working groups should provide a report on Institutional Gap Analysis and Legal Gap Analysis.

MOFE, as NEA for “**Enabling Activities to Conduct Minamata Convention Initial Assessment (MIA) in Nepal**” project, has developed a project implementation mechanism by forming a team at the ministry with the Minamata Convention Focal Point as Contact Person and Chemist at Environment Standard and Monitoring Section as Desk Officer. To support this team in technical matters, a Project Team composed of National Project Coordinator (NPC) and National Project Assistant (NPA) appointed by UNIDO and three Sector Experts, viz. Industry, Waste and Contaminated Sites, and Health and Education appointed by BRI, was formed. The institutional arrangement for MIA project is presented in **Figure 1**.

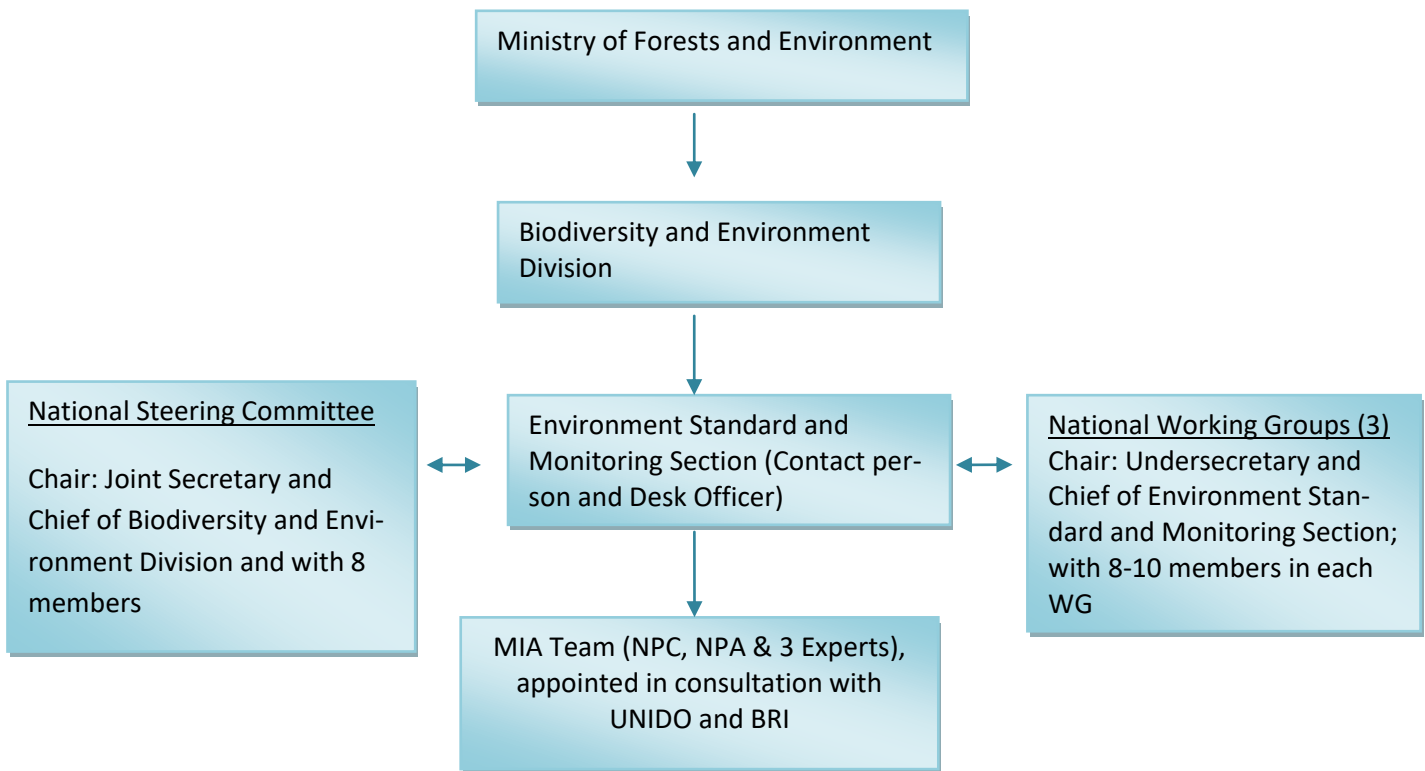


Figure 1: Institutional arrangement for MIA project

Chapter I

1. NATIONAL BACKGROUND INFORMATION

1.1 Geography and population

Nepal has a total area of 147,181 Km² that extends from 60 mamsl in the south to 8,848 m high Mt. Everest in the north within a short distance of 160 Km. The country is situated in the mid-Himalaya within the latitudes 26°22'N to 30°27'N and longitudes 80°04'E to 88°12'E in the northern hemisphere. The average east to west length of country is 885 Km and north to south width is 193 Km. With wide range of topography, Nepal experiences different types of climate (tropical, sub tropical, temperate, sub temperate and alpine). The country shares the border with China in the north and India in the south, east and west.

The total population of the country is 26.49 million with annual growth rate of 1.35 per annum (**Table 1-1**) (CBS, 2011). According to recent state restructuring about 37.63% of the total population is rural; the rate of urbanization is high and rural-urban migration has made the capital of the country densely populated (CBS, 2017). The capital of the country is Kathmandu, which lies in the midhills of Nepal with an average altitude of 1,400 metres (4,600 feet) above sea level in the bowl-shaped Kathmandu Valley. Nepal is divided into three broad physiographic regions (1) Mountains (2) Hills and (3) Terai lowland, covering 35.2 percent, 41.7 percent and 23.1 percent, respectively, of the country's total area (CBS, 2014). The geographical distribution of population is uneven making lowland densely populated. There are 123 spoken languages and 125 ethnic groups residing in the country (CBS, 2016). Nepali is the official language of the country. Major demographic parameters of the country are detailed in the **Table 1-2**.

Table 1-1: Areas and Population by Physiographic Region

Physiographic Region	Area		Number of Districts	Population (based on 2011 Census)
	Km2	Percent		
Mountain	51817	35.2 (15% snow covered)	16	1781792 (6.7%)
Hill	61345	41.7	40	11394007(43.6%)
Terai	34019	23.1 (17% flat)	21	13318705 (50.3%)
Total	147181	100	77	26494504

Source: CBS (2016), Statistical Pocket Book of Nepal

Table 1-2: Major Demographic Parameters

Major Demographic Parameters		
Crude Birth Rate per thousand (CBR), 2011		21.8

Crude Death Rate per thousand (CDR), 2011		7.3
Infant Mortality Rate per thousand (IMR), 2011		40.5
Mortality Rate under Five per thousand, 2011		52.5
Total Fertility Rate (TFR), 2011		2.5
Average Life Expectancy (years) at birth, 2011	Total	66.6
	Male	65.5
	Female	67.9

Source: CBS (2016), *Statistical Pocket Book of Nepal*

1.2 Political, legal and economic profile

The country is declared a Federal Democratic Republic of Nepal as per the Constitution of Nepal promulgated in 2015. Further, the country goes into progressive restructuring by forming seven federal provinces, with 753 local units including 460 Rural Municipalities, 276 Municipalities, 11 sub-metropolises and 6 Metropolises (CBS, 2018). For administrative purposes, Nepal is divided into a total of 77 districts in 7 Provinces. This governance structure is changed into federal, provinces and local levels (**Figure 2**). Nepal is aiming for political stability after holding local, provincial and federal elections in 2017.

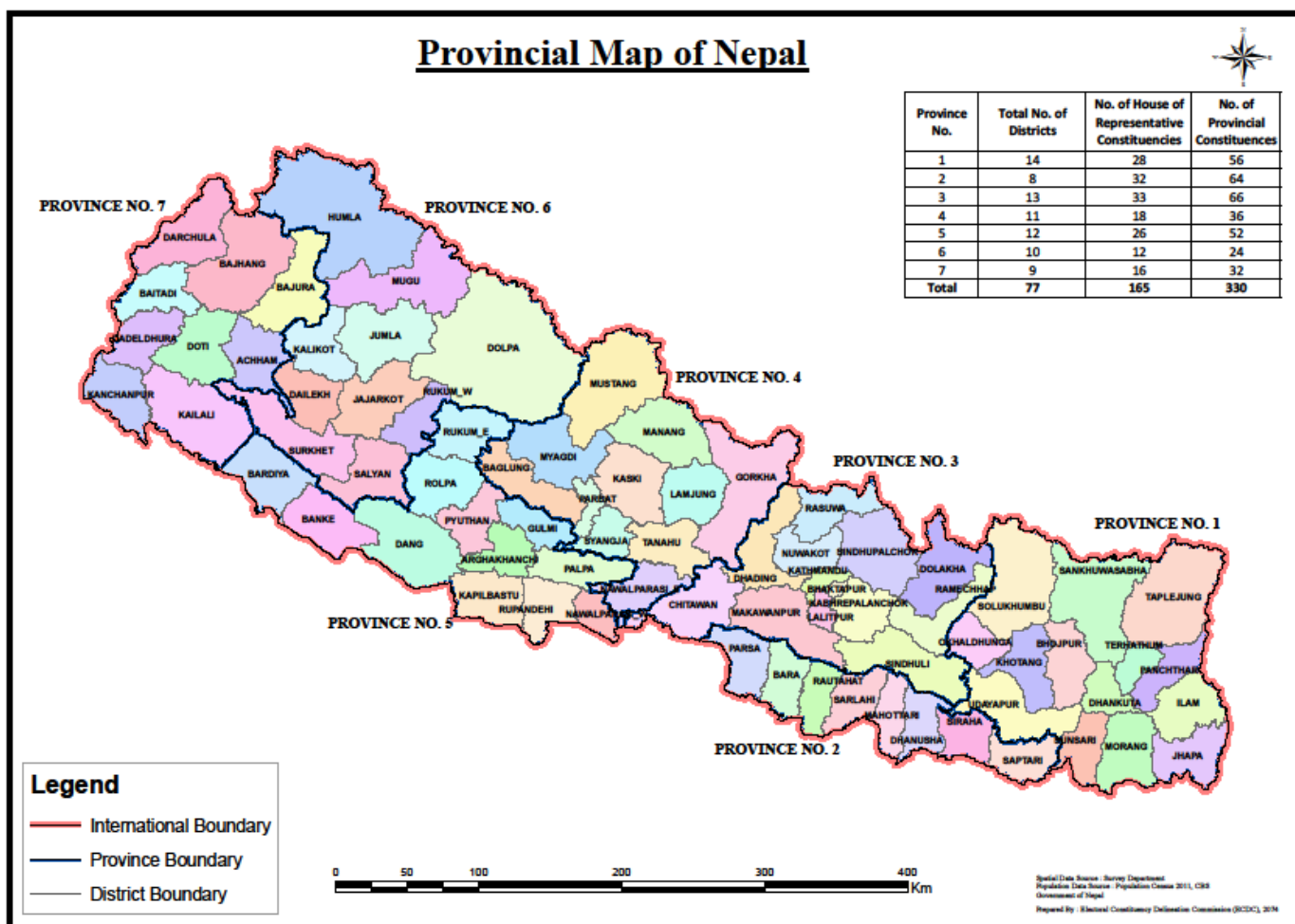


Figure 2: Political Map of Nepal with 77 districts and seven provinces

Source: Election Commission of Nepal, 2017

Nepal suffered huge losses in economy after the devastating earthquake of April 2015. The annual growth rate, which was 2.97 percent in Fiscal Year (FY) 2014/15 reduced to 0.01 percent in 2015/16 (MOF, 2016/17). According to the Economic survey, Gross Domestic Product (GDP) at base prices in 2016/17 was estimated to grow by 6.94 percent. The economic growth in the FY 2016/17 was encouraging. The favorable monsoon, commercialization of agriculture, stability oriented politics, resolution of energy crisis, decrease in political disturbances (closures and strikes), and reform in government policies and programs are expected to contribute in the growth of the country's economy (MOF, 2016/17). The major macroeconomic indicators of the country are listed in the **Table 1-3**.

Table 1-3: Major Macroeconomic Indicators (2016/2017P)

Major Macroeconomic Indicators	
GDP at basic prices (current) in million NPR.	2293989
GDP at basic prices (constant) in million NPR.	742539
Annual GDP growth rate at constant price %	6.94
Per Capita GDP, current price (NPR) (2016/2017P)	90521
Per Capita GDP, constant prices (NPR) (2016/2017P)	28733
Annual changes in real per capita GDP (%) (2016/2017P)	6.07
Nominal Per Capita GDP (USD) (2016/2017P)	853
Nominal Per Capita GNI (USD) (2016/2017P)	862
Gross Domestic Saving/GDP % (2016/2017P)	10.25
Gross National Saving/GDP % (2016/2017P)	43.78
Gross fixed capital formation/ GDP % (2016/2017P)	33.8
Export of goods and services/ GDP % (2016/2017P)	9.76
Import of goods and services/ GDP % (2016/2017P)	42.02
Implicit GDP Deflator	308.08
Exchange rate (USD:NPR) (2016/2017P)	106.1
P= Preliminary	

Source: CBS (2016), Statistical Pocket Book of Nepal

The agriculture sector occupies 28.9 percent of the Nepalese economy. The share of agriculture and non-agriculture sectors to GDP was estimated to remain at 29.37 percent and 70.63 percent, respectively, in FY 2016/17. The composition of the country's GDP is changing each year (**Table 1-4**).

Table 1-4: Change in the Composition of Nepalese GDP (Average of Period)

Sector	1974-1977 ¹ (%)	1999-2001 ¹ (%)	2011 ² (%)
Agriculture, fisheries, forestry	64.2	39	38
Industry	10.6	20.4	15
Services	25.2	40.6	47
Total	100	100	100

¹ World Bank, 2005 and ² World Development Indicators: Structures of Output, World Economy, 2013, World Bank

1.3 Profiles of economic sectors

a) Solid Mineral deposits in Nepal

Nepal has few solid minerals deposits identified in the country and needs to be explored more. According to Economic Survey (2016/17), limestone industries have been established in Surkhet, Dang, Makwanpur, Udaypur and Dhankuta. Also, about 1 billion Metric Ton (MT) of limestone has been explored in Palpa, Arghakhachi, Salyan, Baitadi, Sindhuli, Lalitpur, Dhading and Shyanja districts. Consequently, 14 cement industries with about 8,500 ton per day capacity have been established at government and private levels. Additional 9 small and large cement industries are under construction. Further, coal mine of 5 million MT has been discovered in Dang, Rolpa, Palpa and Arghakhachi districts (MOF, 2016/17). Other minerals such as Talc, Marble, Red clay and Quartzite are also produced in the country (Table 1-5).

Table 1-5: Quantity of Production Obtained from various Minerals by Type (2015/2016)

Minerals	Unit	Industrial
Limestone	MT	4703056
Talc	MT	1860
Coal	MT	2900
Marble	m ²	908
Red clay	m ³	10300
Quartzite	m ²	8908

Source: Department of Mines & Geology in (CBS, 2016)

b) Energy Consumption

About 72.4% of total energy requirement is fulfilled from traditional sources (fuel wood, agricultural waste, animal dung), 25.3% from commercial (coal, petroleum and electricity) and 2.3% from other sources. Fuel wood shares 90.77% of the total traditional sources of energy. Similarly, in commercial sources of energy, petroleum, coal and electricity contribute 64.19%, 20.46% and 15.39%, respectively (MOF, 2017/18) (**Table 1-6**). The share of electricity to total energy consumption is very low (3.9%) although there is huge potential for generating hydroelectricity in the country. People living in rural areas are still dependent on fuel wood for cooking purposes. The dependency on fuel wood is increasing creating pressure on forest resources, which needs attention for the sustainable use of forest products. In case of non-renewable source of energy, use of petroleum products is higher than coal. Combustion of coal and fuel wood releases mercury in the environment¹.

¹ <https://www.epa.gov/mercury/basic-information-about-mercury>

Table 1-6: Sectoral Energy Consumption (in 000' ToE: Tons of Oil Equivalent) during 2014/15 to 2016/17

Fuel Type	2014/15	2015/16	2016/17
Traditional	9104	9227 (78.41%)	9319.5 (72.4%)
Fuel wood	8264	8376	8459.4
Agricultural waste	408	414	418.1
Animal dung	432	438	442.0
Commercial	2334.44	2248.2 (19.10%)	3252.6 (25.3%)
Coal	465	536.25	664.0
Petroleum	1469.16	1275.39	2088.0
Electricity	397.28	436.56	500.6
Others	292.12	292.49 (2.49%)	294.0(2.3%)
Total	11727.56	11767.69	12866.0

Source: (MOF, 2017/18)

According to Nepal Oil Corporation, a GON undertaking, use of petroleum products has decreased in 2015/16 in comparison to 2014/15 (CBS, 2016) (Table 1-7). This may be due to the blockade of petroleum supplies in Nepal that started in September 2015 and lasted for more than six months. Also, power outage of Nepal was stopped in 2016 that led to decrease in use of diesel for back up electricity generator.

Table 1-7: Fuel Consumption by Type (2012/13 to 2015/16) according to Nepal Oil Corporation Limited

Fuel Type	Unit	2012/13	2013/14	2014/15	2015/16
Petrol (MS)	Kl	221,676	251,451	283,567	238,578
Diesel (HSD)	"	716,747	811,100	901,393	782,658
Kerosene (SKO)	"	24,721	19,064	18,628	14,870
ATF	"	115,786	123,527	139,404	80,119
L.D.O	"	258	NA	NA	NA
F.O	"	2,450	2,172	883	77
LPG	MT	207,038	232,660	258,299	214,263

Source: CBS (2016), Statistical Pocket Book of Nepal

Note:

ATF: Aviation Turbine Fuel; L.D.O: Light Diesel Oil; F.O : Furnace Oil; LPG - Liquefied Petroleum Gas

b) Health Sector

The total number of health institutions in the country has reached 4515 (MOF, 2017/18). Ayurved, the traditional system of medicine, is practiced in Nepal. Government is offering ayurvedic health service through 384 ayurvedic dispensaries in different parts of the country. At the central level, the Department of Ayurved and Alternative Medicine and Singhadurbar Vaidyakhana are well established. Free ayurvedic health service was provided to 28,505 senior citizens of 75 districts in 2015/16 (MOF, 2016/17). Also, free ayurvedic camps were organized in all districts in 2016/17. Details of health institutions, beds and human resources in health sector are listed in the **Table 1-8** below. There are 277 laboratories across the country to support in the health care services and also to provide specialized curative services. New laboratory services have started in 35 health posts in FY 2016/17 (MOF, 2016/17). During such practices instruments containing mercury such as thermometers, barometers, pyrometers and sphygmomanometers were still in use.

Table 1-8: Details of Health Institutions, Beds and Human Resources

Description	2015/16	2016/17
1. Total Health Institutions	4599	4515
a) Hospital	116	123
b) Primary Health Post	216	200
c) Health Post	3883	3808
d) Ayurvedic Dispensaries	384	384
e) Sub-Health Post	-	-
2. Hospital Beds	7748	8172
3. Total Human Resources	88640	89243
a) Doctors	2550	2640
b) Nurses/ A.N.M	20423	20510
c) Kabiraj (Ayurvedic physician)	570	719
d) Vaidya (Ayurvedic assistant)	451	693
e) Health Assistant (HA, SHA)	12646	14346
f) Women Health Volunteer Workers	52000	52000
<i>Source: Economic Survey, MOF, 2017/18 * of first eight months</i>		

c) Waste and contaminated sites sector

Waste management issues have become one of the major environmental challenges for Nepal. Increase in population, elevated living standard, rapid urbanization and industrialization are the major reasons behind an increase in the generation of solid wastes. Usually, mixed types of wastes are generated and collected (without any segregation) from municipalities, including from industries and health care institutions. Generally, such wastes are openly burned or openly dumped without adequate processing, recycling or recovery in most of the municipalities. Weak enforcement of existing laws on Solid Waste Management (SWM) and less priority given to SWM in institutional, financial and infrastructure development sectors are the major hindrances in the sustainable municipal solid waste management system (ADB, 2013).

After state restructuring in line with the new constitution, there are now 293 municipalities that constitute 62% of urban population. Based on ADB SWM-Nepal report 2013, the average per capita municipal waste generation in Nepal was 0.317 Kg/day.² Based on this estimation, the current total waste generation by urban population in Nepal is 2.080 million tons per year. The study revealed that municipal waste composition of urban area of Nepal was 56% biodegradable waste, 16% plastic, 16% paper products, 3% glass, 2% metals, 2% textile, 1% leather and rubber products and 4% others as shown in table 1-9. A comparison of studies done in 2004, 2008 and 2012 showed that biodegradable wastes have decreased, while reusable/ recyclable wastes were in increasing trend (**Table 1-9**).

Table 1-9: Municipal Waste generation and Composition in Nepal

Waste Generation and Composition	2004	2008	2012
Average Municipal Waste Generation (Kg/capita/day)	0.25	0.27	0.317
Biodegradable (organic) Waste	65.6%	61.6%	56 %
Reusable / Recyclable Waste	19.7%	24.5%	40%
• Plastic			16%
• Paper			16%
• Metal			2%
• Glass			3%
• Textile			2%
• Rubber and Leathers			1%
Inert	9.6%	6.8%	
Others	5.1%	7.1%	4%

Source: SWMTSC Baseline Survey 2004, 2008, ADB report 2013

Similarly, Health Care Institutions (HCIs) are increasing in to meet the increased demand of health services to wider population and also to give quality health services in Nepal. However, Health Care

² Solid Waste Management in Nepal, ADB, 2013

Wastes (HCWs) generated from such institutions are not properly managed, and this has raised another environmental concern in Nepal. Except few, most of the HCIs dispose of their health care wastes in pits within their premises and then openly burn or use low quality brick or metal incinerators to burn all HCWs. Although HCIs attempted to segregate HCWs at sources, HCWs got mixed up during the final disposal and treatment. According to Ministry of Health and Population (2018), HCWs generation was 1.35 Kg/bed/day and considering 671 private and public hospitals and 41172 beds, total HCWs generation is estimated to be 55.6 tons/day.

With a change in living standard and rapid industrialization, various raw materials and products are imported from various countries in Nepal and such commodities contain hazardous components such as E-waste, pesticides, chemicals. Since, the Government of Nepal has no hazardous waste management policy and regulation, strict enforcement for control such products and management has become an environmental challenge in present context. In November 1952, DDT was the first chemical pesticide introduced in Nepal by the then Ministry of Health. There were 74.5 Mt of obsolete pesticides in different parts of the country, including , 2.2 MT of methyl bromide (MethBr) in 43 cylinders and nearly 150 MT of PCBs waste stored in Nepal; all these chemical wastes were disposed of in an environmentally sound manner (MOPE, 2017) during the impementaiotn of post-NIP projects. Based on an inventory of hazardous wastes prepared by MOPE in 2004, there were 12 industrial sectors, such as dry cell, pharmaceuticals, foam, soap, paint, textile dyeing, paper and pulp, vegetable oil, pest / insecticides, wool dyeing, tannery and iron galvanizing generating major hazardous wastes in Nepal. The total amount of hazardous solid wastes generated by major industrial sectors in the country was estimated to be 5,051 MT per annum (2006/07) and the quantities of such wastes are projected to be 5,732 MT and 6,589 MT per annum for the next five and ten years, respectively.

Solid Waste Management Act 2011 and Regulations 2013 have empowered and given more responsibility to local level governments for sustainable municipal solid waste management. Currently, private sectors are involved in many municipalities to support in effective solid waste management. The MOFE has developed various emission and effluent standards to control environmental pollutions from the industries. In the changing context, GON is preparing new Pesticides Act, hazardous waste management regulations and policy. Various recycling plants for paper, plastic, textile, pet bottles, iron metals etc. are established in Nepal and these are expected to contribute in waste reduction and processing. Due to geographical and socio-cultural diversifications, solid waste management practice has become a bit challenging to Nepal, while some of the good efforts on solid waste management practices by various organizations and the new infrastructures developed in the country may lead to positive direction in the management of solid wastes.

1.4 Environmental overview

Nepal is bestowed with unique landscape varying from lowland of 60 meters up to the highest mountain on the earth. This unique landscape provides opportunities as well as challenges for the people living in mountains and lowlands. The landscape of Nepal is very prone to natural disasters such as earthquake, flood, landslides, soil erosion and glacial lake outbursts flood (GLOF). Also, the country faces adverse impacts from the use of hazardous chemicals in agriculture and industries. Major environmental problems of the country are as follows (CBS, 2016):

- Degradation of air quality
- Degradation of drinking water
- Degradation of natural resources
- Lack of solid waste management
- Degradation of surface water quality
- Diminishing of water resources
- Release of toxic pollutants
- Loss of biodiversity
- Impacts of climate change
- Improper land use

To protect and sustainably manage environment and its resources, Nepal is committed to comply with international legal instruments. Nepal is a party/member to the following multilateral environmental agreements (MEAs) listed in the below **Table 1-10**.

Table 1-10 : List of Multilateral Environmental Agreements ratified or signed by Nepal

S.N.	Title of Treaty or Convention	Ratification Date
1	Paris Agreement on Climate Change (22 April, 2016)	5 October, 2016
2	Nagoya Protocol on Access and Benefit Sharing (ABS) (29 Oct, 2010)	23Aug 2018 (accession)
3	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001	13 October, 2006
4	Rotterdam Convention to the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade, 1998	13 October, 2006
5	Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997	16 September, 2005
6	International Treaty on Plant Genetic Resources for Food Agriculture, 2001	19 October, 2009
7	Cartagena Protocol on Bio-safety to the Convention on Biological Diversity (CBD), 2000	2 March, 2001 (signed)
8	UN Convention to Combat Desertification in those Countries Experiencing Serious Drought and/ or Desertification Particularly in Africa (UNCCD), 1994	15 October, 1996
9	UN Framework Convention on Climate Change, 1992	2 May, 1994
10	Convention on Biological Diversity (CBD), 1992	23 November, 1993
11	Agreement on the Network of Aquaculture Centers in Asia and the Pacific Region, 1988	4 January 1990
12	Convention on Wetland of International Importance Especially as Water fowl Habitat (Ramsar Convention), 1971	17 December 1987
13	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973	18 June, 1975
14	Plant Protection Agreement for the South East Asia and Pacific Region (as amended) 1956	12 August, 1965
15	Convention on the High Seas, 1958	28 December,

		1962
16	Treaty Banning Nuclear Weapon Test in the Atmosphere, in outer Space and Sea-bed, 1963	7 October, 1964
17	Treaty on Prohibition of the Emplacement Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil Thereof, 1971	6 July, 1971
18	Convention for the Protection of the World Cultural and Natural Heritage, 1972	20 June, 1978
19	International Agreement for Tropical Timber (ITTA), 1983	3 July, 1990
20(a)	Vienna Convention for the Protection of the Ozone Layer, 1985	6 July, 1994
20(b)	Montreal Protocol substances that Deplete the Ozone Layer (Montreal Protocol), 1987	6 July, 1994
20(c)	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (London Agreement), 1990	6 July, 1994
21	Basel Convention on the Control of Tran boundary Movements of Hazardous Wastes (Basel Convention), 1989	15 October, 1996
22	United Nations Convention on the Law of the Sea, 1982	2 November, 1998
23	Treaty on Principals Governing the activities of State in the Exploration and Use of Outer Space including and Other the Moon Celestial bodies, 1967	10 October, 1967
24	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention)	1 January, 1973
	Nepal as Signatory	
1	Intergovernmental Science-Policy Platform on Biodiversity and ecosystem services (IPBES)	
2	Minamata Convention on Mercury	10 October, 2013
3	Convention on the Prohibition of the Development, Production and stockpiling of Bacteriological and Toxic Weapons and on their Destruction, 1972	10 April, 1972
4	Convention on Fishing and Convention of the Living Resources of the High Sea, 1958	29 April, 1958
5	Convention on the Continental Shelf, 1958	29 April, 1958
	MOU signed between the MOEST (previously MOPE) and International Organisations	
1	MOU regarding the Implementation of Project Atmospheric Brown Cloud (ABC) in Nepal between MOPE, Regeants of University of California, Scripps Institute of Oceanography University of California, UNEP- RRCAP and ICIMOD	31 August, 2004
2	MOU between UNEP and MOPE regarding Preparation of National Sustainable Development Strategy (NSDS) and Establishment of Multi-Stakeholders Mechanism for NSDS	24 June, 2004
3	MOU between MOPE, ICIMOD and UNEP for Preparation of Kathmandu Valley City IEA/SOE Report	September, 2004
Nepal, as member of the SAARC countries, is working under Male Declaration on Trans-boundary Movement of Air Pollution.		

Chapter II

2. Mercury Inventory and Identification of Emissions and Resources

Nepal is in the process of ratification of the Minamata Convention. Before ratification, Nepal has identified the need for preparing an inventory of mercury used and released (e.g., emissions and releases) in the country. Mercury inventory for Nepal was prepared using the "*Toolkit for identification and quantification of mercury releases, Level 1*" made available by the Chemicals Branch of the United Nations Environment Programme (UN Environment Chemicals).

In order to make successful inventory, three national working group committees were formed by Ministry of Forests and Environment on 2 April, 2018. They were i) Industrial, ii) Waste and Contaminated Sites, and iii) Health and Education, each with 7 to 10 members. Contributions from these working group members were helpful in facilitating data generation and collection from their respective fields.

A two-day inventory training workshop was organized by MOFE with the support of UNIDO and BRI Experts from 3 to 4 April, 2018 in Kathmandu. The stakeholders, who have directly to do with mercury or who can significantly contribute in the inventory process and other subsequent activities were requested to nominate their participants for a two-day training workshop. Among 24 participants expected, training was attended by 19, among which four were female participants (**Annex 1: Table 5**). The main output of the inventory training workshop was to have the participation from main stakeholders and commitment of the stakeholders during the inventory preparation. The inventory training workshop was effective in acquainting the stakeholders with the country's obligations regarding the Minamata Convention, sensitizing the participants on mercury issues and potential sources of mercury and to train them in identifying the articles and processes where mercury might be present or used.

Sources of data were already identified in the inventory training workshop. Primary data were collected during field visits, through personal communications and interviews using semi-structured questionnaires. Further, data were collected from secondary sources such as published reports, journal articles and websites. For data collection, 2016/2017 was taken as the base year for the inventory. For some data types, when data from the base year were not available, the data of the nearest year was taken and this is appropriately mentioned in the report.

This inventory was developed on the Toolkit's Inventory Level 1. The Toolkit is based on mass balances for each mercury release source type. Inventory Level 1 works with pre-determined factors used in the calculation of mercury inputs to society and releases, the so-called default input factors and default output distribution factors. These factors were derived from data on mercury inputs and releases from the relevant mercury source types from available literature and other relevant data sources.

For the following mercury source sub-categories, the presence of mercury controls in the country was included in the calculations. The mercury controls technology were bag filter and dust filter in the case of cement production industries and for the pulp and paper industries, it was found to be installed dust collector:

- Cement production
- Pulp and Paper production

Results and discussion

An aggregated presentation of the results for main groups of mercury release sources is presented in **Figures 3 to 9** and **Table 2-1** below. The following figures and table do not include mercury release data listed under miscellaneous mercury source section.

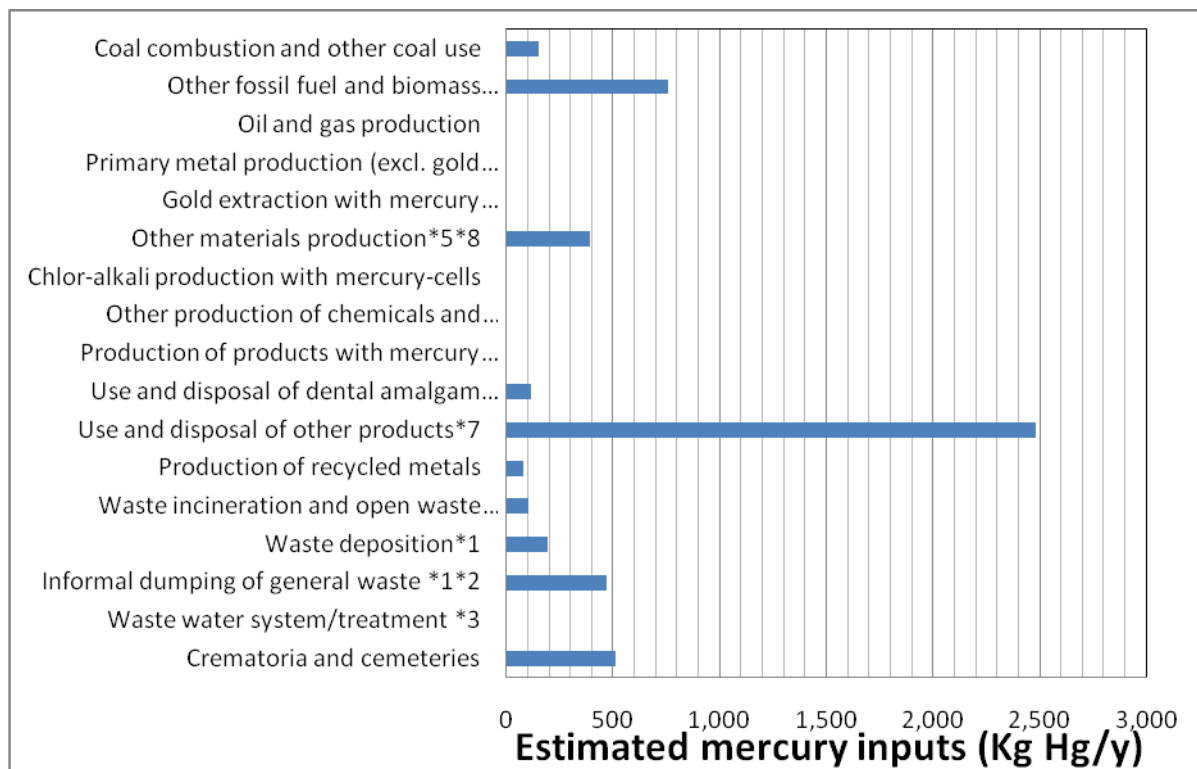


Figure 3: Estimated mercury inputs (Kg Hg/Y)

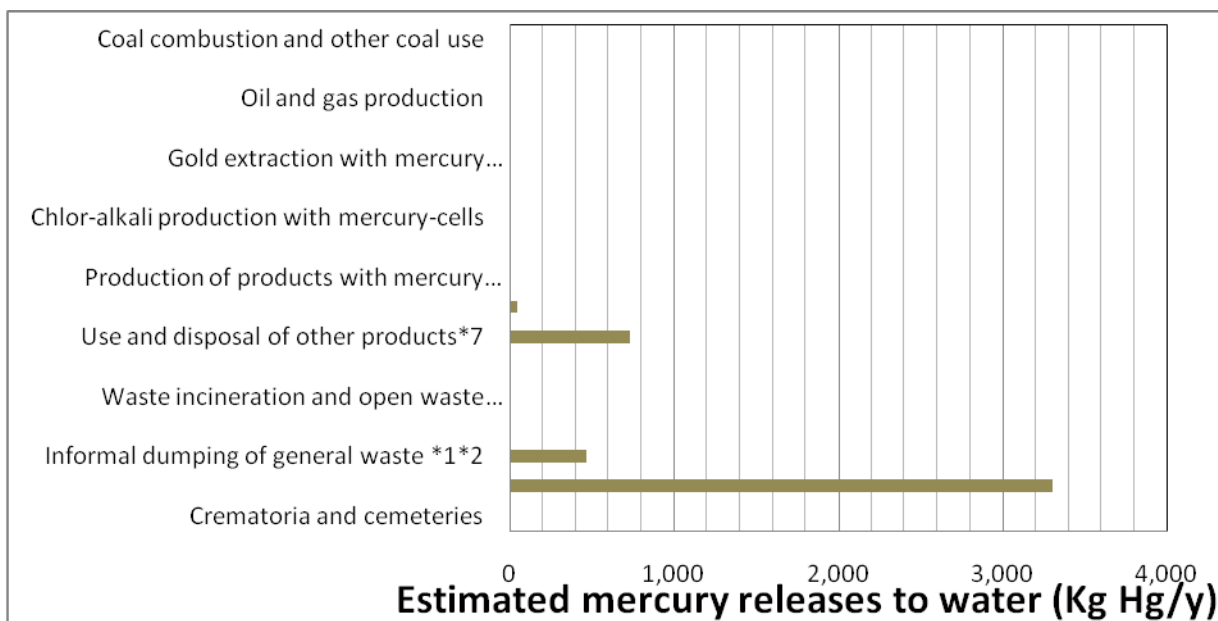


Figure 4: Estimated mercury release to water (Kg Hg/Y)

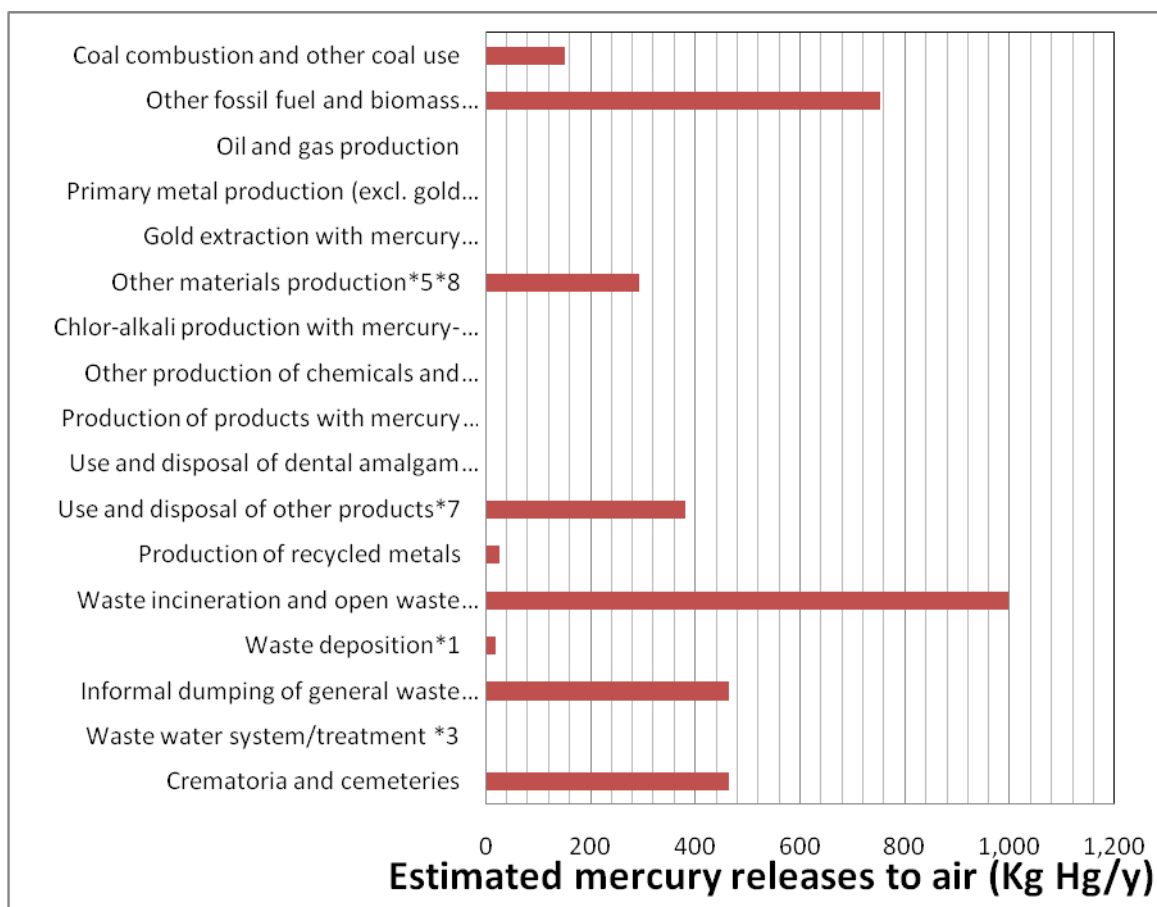


Figure 5: Estimated mercury releases to air (Kg Hg/y)

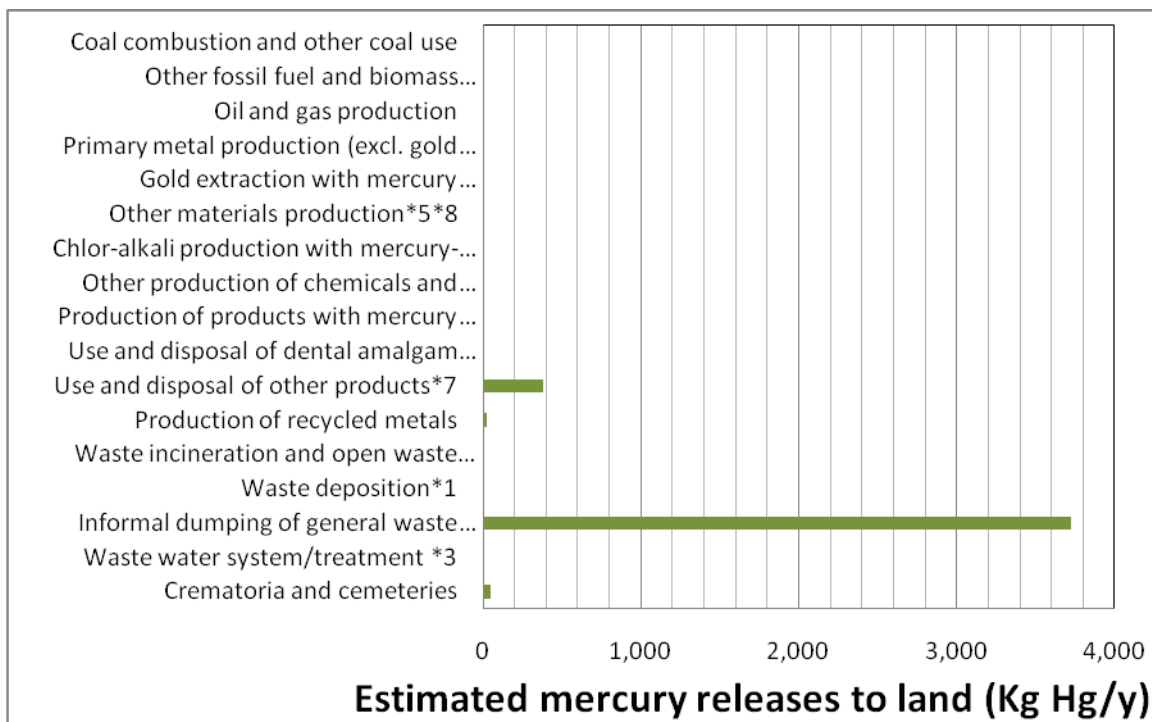


Figure 6: Estimated mercury release to land (Kg Hg/Y)

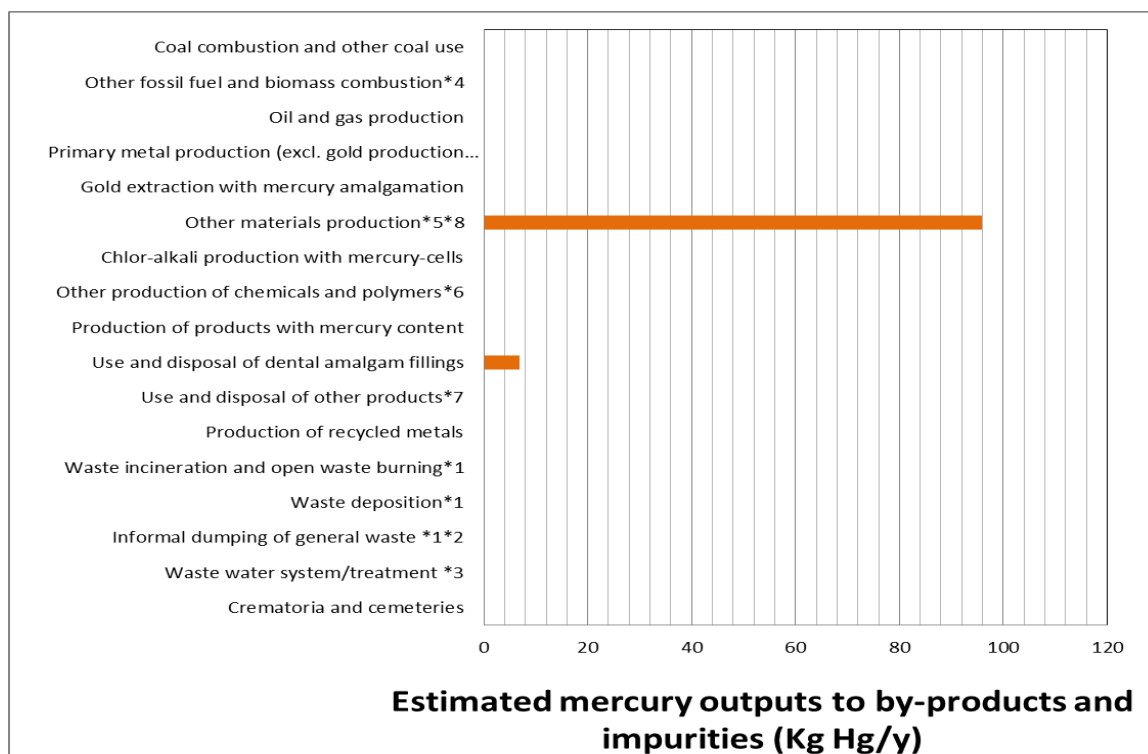


Figure 7: Estimated mercury outputs to by-products and impurities (Kg Hg/Y)

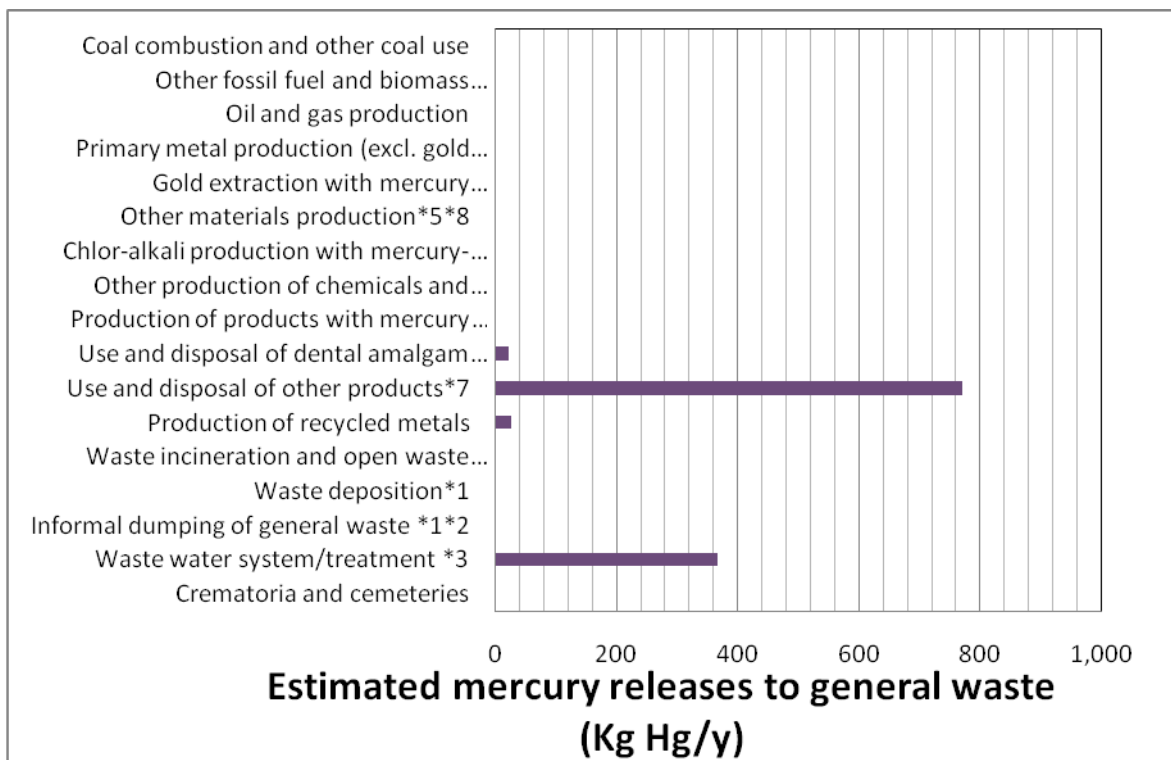


Figure 8: Estimated mercury release to general waste (Kg Hg/ Y)

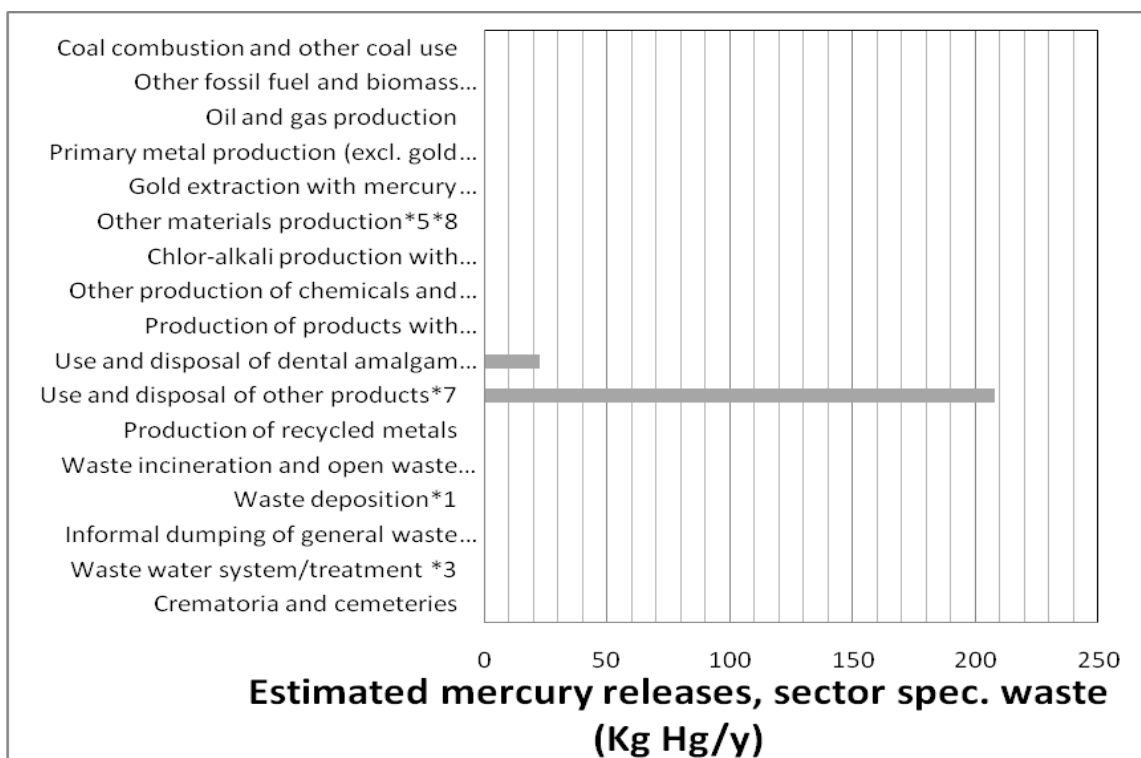


Figure 9: Estimated mercury release, sector specific waste (Kg Hg/Y)

*1: Waste is not an original source to mercury input to society. To avoid double counting of mercury inputs from waste and products in the graphs, only 10% of the mercury input to waste incineration, waste deposition and informal dumping is included in the chart for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Tool-kit. See Appendix 1 to the Inventory Level1 Guideline for more explanation.

*2: Waste is not an original source to mercury input to society. The estimated quantities include mercury in products which has also been accounted for under each product category. To signal the importance of this release pathway, the release to land from informal dumping of general waste has NOT been subtracted in the charts.

*3: Wastewater is not an original source to mercury input to society. The estimated input and release to water include mercury amounts which have also been accounted for under each source category. To avoid double counting, inputs to waste water system/treatment have been subtracted automatically in the charts. To signal the importance of this release pathway, releases to water via waste water system/treatment has NOT been adjusted in the charts in spite of double counting.

*4: Includes petroleum coke, heavy oil, diesel, gasoil, petroleum, kerosene, natural gas, charcoal and other biofuels.

*5: Includes production of cement and pulp and paper.

*6: Includes production of VCM and acetaldehyde

*7: Includes thermometers, electrical switches and relays, light sources, batteries, polyurethane with Hg catalyst, paints and skin creams with Hg, blood pressure gauges and other manometers, lab chemicals, and other lab and medical uses.

*8 To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the TOTALS.

Table 2-1: Summary of mercury inventory results

Source category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y							Percent of total releases *3*4
		Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal	Total releases *3*4*5	
Coal combustion and other coal use	150.3	150.3	0.0	0.0	0.0	0.0	0.0	150	2%
Oil and gas production	753.3	753.3	0.0	0.0	0.0	0.0	0.0	753	11%
Biomass and Charcoal combusted	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Primary metal production (excl. gold production by amalgamation)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Gold extraction with mercury amalgamation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Other materials production (Cement, Pulp and Paper)	388.5	292.5	0.0	0.0	95.9	0.0	0.0	388	6%
Chlor-alkali production with mercury-cells	-	-	-	-	-	-	-	0	0%
Other production of chemicals and polymers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Production of products with mercury content	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Application, use and disposal of dental amalgam fillings	114.4	2.3	50.4	9.2	6.9	22.9	22.9	114	2%
Use and disposal of other products	2,475.9	381.6	734.9	381.6	0.0	769.8	207.9	2,476	36%
Production of recycled metals	80.3	26.5	0.0	27.3	0.0	26.5	0.0	80	1%
Waste incineration and open waste burning*2	998.1	998.1	0.0	0.0	0.0	0.0	0.1	998	15%
Waste deposition*2	1,906.8	19.1	0.2	0.0	-	-	-	19	0%

Informal dumping of general waste *2*3	4,655.4	465.5	465.5	3,724.4	-	-	-	931	14%
Waste water system/treatment *4	3,677.2	0.0	3,309.5	0.0	0.0	367.7	0.0	368	5%
Crematoria and cemeteries	511.8	465.3	0.0	46.5	0.0	0.0	0.0	512	8%
TOTALS (rounded) *1*2*3*4*5	5,230 kg Hg/yr	3,550 kg Hg/yr	1,250 kg Hg/yr	4,60 kg Hg/yr	100 kg Hg/yr	1,190 kg Hg/yr	230 kg Hg/yr	6,790 kg Hg/yr	100%
Gold plating (from Miscellaneous)	12825.0441	12183.7919	384.751323	256.500882				12825.0441	
GRAND TOTALS	18055.0441	15733.7919	1634.751323	716.500882				19615.0041	

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

The gold plating is one of the major mercury sources identified in Nepal. As UNEP Toolkit has not included this in source categories and subcategories in its spreadsheet for estimation of Hg emission and release, it is added in "Miscellaneous sources" of spreadsheet for the present inventory purpose and explained in the "Miscellaneous section" of the MIA report. The above table 2-1 is presented as the summary of mercury inventory results with a grand total of Hg release accounting 19615 Kg Hg/y including gold plating and a total of 6790 Kg Hg/y without the gold plating.

Miscellaneous potential mercury sources present in Nepal

Gold plating (gold-mercury amalgam) is one of the traditional works primarily practiced by an ethnic community in Nepal and has a history of many centuries. According to Department of Archaeology (DOArc), a total of 190,212 pieces of sculptures having a total weight of 1255.33 MT of the gold-plated sculptures were exported and this led to an estimation of 12825 Kg of mercury used in preparing the above sculptures. The gold plated sculptures are mainly exported to China, India, Sri Lanka, Thailand, Bhutan, including others. It has also been estimated that about 95% of the used mercury is released into air while blowing the sculptures with hot flame to remove the mercury; also, 3% of Hg may get into water used to wash the sculptures and only 2% might land into the soil in the immediate vicinity of gold plating activities. Gold plating is done partially as well as completely on the sculptures body.

Considerable amount of mercury containing products was also found used for **educational purposes**. Mercury based equipment and chemicals like pure mercury, HgCl₂, HgS, Hg (NO₃)₂, mercury dental

amalgam were found used in medical schools, colleges, and laboratories of universities. Dental colleges alone seemed to use up to 57 Kg of mercury annually (**Table 9-3**). Among these, 50% of the dental amalgam is estimated to be used in the general public during their visits to dental colleges; this amount has been considered as the quantity used in the population. Remaining 50% of the dental amalgam, i.e. 28.5 Kg of mercury is considered used exclusively in dental colleges (in phantom heads during dental practices).

Mercury was also found used in religious rituals (amulets and other uses) such as PARAD SHIVALING, and Sindur (a red powder), which are traditionally and religiously used in Nepal.

Mercury is also widely used in Ayurvedic and homeopathic medicines. In the year 2016/17 (2073/74 BS), a total of 243.65 Kg mercury-based medicine was produced in Nepal. Additionally, there are 30.11 Kg of liquid mercury and 110 Kg of Kajali (Mercurous sulfide) available at Singhadurbar Vaidyakhana, GON owned Ayurvedic Medicine Manufacturer (Source: Dr. Binod Sah, Singhadurbar Vaidyakhana). Additionally, there are another 10 Nepalese Ayurvedic medicine companies producing mercury-based Ras and Bhasma Medicines.

A total of 3515 tons of Homoeopathic medicaments, including pure Ayurvedic and Yunani, has been imported from India, Switzerland, Pakistan, Thailand and other countries during the same base year 2016/17 (DOC) and it is assumed that some may have mercury-based preparations.

According to Ministry of Defence, about 14 Kg of Mercury and Mercury compounds is found used in **army installation during 2018**.

DOC has a record of an import of 1000 Kg Mercury based pigments during 2016/17.

As shown in the **Table 2-1** and **Figures 3 to 9**, the following source groups contribute with the major mercury inputs (except waste and wastewater categories):

Sources	Mercury Inputs
Miscellaneous (gold plating in case of Nepal)	12825 Kg
Use and disposal of products with mercury content	2476 Kg
Energy consumption	904 Kg
Crematoria and cemeteries	512 Kg
Other materials production	389 Kg

The individual mercury release sub-categories contributing with the highest mercury inputs were (except waste and wastewater categories):

Miscellaneous (gold plating in case of Nepal)	: 12825 Kg
Medical blood pressure gauges	: 1227 Kg
Biomass fired power and heat production	: 739 Kg
Other laboratory and medical equipment with mercury	: 489 Kg
Thermometers	: 489 Kg
Crematoria	: 465 Kg
Cement production	: 384 Kg
Other coal uses	: 150 Kg

Miscellaneous (Ayurvedic medicine)	: 140 Kg
Laboratory chemicals	: 122 Kg
Dental amalgam filling	: 114 Kg

The individual mercury release sub-categories contributing with the highest mercury releases to the atmosphere were:

Miscellaneous (gold plating in case of Nepal)	:	12184 Kg
Open fire waste burning	:	774 Kg
Biomass fired power and heat production	:	739 Kg
Crematoria	:	465 Kg
Informal dumping of general waste	:	466 Kg
Cement Production	:	288 Kg
Medical blood pressure gauges	:	246 Kg
Incineration / Burning of medical waste	:	224 Kg
Thermometers	:	98 Kg

The origin of mercury in waste and wastewater produced in the country is mercury in products and materials. Waste fractions and wastewater do therefore not represent original mercury inputs to society (except imported waste). Waste and wastewater may however represent substantial flows of mercury through society. The followings were found to be the major flows of mercury with waste and wastewater:

Controlled landfills /deposits	: 1907 Kg
Informal dumping of general waste	: 4655 Kg
Wastewater system / treatment	: 3677 Kg

In this inventory, default input factors were used for the estimation of mercury releases from general waste treatment and wastewater treatment, for which the generation of wastewater is calculated based on the GON Policy on Wastewater. The calculations made indicate that the default input factors for general waste and wastewater may over-estimate the mercury releases from these sources (see the section on waste data in this report). This may be of priority in follow-up work, as feasible.

Detailed presentation of mercury inputs and releases for all mercury release source types present in the country are shown in the following report sections.

The Toolkit spread sheets used in the development of this inventory are posted along with this report or can be submitted upon request.

Data gaps and Priorities for further assessment

Major data gaps and main priorities for further assessment (and/or actions) are summarised as follows:

Table 2-2: Data gaps and priorities for further assessment

Source Categories	List most important data gaps	Recommendations for follow-up assessment
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Energy Consumption		
Biomass uses	There is no separate data available on the use of the biomass in the industrial boiler for power generation and heat production with the government. However, the economic survey report 2016/2017 provides the energy consumption statistics (Table 10(a), page, 173 of the report). But this data does not provide sector wise information.	Detail information on the consumption of the biomass for the industrial purpose should be gathered and Water and Energy Commission Secretariat (WECS) should keep the biomass data on sector wise.
Other Material Production		
Cement production	No separate data on own-clinker production base cement industries and clinker-import base cement industries as well as status of their operation. However, the economic survey report 2016/17 (page, 156), provides the information on current operation of the own-clinker production base cement industries at government and private levels.	Individual clinker cement production industries information should be collected in future and the information on the current operation of the clinker base cement production should be updated by the Department of Industry.
Paper and Pulp production	Out of six, four industries use waste paper as raw material and two industries use bagasse only partially and also these industries do not use the chemicals as mentioned in the UNEP Tool Kit level 1-guideline. For the mercury emission estimations, the UNEP toolkit level 1- guideline considers only the use of biomass as a wood chip.	Department of Industry need to update information on the operational status of industries.
Production of products with mercury contents		
Batteries with mercury production	No Production of batteries with mercury	
Paint with mercury preservatives	There is no information on the use of mercury preservatives in the paints product from the sampled industry. However, DOC record shows an import of 1000 Kg of vermilion pigment (mercury sulphide) in 2016/2017 (Source: DOC).	Need to verify further from the DOC that for which purposes, the vermilion pigments is imported. Further, need to take samples of different brands of the domestic production for the analysis of the mercury contamination.
Use and disposal of products with mercury content		
Dental amalgam	The toolkits only considers the dental amalgam used in public, but not in the dental education system.	Revision of Curricula of the BDS, MDS and Dental Hygienist and interview with them to find out exact filling made per academic year.
Thermometer	DOC has same HS codes for all types of thermometers and no separate record keeping for the mercury free and mercury containing thermometers.	Not possible to separate them but based on discussion with DOC, suitable judgement is made for the present purpose, but it needs to be improved in the future.
Electrical Switches	Currently no electrical switches with mer-	HS Code for Mercury free

	cury have been known to be imported.	electrical switches needs to be introduced.
Light sources with mercury	No separate record keeping is in practice for different types of mercury containing light sources at DOC and mercury containing and mercury free lighting sources could not be identified.	Not possible to separate them out, so 10-digits HS codes would help to differentiate between Hg-containing and Hg-free light sources.
Batteries with mercury	Data on batteries with mercury available in pieces (numbers) but the required units is tons/y. Also, no clear statement on Hg is given on the product label.	Suitable ways to convert numbers into weight should be worked out for which a thorough study of batteries in the market needs to be made.
Polyurethane (PU, PUR)	Not produced in Nepal but imported and used. The level of mercury in imported items not known.	More research needed. The estimation is based on total inhabitant.
Paint with mercury	No data on mercury level in paints (domestic/imported) available and also paint industries using Hg-pigments could not be verified	More research is needed on Hg-determination in paints available in the market.
Skin whitening creams and soaps	Product label with no information on whether with or without Hg. Thus even the suspected items could not be considered as Hg-containing ones.	Determination of Hg in cosmetics to be done; also, legislative and institutional provisions to regulate Hg in cosmetics to be made effective.
Medical blood pressure gauge	DOC has no system of separate listing of blood pressure gauges with or without mercury.	DOC need to be strengthened to start 10-digits HS codes, so that the differentiation between Hg-containing and Hg-free items can be made.
Other manometer and gauges with Hg	As DOC was found listing both mercury and non-mercury items under the same category, the estimate was made on the basis of total inhabitants.	DOC need to be strengthened to start 10-digits HS codes, so that the differentiation between Hg-containing and Hg-free items can be made..
Laboratory chemicals	Not produced but imported and used. The level of mercury in imported items not known.	More research needed. The estimation is based on total inhabitant
Other laboratory and medical equipment's	No data on mercury level in paints (domestic/imported) available and also paint industries using Hg-pigments could not be verified	More research is needed on Hg-determination in different types of laboratory and medical equipments available in the market.
Production of Recycled of Metals		
Ferrous metal production	UNEP tool kit is in number of vehicles recycled/year but in Nepal such data is available in ton/yr.	It is desirable that UNEP tool-kit would also provide an option to calculate Hg based on weight of scarp ferrous metals and consider separate weight of metals for vehicles in South Asian countries.

Waste Incineration		
Incineration of Hazardous waste	No proper data on hazardous waste generation and its incineration.	Need detail inventory on hazardous waste generated from industrial sector
Incineration or burning of Medical waste	No proper data on health care waste studies in Nepal. Conducted only few case studies in few medical hospitals. No data on quantity of incineration or burning of medical waste.	Need detail inventory on Medical waste generation and treatment facilities from HCIs in Nepal
Open fire waste burn (on landfill and informally)	No proper data at national level besides recent study in Kathmandu valley	Need detail assessment on open fire waste burning of general waste as it is common practice in rural and urban area
Waste Deposition/Land filling and Waste Water Treatment		
Controlled landfill site / deposition	<ul style="list-style-type: none"> There are limited sanitary landfill sites and controlled dumps which are not functioning properly. Difficult to get accurate data from the municipalities due to inadequate study on it or no system of keeping the record 	Need detail study on situation of controlled landfill sites and deposition
Informal dumping of general waste	<ul style="list-style-type: none"> No accurate data on informal dumping of general wastes by municipalities; also aggravated by increasing the number of municipalities from 58 to 293 within 5 last years. 	System of segregation of wastes and keeping their record to be introduced in all municipalities
Waste Water Treatment Plants	<ul style="list-style-type: none"> No proper WWTP in Nepal except few. No proper record of water consumption by total population of Nepal as well as water consumption/ waste water generation from industrial sectors 	Need detail study on waste water generation at domestic level and industrial level in Nepal
Crematoria and Crematoria		
Crematoria and cemeteries	<ul style="list-style-type: none"> There is no exact record or data on number of crematoria and cemeteries in Nepal, so the data are computed based on death rate and type of after death rituals followed by different religious groups. 	Need further study and mandatory yet effective registering of deaths and to be made available from CBS.
Miscellaneous		
Gold plating	Though it is a major source of Hg, systematic data record is available neither with FHAN nor with concerned government body.	FHAN, DOC and concerned stakeholders need to be informed or made aware of proper use of Hg and maintain a record of its rate of consumption.
Ayurvedic Medicine	Data on mercury-based Ayurvedic medicine produced is not available. The level of mercury contamination in Ayurvedic medicine is also not known.	Department of Ayurved and Alternative Medicine (DOAA), DOC and DDA should envision the policy that will take ac-

		count of import & domestic production of Mercury based Ayurvedic Medicine.
Educational Uses	No record of mercury, mercury base chemicals and equipment used in educational system available.	All academic institutions using mercury, mercury based chemicals and equipment should develop self-registry and reporting of these items to MOFE.
Transboundary movement of pollution	There is no provision of calculating transboundary movement of mercury in the toolkit. Nepal may have more mercury in the atmosphere, transported by air from the neighbouring countries like India and China.	Mercury Air Monitoring System including the transboundary mercury movement should be built in Nepal.

2.1 Summary of mercury releases, stockpiles, and supply and trade.

2.1.1 Mercury release source types present

Table 2-3 shows mercury release sources identified at present or absent in the country. Only source types positively identified at present are included in the quantitative assessment.

It should be noted however, that presumably minor mercury release source types shown in **Table 2-4** were not included in the detailed source identification and quantification work. These may however be present in some countries.

Table 2-3: Identification of mercury release sources in the country; sources present (Y), absent (N), and possible but not positively identified (?).

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

Primary metal production	
Mercury (primary) extraction and initial processing	N
Production of zinc from concentrates	N
Production of copper from concentrates	N
Production of lead from concentrates	N
Gold extraction by methods other than mercury amalgamation	N
Alumina production from bauxite (aluminium production)	N
Primary ferrous metal production (pig iron production)	N
Gold extraction with mercury amalgamation - from whole ore	N
Gold extraction with mercury amalgamation - from concentrate	N
Other materials production	
Cement production	Y
Pulp and paper production	Y
Production of chemicals	
Chlor-alkali production with mercury-cells	N
VCM production with mercury catalyst	N
Acetaldehyde production with mercury catalyst	N
Production of products with mercury content	
Hg thermometers (medical, air, lab, industrial etc.)	N
Electrical switches and relays with mercury	N
Light sources with mercury (fluorescent, compact, others: see guideline)	N
Batteries with mercury	N
Manometers and gauges with mercury	N
Biocides and pesticides with mercury	N
Paints with mercury	?
Skin lightening creams and soaps with mercury chemicals	N
Use and disposal of products with mercury content	
Dental amalgam fillings ("silver" fillings)	Y
Thermometers	Y
Electrical switches and relays with mercury	N
Light sources with mercury	Y
Batteries with mercury	?
Polyurethane (PU, PUR) produced with mercury catalyst	N
Paints with mercury preservatives	?
Skin lightening creams and soaps with mercury chemicals	?
Medical blood pressure gauges (mercury sphygmomanometers)	Y
Other manometers and gauges with mercury	Y
Laboratory chemicals	Y
Other laboratory and medical equipment with mercury	Y
Production of recycled of metals	
Production of recycled mercury ("secondary production")	N
Production of recycled ferrous metals (iron and steel)	Y
Waste incineration	
Incineration of municipal/general waste	N
Incineration of hazardous waste	Y
Incineration / burning of medical waste	Y
Sewage sludge incineration	N
Open fire waste burning (on landfills and informally)	Y

Waste deposition/landfilling and waste water treatment	
Controlled landfills/deposits	Y
Informal dumping of general waste *1	Y
Waste water system/treatment	Y
Crematoria and cemeteries	
Crematoria	Y
Cemeteries	Y

Table 2-4: Miscellaneous potential mercury sources not included in the quantitative inventory; with preliminary indication of possible presence in the country.

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

2.1.2 Summary of mercury inputs to society

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

Table 2-5: Summary of mercury inputs to society

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
Energy consumption				
Coal combustion in large power plants	N	0	Coal combusted, T/y	-
Coal combustion in coal fired industrial boilers	N	0	Coal combusted, T/y	-
Other coal uses	Y	1,127,546	Coal used, T/y	150
Combustion/use of petroleum coke and heavy oil	Y	82,932	Oil product combusted, T/y	5
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	1,575,812	Oil product combusted, T/y	9
Use of raw or pre-cleaned natural gas	N	0	Gas used, Nm ³ /y	-
Use of pipeline gas (consumer quality)	N	0	Gas used, Nm ³ /y	-
Biomass fired power and heat production	Y	24,617,188	Biomass combusted, T/y	739
Charcoal combustion	Y	13,000	Charcoal combusted, T/y	2
Fuel production				
Oil extraction	N	0	Crude oil produced, T/y	-
Oil refining	N	0	Crude oil refined, T/y	-
Extraction and processing of natural gas	N	0	Gas produced, Nm ³ /y	-
Primary metal production				
Mercury (primary) extraction and initial processing	N	0	Mercury produced, T/y	-
Production of zinc from concentrates	N	0	Concentrate used, T/y	-
Production of copper from concentrates	N	0	Concentrate used, T/y	-
Production of lead from concentrates	N	0	Concentrate used, T/y	-
Gold extraction by methods other than mercury amalgamation	N	0	Gold ore used, T/y	-
Alumina production from bauxite (aluminium production)	N	0	Bauxite processed, T/y	-
Primary ferrous metal production (pig iron production)	N	0	Pig iron produced, T/y	-
Gold extraction with mercury amalgamation - from whole ore	N	0	Gold produced, Kg/y	-

Gold extraction with mercury amalgamation - from concentrate	N	0	Gold produced, Kg/y	-
Other materials production				
Cement production*4	Y	2,805,000	Cement produced, T/y	384
Pulp and paper production	Y	157,972	Biomass used for production, T/y	5
Production of chemicals				
Chlor-alkali production with mercury-cells	N	0	Cl ₂ produced, T/y	-
VCM production with mercury catalyst	N	0	VCM produced, T/y	-
Acetaldehyde production with mercury catalyst	N	0	Acetaldehyde produced, T/y	-
Production of products with mercury content				
Hg thermometers (medical, air, lab, industrial etc.)	N	0	Mercury used for production, Kg/y	-
Electrical switches and relays with mercury	N	0	Mercury used for production, Kg/y	-
Light sources with mercury (fluorescent, compact, others: see guideline)	N	0	Mercury used for production, Kg/y	-
Batteries with mercury	N	0	Mercury used for production, Kg/y	-
Manometers and gauges with mercury	N	0	Mercury used for production, Kg/y	-
Biocides and pesticides with mercury	N	0	Mercury used for production, Kg/y	-
Paints with mercury	?	0	Mercury used for production, Kg/y	?
Skin lightening creams and soaps with mercury chemicals	N	0	Mercury used for production, Kg/y	-
Use and disposal of products with mercury content				
Dental amalgam fillings ("silver" fillings)	Y	28,043,744	Number of inhabitants	114
Thermometers	Y	488,861	Items sold/y	489
Electrical switches and relays with mercury	N	28,043,744	Number of inhabitants	-
Light sources with mercury	Y	3,594,064	Items sold/y	87
Batteries with mercury	?	0	T batteries sold/y	?
Polyurethane (PU, PUR) produced with mercury catalyst	N	28,043,744	Number of inhabitants	-
Paints with mercury preservatives	?	0	Paint sold, T/y	?
Skin lightening creams and soaps with mercury chemicals	?	0	Cream or soap sold, T/y	?
Medical blood pressure gauges (mercury sphygmomanometers)	Y	15,341	Items sold/y	1,227
Other manometers and gauges with mercury	Y	28,043,744	Number of inhabitants	61
Laboratory chemicals	Y	28,043,744	Number of inhabitants	122
Other laboratory and medical equip-	Y	28,043,744	Number of inhabitants	489

ment with mercury				
Production of recycled of metals				
Production of recycled mercury ("secondary production")	N	0	Mercury produced, Kg/y	-
Production of recycled ferrous metals (iron and steel)	Y	73,035	Number of vehicles recycled/y	80
Waste incineration				
Incineration of municipal/general waste	N	0	Waste incinerated, T/y	-
Incineration of hazardous waste	Y	31	Waste incinerated, T/y	1
Incineration / burning of medical waste	Y	9,331	Waste incinerated, T/y	224
Sewage sludge incineration	N	0	Waste incinerated, T/y	-
Open fire waste burning (on landfills and informally)	Y	154,691	Waste burned, T/y	773
Waste deposition/land filling and waste water treatment				
Controlled landfills/deposits	Y	381,365	Waste landfilled, T/y	1,907
Informal dumping of general waste *1	Y	931,089	Waste dumped, T/y	4,655
Waste water system/treatment	Y	700,422,822	Waste water, m ³ /y	3,677
Crematoria and cemeteries				
Crematoria	Y	186,101	Corpses cremated/y	465
Cemeteries	Y	18,606	Corpses buried/y	47
TOTAL of quantified inputs*1*2*3*4				5,210 Kg Hg/y

Notes:

- *1: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration sources, waste deposition and informal dumping is included in the total for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Toolkit. See Appendix 1 to the Inventory Level1 Guideline for more explanation.
- *2: The estimated quantities include mercury in products which has also been accounted for under each product category. To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS.
- *3: The estimated input and release to water include mercury amounts which have also been accounted for under each source category. To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS.
- *4: To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the TOTALS.

Table 2-6: Miscellaneous

Source category	Source present?	Estimated Hg input, Kg Hg/y

	Y/N/?	Standard estimate
Gold Plating	Y	12825
Ayurvedic medicine containing mercury	Y	243.65
Mercury available in Ayurvedic Office, Singhadurbar	Y	140.11
Dental Amalgam	Y	28.5
Army Installation, Ministry of Defence	Y	14

Note that the following source sub-categories made the largest contributions to mercury inputs to society:

Miscellaneous (gold plating in case of Nepal)	: 12825 Kg Hg/ Y
Informal dumping of general waste	: 4655 Kg Hg/ Y
Waste water system/treatment	: 3677 Kg Hg/ Y
Controlled landfills/deposit	: 1907 Kg Hg/ Y
Medical blood pressure gauges	: 1227 Kg Hg/Y
Thermometers	: 489 Kg Hg/ Y

2.1.3 Summary of mercury releases

In the **Table 2-7** below, a summary of mercury releases from all source categories present is given. The key mercury releases here are releases to air (the atmosphere), to water (marine and freshwater bodies, including via waste water systems), to land, to general waste, and to sectors specific waste treatment. An additional output pathway is "by-products and impurities" which designate mercury flows back into the market with by-products and products where mercury does not play an intentional role. See **Table 2-8** below for a more detailed description and definition of the output pathways.

Table 2-7: Summary of mercury releases

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Energy consumption						
Coal combustion in large power plants	-	-	-	-	-	-

Coal combustion in coal fired industrial boilers	-	-	-	-	-	-
Other coal uses	150.3	0.0	0.0	0.0	0.0	0.0
Combustion/use of petroleum coke and heavy oil	4.6	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	8.7	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	-	-	-	-	-	-
Use of pipeline gas (consumer quality)	-	-	-	-	-	-
Biomass fired power and heat production	738.5	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	1.6	0.0	0.0	0.0	0.0	0.0
Fuel production						
Oil extraction	-	-	-	-	-	-
Oil refining	-	-	-	-	-	-
Extraction and processing of natural gas	-	-	-	-	-	-
Primary metal production						
Mercury (primary) extraction and initial processing	-	-	-	-	-	-
Production of zinc from concentrates	-	-	-	-	-	-
Production of copper from concentrates	-	-	-	-	-	-
Production of lead from concentrates	-	-	-	-	-	-
Gold extraction by methods other than mercury amalgamation	-	-	-	-	-	-
Alumina production from bauxite (aluminium production)	-	-	-	-	-	-
Primary ferrous metal production (pig iron production)	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from whole ore	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from concentrate	-	-	-	-	-	-
Other materials production						
Cement production*3	287.8	0.0	0.0	95.9	0.0	0.0
Pulp and paper production	4.7	0.0	0.0	0.0	0.0	0.0
Production of chemicals						
Chlor-alkali production with mercury-cells	-	-	-	-	-	-
VCM production with mercury catalyst	-	-	-	-	-	-

Acetaldehyde production with mercury catalyst	-	-	-	-	-	-
Production of products with mercury content						
Hg thermometers (medical, air, lab, industrial etc.)	-	-	-	-	-	-
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury (fluorescent, compact, others: see guideline)	-	-	-	-	-	-
Batteries with mercury	-	-	-	-	-	-
Manometers and gauges with mercury	-	-	-	-	-	-
Biocides and pesticides with mercury	-	-	-	-	-	-
Paints with mercury	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	-	-	-	-	-	-
Use and disposal of products with mercury content						
Dental amalgam fillings ("silver" fillings)	2.3	50.4	9.2	6.9	22.9	22.9
Thermometers	97.8	146.7	97.8	0.0	146.7	0.0
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury	26.2	0.0	26.2	0.0	34.9	0.0
Batteries with mercury	?	?	?	?	?	?
Polyurethane (PU, PUR) produced with mercury catalyst	-	-	-	-	-	-
Paints with mercury preservatives	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	?	?	?	?	?	?
Medical blood pressure gauges (mercury sphygmomanometers)	245.5	368.2	245.5	0.0	368.2	0.0
Other manometers and gauges with mercury	12.2	18.3	12.2	0.0	18.3	0.0
Laboratory chemicals	0.0	40.3	0.0	0.0	40.3	41.6
Other laboratory and medical equipment with mercury	0.0	161.4	0.0	0.0	161.4	166.3
Production of recycled of metals						
Production of recycled mercury ("secondary production")	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	26.5	0.0	27.3	0.0	26.5	0.0
Waste incineration						

Incineration of municipal/general waste	-	-	-	-	-	-
Incineration of hazardous waste	0.7	0.0	0.0	0.0	0.0	0.1
Incineration / burning of medical waste	223.9	0.0	0.0	0.0	0.0	0.0
Sewage sludge incineration	-	-	-	-	-	-
Open fire waste burning (on landfills and informally)	773.5	0.0	0.0	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment						
Controlled landfills/deposits	19.1	0.2	0.0	-	-	-
Informal dumping of general waste *1	465.5	465.5	3,724.4	-	-	-
Waste water system/treatment *2	0.0	3,309.5	0.0	0.0	367.7	0.0
Crematoria and cemeteries						
Crematoria	465.3	0.0	0.0	-	0.0	0.0
Cemeteries	0.0	0.0	46.5	-	0.0	0.0
TOTAL of quantified releases*1*2*3	3,540.0	1,250.0	460.0	100.0	1,190.0	230.0

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

Miscellaneous

There are gold plating practices on sculptures, pinnacles and temple roofs. However, the estimated use of mercury only for the sculptures was considered for the estimation of mercury emissions. Based on Department of Archaeology (DArch) and Federation of Handicraft Association of Nepal (FHAN), about 12,825 Kg of mercury were found used annually in gold plating purpose in Nepal.

It is estimated that about 95% of it is released into air (i.e. 12183.79 Kg), 3% into water (i.e. 384.75 Kg) and 2% into land (i.e. 256.5 Kg).

Since mercury release from various miscellaneous sources, such as education sector, traditional medicines manufacturers, Nepal army, etc. into air, water and land are not in UNEP toolkit; these activity data could not be used for estimation of mercury release.

That the following source sub-categories made the largest contributions to mercury releases to the atmosphere:

Miscellaneous (Gold plating in context to Nepal)	:	12184 Kg
Open fire waste burning (on landfill and informally)	:	774 Kg
Crematoria	:	465 Kg
Informal dumping of general waste	:	464 Kg
Cement production	:	288 Kg
Medical blood pressure gauges	:	246 Kg

Incineration / burning of medical waste	:	224 Kg
Thermometers	:	98 Kg

Table 2-8 below provides general descriptions and definitions of the output pathways.

Table 2-8: Description of the types of results

Calculation result type	Description
Estimated Hg input, Kg Hg/y	The standard estimate of the amount of mercury entering this source category with input materials, for example calculated mercury amount in gold plating in used annually in the country.
Air	Mercury emissions to the atmosphere from point sources and diffuse sources from which mercury may be spread locally or over long distances with air masses; for example from: <ul style="list-style-type: none"> • Point sources such as blowing Hg from gold plated sculptures using high heat, metal smelter, waste incineration; • Diffuse sources such as informal burning of waste with fluorescent lamps, batteries, thermometers.
Water	Mercury releases to aquatic environments and to waste water systems; point sources and diffuse sources from which mercury will be spread to freshwaters (rivers, lakes, etc.), for example releases from: <ul style="list-style-type: none"> • Gold plating during which Hg in water used for washing gold plated sculptures is released into the municipal drains; • Industry, households, etc. to aquatic environments; • Surface run-off and leachate from mercury contaminated soil and waste dumps
Land	Mercury releases to the terrestrial environment: General soil and ground water. For example releases from: <ul style="list-style-type: none"> • Solid residues from gold plating disposed of on land after extraction of traces of gold. • Uncollected waste products dumped or buried informally • Local un-confined releases from industry such as on site hazardous waste storage/burial
By-products and impurities (Perhaps not relevant to Nepal)	By-products that contain mercury, which are sent back into the market and cannot be directly allocated to environmental releases.
General waste	General waste: Also called municipal waste in some countries. Typically household and institution waste where the waste undergoes a general treatment, such as incineration, land filling or informal dumps. The mercury sources to waste are consumer products with intentional mercury content (batteries, thermometers, fluorescent tubes, etc.) as well as high volume waste like printed paper, plastic, etc., with small trace concentrations of mercury.
Sector specific waste treatment /disposal	Waste from industry and consumers which is collected and treated in separate systems, and in some cases recycled; for example: <ul style="list-style-type: none"> • Hazardous industrial waste with high mercury content which is deposited in dedicated, safe sites • Hazardous consumer waste with mercury content, mainly separately collected batteries, thermometers, mercury switches, lost teeth with amalgam fillings, etc.

2.1.4 Summary of mercury stockpiles, and supply and trade

- Stockpiles at Singhadurbar Vaidyakhana – there was 30.11 Kg of elemental mercury and 110 Kg of Kajali (Mercurous sulphide) available with Singhadurbar Vaidyakhana only;
- Army – Ministry of Defence, about 14 Kg of Mercury and Mercury compounds was found stored in army installation in 2018.
- DOC has a record of an import of 215 Kg of elemental mercury imported from India for the year 2016/17.
- Bir Hospital Dental Department has 200 Dental Mercury Amalgam Capsules stored safely. This might give about 0.24 Kg of mercury [200 capsule *1200 mg Hg/capsule].

2.2 Data and inventory on energy consumption and fuel production

Under the STEP 1 section, category Energy and the sub categories such as “other coal uses”, “combustion/use of petroleum coke and heavy oil”, “combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates”, “biomass fired power and heat production and charcoal production” have been covered for the calculation of mercury emission. The other subcategories such as “coal combustion in large power plant, coal fired power plant” and the category “oil production” have not been considered, as there are no such activities in Nepal. The UNEP Tool Kit level1 is used for the calculation of the mercury emission for the STEP 1 “Energy Fuels, Consumption and Production and illustrated below:

2.2.1 Other Coal uses

The import data on coal was gathered from Nepal Foreign Trade Statistic published by DOC in 2016/17. The coal is mainly imported from China, Indonesia, USA, Bhutan and India. The concentration of mercury in coal varies considerably depending on the coal type, the origin of the coal and even within the same mine.

The coal consumption in the cement kilns are excluded from this section and are calculated under cement production section separately. It is assumed that the coal is mostly used in the brick and tea processing industries. The total consumption of coal under this subcategory is accounted 1127546 MT/y (Data sheets of DOC) (DOC, 2016/17), which gives an estimated input of 150 Kg Hg/y. The detail import data is presented in **Annex 1: Table 6**.

2.2.2 Combustion of petroleum coke and heavy oil

The petroleum coke and heavy oil data for the year base year 2016/2017 is obtained from Nepal Foreign Trade Statistics published by DOC. The petroleum coke and heavy oil (furnace oil) are used in the metal industry furnaces to produce the heat for smelting. The petroleum coke and heavy oil are imported from India, United Arab, Saudi Arab, Malaysia, China, Singapore, South Africa and Spain.

The total quantity imported in the year 2016/2017 was 82932 MT/y (DOC, 2016/17). The total input of the mercury due to the combustion of the petroleum coke and heavy oil is accounted for 5 Kg/y. The **Annex 1: Tables 7 and 8** give the detail information on the import of petroleum coke and heavy oil (furnace oil).

2.2.3 Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates

The diesel, petroleum, kerosene and LPG data was obtained from the Nepal oil Corporation, Kathmandu office for the base year 2016/2017, whereas the other light and medium distillate data was obtained from the Nepal Foreign Trade Statistics, DOC. These petroleum products are intended for the use for transport, electricity generation, and manufacturing and for house hold purpose. LPG gas is used mainly for cooking and water heating, and also in transport vehicles using LPG. The petroleum products were imported from India and other light and medium distillates were imported from India, Malaysia, and Thailand. The total consumption is accounted 127973MT/year; please refer **Annex 1: Table 9** (DOC, 2016/17) (personal communication, M. Manandhar, 22 June, 2018). This activity data led to an estimation of 9 Kg/y of mercury release. Following conversion factor was used to convert KL into Metric Ton.

The conversion factor for Kerosene, Petrol and diesel were 1.285, 1.41 and 1.21 (source: <http://www.nepaloil.com.np/conversion-factors-20.html>).

2.2.4 Biomass fired power and heat production

The biomass is used in the industry boilers in the form of bagasse, rice husk and fuel wood; fuel wood is also used at the domestic level for cooking. There is no separate information on the use of biomass only for the industries at the government level. However, there is an information on the total consumption of energy in the Economic Survey report; the total consumption of biomass (fuel wood and agriculture residue) accounts to 8790000 Tons of Oil Equivalent (TOE) (MOF, 2016/17), which corresponds to 24617188 MT/y (using the conversion factor of 1 metric ton of wood = 15GJ and 1 TOE = 41.868GJ, 1 metric ton of agriculture residue = 10 – 17 GJ) (**Annex 1: Table 11**). The data is used as an activity data in the Toolkit for the estimation of mercury and corresponds to 739 Kg/y.

Data gaps and priorities for potential follow up

The detail information on the consumption of the biomass for the industrial purpose was not available at the government level or in any other report. Therefore, a detailed study on the use of biomass in the industrial sector needs to be carried out and WECS should also keep the separate data on the use of biomass used in the industrial sector.

2.2.5 Charcoal Combustion

The charcoal defined herein refers to briquette, which is commercially produced in Nepal. The briquette is used for the cooking and heating at household level, especially in the rural areas. A total of 13000 metric tons of briquettes was produced in the year 2016/2017 (personal communication: Prajjwal Shakya, Alternative Promotion Energy Centre, 18 May 2018). The data is used as an input to the Toolkit and estimated mercury release corresponds to 2kg Hg per year.

2.3 Data and inventory on domestic production of metals and raw materials

2.3.1 Primary Metal Production and Other Material Production

Under the Step 3 of Toolkit, "primary metal production and other material production", the source category "**primary metal production**" is not covered for the calculation of mercury as there is no primary metal production in the context of Nepal. Therefore, this section covers only the category "Other materials production" and subcategories "Cement production and Pulp and paper production". The UNEP Toolkit level 1 is used for the calculation of mercury emissions and detail illustration of subcategory is given below.

2.3.2 Cement Production

According to information obtained from the Department of Industry (DOI), there are 105 cement industries registered under the Department of Industry and among them, 66 are large industries and 39 medium scale industries. However, there is no separate information on and distinction between the clinker production based and clinker-import based cement industries, and also no information is available on how many of them are under operation.

According to the Nepal Bureau of Standard and Metrology (NBSM), there are 19 clinker production based cement industries (Industry having their own lime stone mines) operating in the country (Personal communication, A. Singh). The largest cement industry in Nepal is Hongshi Cement industry which is a recently established multinational company and has a production capacity of 6000 MT/day. However, the cement production related information of all nineteen industries was not available from NBSM. In this case, the information available from Economic Survey of Nepal for the base year 2016/17 was used; there are 14 lime stone based cement industries established at the government and private sector level and other 9 small and medium industries under construction. The total production capacity of these 14 industries is given as 8500 MT/day (MOF, 2016/17). It is assumed that if the industry operates for 330 days/year, this will give the yearly production of 2805000 MT of cement. The data is used as an input to the Toolkit and estimated mercury input corresponds to 384 Kg Hg per year. Among these industries, some industries (Shivam Cement Industry, Udaypur cement Industry and Hetauda Cement Industry) were visited during the inventory process and it was found that these industries were equipped with air pollution control technology (fabric filters) and Dust Control Equipment.

Distribution of activity rates on the relevant mercury controls: Out of 14 industries, three industries were visited and all of them were found to have the pollution control technology as indicated in the table below:

Table 2-9: Pollution control technology in cement industries

Relevant pollution abatement options (guide: click white cells)	0: No filters used	1: Simple particle filters	2: Fabric filters	3: Efficient APC	4: Very efficient APC	5: Mercury specific
Enter per cent of total activity rate per type:	0	3	3	0	0	0

Note Filed Visit (Pollution control installed industry): Hetauda Cement Industry, Udaypur Cement Industry, Shivam Cement Industry,

Data gaps and priorities for potential follow up

The data obtained on the cement production from DOI gives only the annual production capacity at the time of registration with the DOI. According to the department, there are 105 cement industries registered with DOI. Among 105 cement industries, there are 66 large industry and 39 medium scale industries. However, there is no separate information about the clinker production based cement industries and clinker (import) based cement production industries and also no information on how many of them are under operation. It is also assumed that the industry may not have utilized the full production capacity or may also increase their production capacities than the actual production as indicated during registration with the DOI.

Further, the information received from the NBSM reveals that there are 19 large clinker production based cement industries. However, the economic survey reports that only fourteen clinker base cement production industries were operating in Nepal during 2016/17.

The information extracted from the DOI regarding the actual number of clinker base cement industries and information received from NBSM and the available information from the Economic Survey does not match properly. There may be more clinker production cement industries in operation than the information available from the existing sources. Therefore, a detail study on the clinker production cement industries would provide more reliable activity data for estimation of mercury emission.

2.3.3 Pulp and Paper Production

There are fifteen pulp and paper producing industries registered with DOI. Among them, only six are in operation at the moment (personal communication, Mr. Santosh Dahal, Manager of Everest Paper industry, 2 June, 2018). Among six industries, two industries use both bagasse and waste paper whereas other four industries use only waste paper to produce kraft, writing and printing paper. The data on the biomass use (bagasse and waste paper) was obtained from the six individual facilities

and accounted 157942 MT/y (field visit: Everest paper mill, Mr. Santosh Dahal, 28 May, 2018 and personal communication:-Mr. Deepak Shrestha / Devi Bhattarai / Sunrise paper industry and Baba paper industry - 05 August 2018, Mr. Ananda Sighal, Shree Maruti paper industry - 27 July, 2018, Murari Subedi MK paper mill - 28 August, 2018) as mentioned in **Annex 1: Table 12**.

The data is used as an input to the Toolkit and estimated mercury input corresponds to 5 Kg Hg per year. It is assumed that the estimation of mercury emission could be less as all four industries use only the waste paper and also they do not use acid and alkali unlike as mentioned in the UNEP Toolkit.

Distribution of activity rates on the relevant mercury controls: Out of six industries, three industries were visited and all three were found to have the pollution control technology as indicated in the below table:

Table 2-10: Pollution control technology in pulp and paper industries

Relevant pollution abatement options (guide: click white cells)	0: No filters used	1: Simple particle filters	2: Fabric filters	3: Efficient APC	4: Very efficient APC	5: Mercury specific
Enter per cent of total activity rate per type:	0	3		0	0	0

2.4 Data and inventory on domestic production and processing with intentional mercury use

Under the Step 4 "Industrial mercury use", the source category "Production of chemical" is not considered as there is no chemicals producing industry in Nepal. Similarly, the source category "Production of product with mercury content" of sub category "Battery with mercury", "Paint with mercury" and "Skin lightening cream and soap with mercury content" is not considered for the illustration, as there is no desired information available, despite the study put much effort considering the probability of intentional use of mercury. The other subcategories were also not considered as there is no production of such products in Nepal.

Additionally, the gold plating activity is considered as one of the important traditional and indigenous practices in Nepal and such industry was found to use significant amount of mercury for the production of gold plated sculptures and this activity is advisable to be added in the UNEP Toolkit level 1 and Level 2. Also, an appropriate formula to calculate the mercury release to different environmental compartments from such activities/practices is highly desirable.

2.4.1 Battery with Mercury

There is no information on the use of mercury for the production of battery. Therefore, this sub category is not considered for the calculation.

2.4.2 Paints with Mercury

Different varieties of paints are widely used in Nepal. There are domestic industries that produce the distemper paints, cement paints as well as water- and enamel-based paints. There are more than twenty small and medium scale industries (Source: Nepal Paints Manufacturers' Association). Recently there was a small study conducted by Nepal Environmental and Scientific Services (NESS) taking samples of four domestic paint products and it was found that the concentration of mercury was not higher than 0.0001 ppm.

The MIA Expert team carried out field visits to three industries, two domestic (Pashupati Paint Industry, Sunsari and Aarati Paints Industry, Kaski) and another multinational company (Asian Paint Industry, Makwanpur) and found that the Aarati Paint industry and multinational company were not using the raw materials that contained mercury or its compounds. As there was no indication of "not using of metal-based pigments" by the paint industries, it should be kept open that such industries might use the pigments that may contain the heavy metals. But there is no information whether the pigments contain mercury as the industries have not done any analysis on metal content and the Government has also not set any standard for the mercury in paints. However, in the "waste water standard for paint industry", mercury is one of the parameters for compliance of the effluent discharged from the industry. Further, the department of customs shows the import of 1000 Kg vermilion pigment (mercury sulphide) for the base year 2016/2017 (DOC, 2016/17), but there is no information on in which sector this pigment is being used. Therefore, the paint with mercury is not considered for the calculation.

Data gaps and priorities for potential follow up

There is neither separate information on the mercury contained in the paint products, nor any label indicating the presence of heavy metals (in this context mercury). Although there is information on the import of the vermilion pigment 1000 Kg (DOC, 2016/17), it does not provide further information on in which sector the vermilion pigment is used. Therefore, there is a need of detail analysis of the mercury in the paint and the government should introduce standard for Hg in paints as well as establish the system of labelling the products with or without mercury.

2.4.3 Skin lightening creams and soaps with mercury chemicals

According to DOI, there are only 2 industries in Nepal that produce the skin lightening creams and soaps. One of them is Unilever Industry, which informed that it did not use mercury in its products. Further, there is no study/research on the mercury content in skin lighting soaps and creams. Therefore, this sub category is not considered for the calculation of mercury.

Data gaps with potential improvements

There is a need to carry out a detail analysis of mercury contained in the skin lightening creams and soaps. The government should establish the system of labelling the products with our without mercury.

2.5 Data and inventory on waste handling and recycling

2.5.1 Question about general waste management setup

The overall questions about the overall waste treatment setup in the country were answered as follows:

Table 2-11: Questions about general waste management setup

Please answer questions about the current waste treatment set-up in your country:	Y/N		Y/N
a) Is more than 2/3 (two thirds = 67%) of the general waste collected and deposited on lined landfills or incinerated in closed incinerators?	N	b) Is more than 1/3 (one third = 33%) of the mercury-added products waste safely collected and treated separately?	N

2.5.2 Production of Recycled of Metal

❖ Production of recycled mercury (secondary production)

There is no activity that recovers mercury or secondary production of mercury in Nepal.

❖ Production of Recycled Ferrous Metals (iron and steel)

There are numbers of iron and steel industries which produce recycled ferrous metals. The quantity of ferrous metals from different sources (scrap, old vehicles, etc.) was received in tons as mentioned in **Annex 1: Table 13**, but UNEP Toolkit Spreadsheet requires number of vehicles for estimation of mercury input. Thus, considering present vehicles numbers (bus, minibus, microbus, car, van and pick-up van) in Nepal, the average weight of vehicles is considered as 2200 Kg. Dividing total weight of recycled ferrous metals by average weight of vehicle, total number of vehicles was estimated to be 73, 035. This figure does not consider the total number of vehicles recycled, but it represents total amount of ferrous metals recycled by iron and steel industries of Nepal. The input of mercury release is calculated as 80 Kg.

2.5.3 Waste Incineration

❖ Incineration of Municipal/General Waste

There is no incineration plant for municipal and general wastes in Nepal, thus no incineration of such wastes. So, there is no data on incineration of Municipal / General Waste.

❖ Incineration of Hazardous waste

According to Updated and Reviewed National Implementation Plan (NIP) for Stockholm Convention on Persistent Organic Pollutants in Nepal (MOPE, 2017), about 31 ton/year of hazardous waste was incinerated (low technology combustion, no APCs) during the year 2014/15. As such data was not available for 2016/17; the data from the previous year was used at least to represent the activity data for the present purpose. The UNEP Toolkit gives a release of about 1 Kg of Hg per year from this activity. The information in NIP shows that there is no proper Hg control device applied by industries.

❖ Incineration / Burning of Medical Waste

Low grade incineration made from brick or metal and open burning of medical waste is still common in health care institutions in Nepal. Medical waste is usually burned in their premises.

According to secondary information, there are currently about 671 hospitals (Government and Private) with a total of 41,172 beds (approximately). Considering 1.35 Kg/bed/day health care waste (HCW) generation as given by MOHP (**Annex 1: Table 14**), total HCW generation was estimated to be 55,582 Kg per day. About 45% of total HCW was found burnt or incinerated by private hospitals (CBS, 2014) and about 50% of total HCW seemed to be burnt in simple incineration device or openly burnt (field survey 2018, **Annex 1: Table 15**); this led to a total of 9331 metric ton of HCW burnt per year and a release of 224 Kg /y of mercury.

❖ Sewage Sludge Incineration

There is no sewage sludge incineration in Nepal.

❖ Open fire waste burning (on landfill and informally)

There is no exact data on total waste burning on landfill and informally. However, based on 2006 IPCC guidelines on Greenhouse Gas Inventories from Waste and case study conducted on waste burn inventory in the Kathmandu Valley by Tribhuvan University with support of SWMTSC, informal open fire waste burning is estimated as follows:

Table 2-12: Estimation of open burning of MSW

MSW open burn informally			
Variables	Description	Value	Source of Data
$MSW_B = P * P_{frac} * MSW_p * B_{frac} * 365 * 10^{-6}$			(IPCC, 2006)
MSW_B	Total amount of Municipal solid waste open burned, Gg/y		(IPCC, 2006)
P	Population (capita) (Urban Population ,2016)	17,731,304	(CBS, 2017)
P_{frac}	Fraction of population burning	0.13	(Das, Bhave, Sapkota,

	waste, (fraction)		& Byanju, 2018)
MSW _p	Per capita waste generation, Kg waste/capita/day	0.317	(ADB, 2013)
B _{frac}	Fraction of the waste amount that is burned relative to the total amount of waste treated	0.58	IPCC, Default value for open burn
365	Number of days per year	365	

$$MSW_B = P * P_{frac} * MSW_p * B_{frac} * 365 * 10^{-6}$$

$$MSW_B = 17731304 \times 0.13 \times 0.317 \times 0.58 \times 365 \times 10^{-6}$$

$$= 154.6906799 \text{ Gg/Y}$$

$$= 154690679.9 \text{ Kg / Y}$$

$$= 154690.6799 \text{ ton/ Y}$$

As calculated above, municipal solid waste openly burned was 154690.6799 ton /y in Nepal. Based on this data, it is estimated that 773 Kg / y of Hg was released into the environment.

Data gaps and priorities for potential follow up

There is no proper data on hazardous waste generation and its incineration. Similarly, there is no proper data on Health care waste generation from each HCI in Nepal and its treatment, especially HCW burning and quantification. There were few studies on HCW but they were very random and scattered. With the recent restructuring of the country, there are lots of changes in urban and rural municipalities. Therefore, detail study at the national level on the nature and quantity of hazardous waste, health care waste and municipal waste is desperately needed in the changed context.

2.5.4 Waste deposition/Land filling and Waste water treatment

❖ Control landfills/Deposits

After state restructuring of Nepal, there are now 293 municipalities in the country. According to SWMTSC, there are at present only 5 sanitary landfill sites and 26 controlled dumping sites in Nepal. Municipalities in Kathmandu District along with Kathmandu and Lalitpur Metropolitan Cities are disposing of their wastes in Sisdole landfill site, while Ghorahi, Dhankuta, Pokhara, Tansen Municipalities have their own separate sanitary landfill sites for waste disposal. However, these sanitary landfill sites are not well functional and up to the mark. The list of municipalities with control landfills / deposits is mentioned in **Annex 1: Table 16**.

Total population of municipalities with sanitary landfill sites and controlled dumping sites was 4,944,020 for 2016, as projected by CBS based on Census 2011 and population growth rate of 1.35 (CBS, 2014). Considering the average waste generation of 0.317 Kg/capita/day (ADB, 2013), total municipal waste generation from municipalities with sanitary landfill sites and controlled dumping sites was estimated to be 1,567 tons per day. Based on ADB report 2013 and other SWMTSC studies, 2/3 of MSW was generally sent to landfill or controlled dumping sites. This led to an estimation that

total waste disposed of in sanitary landfill sites and controlled dumping sites to be 1044 ton /day and 381,365 ton/y, respectively (**Annex 1: Table 17**). Based on this value, the Toolkit has calculated a total of 1907 Kg of Hg released into the environment.

❖ Informal Dumping General Waste

Besides municipalities having facilities of sanitary landfill sites and controlled landfill sites, 250 municipalities out of 293, usually practice informal dumping of MSW. Nepal's total municipal population constitutes 12,137,479 based on 2011 census (CBS, 2017). Considering population growth rate of 1.35%, total population projected for 2016 was 12,979,180 (CBS, 2014). Further, considering 0.317 Kg/capita/day of MSW generation, total waste generation per day was estimated to be 4114 tons/day. Considering an average waste collection efficiency of 62% (ADB, 2013), total informal dumping of general waste or MSW was estimated to be 931,089 MT/yr (**Annex 1: Table 18**), which led to a release of 4655 Kg of mercury.

Data gaps and priorities for potential follow up

Due to recent state restructuring of Nepal, there is considerable change in the population in different municipalities (local levels) and in provinces. Within the last three years, the number of municipalities increased from 58 to 293 municipalities. In this scenario, there is a need of a study on MSW generation and disposal to have an updated status on the generation of MSW, to which Government of Nepal has to give a high priority.

❖ Waste water System / Treatment

There are no domestic/municipal waste water treatment plants in Nepal, except the ones in Kathmandu for municipal waste water. There were five municipal waste water treatment plants in Kathmandu, such as: active sludge plant at Guheshwori, non-aerated lagoons at Kodku and Dhobighat and aerated lagoons at Sallaghari and Hanumanghat. Out of these five, only one at Guheshwori is in operation, but it also gets out of order now and then due to overload and high pollutant contents. According to Kathmandu Upatyaka Khanepani Limited (KUKL, i.e, Kathmandu Valley Drinking Water Company), five new waste water treatment plants are planned and one of them is already under construction.

National urban water supply and sanitation policy 2009 (MoPPW, 2009) has projected a water consumption of 100 LPCD for urban population and 45 LPCD for rural population considering this and population projection for 2016 by CBS (2011) (CBS, 2017), water consumption for rural and urban population in Nepal was estimated 2,254,639 m³/day. Then referring to State of Environment of Nepal 2001, which considers that 85% of total water consumed turns out to be waste water, a total of 699,501,734 m³/y of waste water was projected to be generated for the year 2016/17 by rural and urban populations in Nepal, (**Annex 1: Table 19**).

There are 10 industrial zones in Nepal (**Annex 1: Table 20**). Except Bhaktapur, nine industrial zones supply water to industries operated in their zones. Based on the total water consumption in these zones and about 85% of it assumed to be discharged as waste water, a total of 920,986 m³ of waste water will be generated annually from industrial zones of Nepal.

Combining the wastewater generated from domestic level and industrial zones, there will be a total of 700,422,822 m³ of wastewater a year and this according to UNEP Toolkit will release 3677 Kg of Hg annually.

Data gaps and priorities for potential follow up

At present situation, there is no waste water treatment plant in Nepal except two plants at Guheshwori and Hetauda. So, it is difficult to get proper quantity of waste water generated in Nepal. Besides the industrial zones run by the government of Nepal, there are other industrial corridors such Biratnagar-Dharan Industrial Corridor, Birgunj-Simara Industrial Corridor, Bhairawa Industrial Corridor, Nepalgunj Industrial Corridor, whose data could not be received and thus not considered for the present inventory.

It is necessary to have exact data on total water consumption by rural and urban populations and waste water discharge at domestic level to calculate Hg release from such source. Also, the quantity of waste water generated from different industries in Nepal should be recorded and annually updated in Industrial Statistics Entry System of DOI.

2.6 Data and inventory on general consumption of mercury in products, as metal mercury and as mercury containing substances

2.6.1 General background data

The healthcare system is a key consuming sector of mercury's global demand and also major source of emissions. Mercury is used especially in instruments like thermometers, barometers, pyrometers, and sphygmomanometers that are still imported and used in very large numbers in different levels of health care facilities in the country. As the mercury columns of these instruments are made of glass, significant amount of mercury can be released up-on their breakage. Mercury has been widely used in dental filling, ayurvedic medicine, laboratory chemicals, cosmetics, paints and soap. Mercury is liquid at room temperature and pressure, but spilled Hg vaporizes into the surrounding air. Apart from breakage of these instruments, in-house calibration practices of mercury-containing barometers and sphygmomanometers can be the source of mercury in indoor air as large amount of liquid mercury has been seen stored in the repair, maintenance and calibration departments of certain health care facilities. Poor ventilation of such rooms can lead to acute Hg exposure to health professionals, patients and patient parties, including the waste handlers.

Table 2-13: Groups of Product

Sub-category	Data types used as activity rates
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Dental amalgam fillings ("silver" fillings)	Population (28043744), density of dental personnel (0.017)
Electrical switches and relays with mercury	Population (28043744), electrification rate (per cent of population with access to electricity) (44%)
Polyurethane (PU, PUR) produced with mercury catalyst	Population (28043744), electrification rate (percent of population with access to electricity) (44%)
Other manometers and gauges with mercury	Population (28043744), electrification rate (per cent of population with access to electricity) (44%)
Laboratory chemicals	Population (28043744), electrification rate (per cent of population with access to electricity) (44%)
Other laboratory equipment with mercury	Population (28043744), electrification rate (per cent of population with access to electricity) (44%)

Table 2-14: Background data for default calculations for dental amalgam and certain other product types

BACKGROUND DATA FOR DEFAULT CALCULATIONS AND RANGE TEST			
Country	Population in 2010 (or as recent as available data allow; UNSD, 2012)	Dental personnel per 1000 inhabitants	Electrification rate, population (%) with access to electricity
Nepal	28043744	0.017	44

NOTE: Dental Health professional: Dental Doctor 2344 (NMC 2017 data) + Dental Hygienist 1205 (HPCN data)-750 aboard = 2799). This gives almost 0.017 Dental Health Care professional per 10,000 population, equivalent to the toolkit default value.

The data in Table 2-13 are provided as part of the Toolkit. For most countries they are based on authoritative international data sources (population data: UNSD; Dental data: WHO; Electrification data: IEA). For a few countries, data from these sources have not been available and other sources were used as described in the Toolkit Reference Report's Annex 8.4.

2.6.2 Dental Amalgam fillings (silver fillings)

Mercury has been widely used in dental filling in both dental health care services as well as dental health education sector. Elemental mercury, which is liquid at room temperature and pressure, evaporates up on spillage as well as during the preparation, use and disposal of leftover dental amalgam into the surrounding air leading to acute Hg exposure to health professionals, patients, patient parties and also to waste handlers.

As per the UNEP toolkit, use and disposal of products with mercury content releases Hg during preparation, and use and disposal of dental amalgam fillings (silver fillings); about 114 Kg of mercury has been estimated to be used annually in Nepal based on the total population projected for 2016. Such releases from dental amalgam uses and disposal into air is about 2.3 Kg/y, into water 50.4 Kg/y, into

land 9.2 Kg/y, as by products and impurities about 6.9 Kg/y, general waste 22.9 Kg/y, sector specific waste management and disposal 22.9 Kg/y.

There are 13 Colleges under Tribhuvan University, Kathmandu University, and BPKIHS that run BDS (Bachelor of Dental Surgery) programmes. As per Nepal Medical Council, 21,413 doctors were registered with NMC by December 2017; among them 19069 were general doctors, 2344 were Dental doctors and 6079 were Specialist/Sub-specialist doctors.³ According to Nepal Dental Association (NDA), among 2344 Dental Surgeons registered, 1800 are working in Nepal and catering dental health care services to the Nepalese population from private and public institutions (source: Dr. Manoj Humagain, General Secretary, NDA). According to him, each dental college has about 50 students and each has to perform a number of dental amalgam fillings (in phantom heads and in people's teeth). Based on the number of colleges and student per college as well as the Hg capsule used, about 57.18 Kg of mercury is found used in dental practice as presented in the following table.

Table 2-15: Usage of Mercury in Dental Colleges

Universities	No. of College affiliated	BDS quota/college	Total quota	No. of Dental Restoration	Mercury Required per year (Kg)	Reference
Kathmandu University	6	50	300	13	4.68	Dr. Reetu Shrestha, SMS, KU
Tribhuvan University	6	50	300	100 to 125	45	Dr. Nitin Agrawal, IOM, TU
BPKISH, Dharan	1	50	50	100 to 125	7.5	
Total					57.18	
Dental Hygienist	7	40	280	15	5.05	Mr. Rai, President of Nepal Hygienist Association

Note: 50% of this estimate of mercury use is already covered in general population and 50% in the phantom head in dental colleges

Additionally, there are about 200 Dental Mercury Amalgam Capsules in Bir Hospital dental department stored safely (Source: Dr. Reema Joshi, Dental Doctor at Bir Hospital). This might give about 0.24 Kg of mercury [200 capsule * 1200 mg Hg/capsule].

About 10 educational institutions also offer Dental Hygienist courses other than BDS, and offer 3-year Certificate in Dental Science (Dental Hygiene) program. The graduates are eligible for registration as Dental Hygienist (Grade-B) in the Health Professional Council of Nepal (HPCN).⁴ So far there are 651 Dental Assistant (3 year) and 554 (2 year) have been formally registered with Nepal Health Professional Council.⁵

Data gaps and priorities for potential follow up

³ <http://www.nmc.org.np/contents/history-information.html>

⁴ <http://kantipurdental.edu.np/cds/>

⁵ https://nhpc.org.np/frontend/web/browse/pages?page_slug=hrh-registered-in-nhpc

The toolkit only considers the dental amalgam use in public, not in the dental education system. So review of the dental curriculum and interview with few students to find out the differences in number of dental fillings needs to be performed by a perspective dental health care professional during her/his graduation. This would help in making realistic estimate of the mercury used in education sector among others.

2.6.3 Thermometers

There is no production of mercury thermometers in Nepal. Large number of mercury thermometer is imported annually. According to a study conducted by Center for Public Health and Environmental Development (CEPHED) in 2010, thermometer breakage rate in the hospitals ranged from 0.48 to 3.44 per bed per year and it is estimated that Nepal has 501.75 Kg of mercury in thermometers (125.15 Kg) and sphygmomanometers (376.6 Kg) used in health care sector. Total annual mercury release from broken thermometers can be 125.85 Kg (CEPHED, 2010).

Use and disposal of products with mercury content with reference to thermometers is estimated to be 488861 in number. DOC data for the base year 2016/17 shows an import of different types of thermometers like 146320 pieces of medical mercury thermometers, 341985 pieces of other glass mercury thermometers (air, laboratory, dairy, including others) and 556 pieces of engine control mercury thermometers. Total mercury release from use and disposal of thermometers is estimated to be about 489 Kg of mercury. Mercury releases from thermometer uses and disposal into air is about 97.8 Kg/y, 146.7 Kg/y in water, 97.8 Kg/y in land and 146.7 Kg/y in general waste.

Data gaps and priorities for potential follow up

There is no separate record keeping for the mercury free and mercury containing thermometer in all types (medical, air, laboratory) of thermometers at the DOC. It has not been possible to separate these types of thermometers. Based on discussion with Customs Office, the medical thermometers have been identified and rests of the thermometers have been grouped into other glass mercury thermometers.

2.6.4 Electrical Switches and Relays with mercury

As per the UNEP Toolkit, use and disposal of products with mercury releases from Electrical Switches and Relays is estimated to be 1712 Kg/y based on total inhabitants of Nepal. Mercury releases from Electrical Switches and Relays uses and disposal is about 513.5 Kg/y into air, 684.8 Kg/y in land, 513.5 Kg/y in general waste.

2.6.5 Light source with mercury

Different types and quantities of light sources with mercury have been imported and sold or distributed. The import data from the DOC for the year 2016/17 for different fluorescent lamps was 3967084 [Discharge lamps, other than ultra-violet lamps, fluorescent- 3,419,061 as tube light with double end, Mercury or sodium vapour lamps; metal halide lamps- 175,003 as CFL single end and

Discharge lamps, other than ultra-violet lamps, mercury or sodium vapor lamps- 373,020 as other Hg containing light sources], which are mentioned as mercury containing ones. As DOC does not have separate import data for different types of light sources, all fluorescent and mercury-based lamps imported have been grouped into three categories and used in the Toolkit for Hg estimation.

As per the UNEP Toolkits, use and disposal of products with mercury content with reference to light sources with mercury, about 87 Kg of mercury has been estimated using the import data (DOC, 2016/17) of Discharge lamps, other than ultra-violet lamps, fluorescent, mercury or sodium vapor lamps, metal halide lamps. Such Discharge lamps were counted to be 373,020 in Nepal and the estimated mercury releases to different environmental compartments are as follows.

Mercury releases from light sources with mercury uses and disposal into air is about 26.2 Kg/y, 26.2 Kg/y in land and 34.9 Kg/y in general waste.

Data gaps and priorities for potential follow up

There is no separate record keeping of different types of mercury containing light sources at DOC and it is not possible to separate them. Also mercury containing and mercury free lighting sources have not been identified.

2.6.6 Batteries with mercury

Batteries of different types and numbers have been imported, sold or distributed and used in Nepal. The data on batteries with mercury have been available only in numbers (pieces), as recorded in the import data sheet of DOC (2016/17). Among different batteries imported into Nepal, only those with confirmed mercury content have been estimated to be 1964821 in number, which include 2663 pieces of Mercury oxide (button cells and other sizes), also called mercury-zinc cells, and 1962158 other button cells (zinc-air, alkaline button cells, silver-oxide).

Data gaps and priorities for potential follow up

There is no separation of batteries with and without mercury in the data available in Department of Customs. Also the size, shape and weight of different batteries vary and there is no standard weight to scientifically convert numbers of batteries into the weight. It has thus become rather difficult to estimate the mercury inputs from batteries at the moment, as Toolkit requires it in tons/y.

2.6.7 Polyurethane (PU, PUR) produced with mercury catalyst

Polyurethane is not produced in Nepal but only imported and used. It could not be confirmed whether polyurethane imported to Nepal can be considered as the source of mercury.

2.6.8 Paints with mercury preservatives

There is a lack of evidence of mercury contamination in paints produced in Nepal. However, DOC shows an import of pigments called Vermilion 6 (which is mercuric sulphide with the formula HgS). This might be used in the production of the paints within the country or other sectors.

Paint is also imported in high quantity from different countries. A total of 4732 tons/y of paints, driers and pigments was imported during 2016/17. However, the level of mercury in them is not known. Thus, it could not be taken as the source to estimate the release of mercury.

Additionally, MOFE/GON has set the effluent standard for the paint industries limiting the mercury level to 0.001 mg/l in the effluents and it is also mandatory for paint industries.

Data gaps and priorities for potential follow up

No data on mercury level in paints is available. As import of mercury-based pigment has been identified, further exploration needs to be made on its use in the country.

2.6.9 Skin lightening creams and soaps with mercury chemicals

There are no detailed studies on the mercury contamination in the skin lightening creams and soaps in Nepal.

2.6.10 Medical Blood Pressure Gauge (Mercury Sphygmomanometer)

There are varieties of instruments available to measure pressure. The mercury sphygmomanometer has been considered a standard instrument for measuring the pressure in medical as well as laboratory and metrological stations, also in Nepal. However, the trend of using mercury sphygmomanometer in medical sector has decreased substantially because of availability of equally reliable aneroid and digital sphygmomanometers.

Instrument for measuring or checking pressure has been imported from different countries. So, based on the import of 15341 pieces of such instruments in 2016/17 for measuring pressure (DOC, 2016/17), a total of 1227 Kg of mercury seems to be released into the environment as per the UNEP toolkit. This mercury release from such instruments is 245.5 Kg/y in air, 368.2 Kg/y in water, 245.5 Kg/y in land and about 368.2 Kg/y in general waste.

Data gaps and priorities for potential follow up

There is inadequate data and even such data do not distinguish between mercury containing or non-mercury ones. Mercury estimate in this sector is based on the total inhabitants.

2.6.11 Other manometer and gauge with Mercury

⁶ <https://colourlex.com/project/vermilion/>

In addition to medical thermometers and sphygmomanometers, there are other mercury based manometers and gauges used in different industries, meteorological stations and chemistry laboratories in universities and colleges.

Manometers and other gauges with mercury for measuring pressure have been imported to Nepal. So, based on the total number of inhabitants of the country, a total of 61 Kg of mercury is estimated to be released into the environment as per the UNEP Toolkit. This gives an annual mercury release into different environments as: air - 12.2 Kg, water - 18.3 Kg; land - 12.2 Kg and general waste -18.3 Kg.

During site visits a number of temperature and pressure measuring equipment were found at Department of Hydrology and Meteorology (DHM) as well as Central Department of Chemistry as follows:

Table 2-16: Quantity of barometer and thermometers in DHM and Central Department of Chemistry, TU

Institutions	Barometer	Ordinary Thermometer	Maximum Thermometer	Data Sources
132- Meteorological Stations, DHM	16	264	132	Ms. Indira Kandel, Instrument Section Head, DHM, Mob: 9841735560 (I. Kandel, personal communication, Date of interview)
5-Head, Field and Regional Office of DHM	4	29	34	Do + some 62 damaged thermometers NOTE: each barometer has 692.8 grams of Hg
Central Department of Chemistry (CDC), TU	1	36		Dr. Khaga Raj Sharma, MIA Working Group Member from TU. (K.R. Sharma, personal communication)
Total	21	229	166	
(CDC), TU	Polarography -1 pieces Calomel electrode – 6 pieces Mercurous nitrate-500gm Mercurous chloride 500 gm CFL and Tubelight- 2 Dozens More chemicals might be in store			do

Data gaps and priorities for potential follow up

The data do not distinguish between with-mercury or without mercury. So, this estimate is also based on total inhabitants which might not be a realistic estimate in the context of Nepal. Additionally, data on barometer available with some public and academic institution needs to be accounted and included.

2.6.12 Laboratory Chemicals

There are large number of laboratories of different kinds, viz, pathological, research (labs in colleges and universities), specialized and environmental, forensic in public and private sector; they are consuming different laboratory chemicals including mercury-based chemicals. Additionally, there are 11 Ayurvedic Medicine factories (source: Mr. Prakash Gayawali, DDA, Chief of Ayurved Division), which use mercury in the process of different preparations.

Nepal imports all laboratory chemicals from different countries. So, based on the total population of the country a total of 122 Kg of mercury is estimated to be released into the environment as per the UNEP Toolkit. This mercury release from the use and disposal of laboratory chemicals in water is 40.3 Kg/y, in general waste 40.3 Kg/y, and in sector specific waste treatment and disposal 41.7 Kg/y.

Data gaps and priorities for potential follow up

The data are neither maintained properly nor differentiated as to the purpose. Further data on mercury use in individual Ayurvedic Medicine manufacturers need to be properly registered and when such data would be available, the estimate of mercury release would be more realistic. Otherwise, the estimation based on the inhabitants will be final as presented in the draft inventory.

2.6.13 Other laboratory and medical equipment with mercury

It is also based on the total inhabitants of the country and a total of 489 Kg of mercury is estimated to be released into the environment as per the UNEP Toolkit. This mercury release from the use and disposal of other laboratory and medical equipment with mercury is assumed to be: in water - 161.4 Kg/y; in general waste - 161.4 Kg/y; and in sector specific waste treatment and disposal -166.3 Kg/y.

Data gaps and priorities for potential follow up

There is a lack of data and also existing data are not kept separately to distinguish between general laboratory and medical equipment with or without mercury.

2.7 Data and inventory on crematoria and cemeteries

2.7.1 Crematoria and Cemeteries

There is no defined data on total number of crematoria and cemeteries in Nepal. Based on 2011 Census (CBS 2012) and growth rate the population distribution with respect to different religions and ethnicities are projected for 2016 (**Annex: Table 21**). Also, crude death rate of 7.2 (CBS, 2016) is taken to estimate the total deaths and deaths per religion. This is done to estimate the deaths that are either cremated or buried (cemeteries). It was found that 186101 are cremated, whereas 18606 were buried (cemeteries). According to Toolkit calculation, Hg release from crematoria and cemeteries is found to be 465 Kg and 47 Kg, respectively.

Data gaps and priorities for potential follow up

There is no systematic record or data on number of crematoria and cemeteries in Nepal. Government of Nepal needs to adopt the system of compulsory record keeping of religion wise mortalities at local level.

2.8 Miscellaneous potential mercury sources not included in the quantitative inventory; with preliminary indication of possible presence in the country

2.8.1 Gold Plating

Gold plating (gold-mercury amalgam) is one of the traditional works in Nepal and has a history of many centuries. This profession is mainly undertaken by the Newar Community including some other communities. According to Federation of Handicraft Association Nepal (FHAN), it is assumed that there are more than 400 families involved in this business. The traditional way of gold plating using mercury generates good income, though it is costlier than the electro gold plating. According to mercury based gold plating entrepreneurs, the quality of the gold plating using Hg is higher than the electro gold plating and has a good demand and high market value. According to the gold plating entrepreneurs, FHAN and DOArch/GON, about 90 % of the gold-plated sculptures are exported and only 10 % is consumed domestically. According to the gold plating entrepreneurs, gold and mercury are mixed at a ratio of 1:15 (on average) while doing gold plating on the brass and copper statues/sculptures.

For this subcategory, the estimation of the mercury input was done based on the information received from gold plating entrepreneurs. The mercury input was calculated for the base year 2016/2017 based on the number and size of sculptures registered with the DOArch. According to DOArch, the sculptures are mainly made in sizes of 8, 12, 18, 24 inches in height and larger and the exported sculptures constitute 15%, 60%, 10 % 10% and 5%, respectively. Similarly, the mercury input for each size was estimated as informed by gold plating entrepreneurs, and is given in **Annex 1: Table 22 and 23**.

According to DOArch, a total of 190212 pieces of sculptures having a total weight of 1255.33 MT of the gold-plated sculpture were exported and this led to an estimation of 12825 Kg of mercury input while preparing the above sculptures. It has also been estimated that about 95% of the used mercury is released into air while blowing the sculptures with hot flame to remove the mercury; also, 3% of Hg may get into water used to wash the sculptures and only 2% might land into the soil in the immediate vicinity of gold plating activities.

2.8.2 Semiconductor

There are 466485 pieces of both photosensitive and non-photosensitive semiconductors imported into Nepal (DOC 2016/17) from China, Denmark, Estonia, Finland, France, Germany, India, Italy, Japan, Korea, Singapore, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, United States, Vietnam,

Netherlands, Poland, etc. There are dilator tubes also imported into Nepal and such tubes may contain mercury.

2.8.3 Educational uses

Educational materials used in the laboratories of educational institutions are also found to contain mercury. Several mercury based equipment such as thermometers (med/lab), sphygmomanometer, barometer, manometer, hygrometer, including others, can be found in medical schools, colleges, and universities. Likewise, chemicals like pure mercury, HgCl_2 , HgS , $\text{Hg}(\text{NO}_3)_2$, Mercury Dental Amalgam are in use in laboratories of academic institutions including dental and medical colleges as well as Higher Secondary Schools. Dental colleges were found to use 28.5 Kg of mercury per year in phantom heads during dental practices.

2.8.4 Religious Use

Mercury is also used in religious rituals (amulets and other uses) such as PARAD SHIVALINGS, which are traditionally and religiously used in Nepal.

2.8.5 Traditional Medicine

Mercury is used in traditional medicines (ayurvedic and others) and homeopathic medicine. Mercury based Ayurvedic medicines are produced, imported and used in Nepal. In the year 2073/74 BS (2016/17), total mercury based medicine produced was estimated to be about 243.65 Kg. Additionally, there are 30.11 Kg of elemental mercury and 110 Kg of Kajali (Mercurous sulfide) available with Singhadurbar Vaidhyakhana only (Source: Dr. Binod Sah, Singhadurbar Vaidhyakhana). Additionally, there are other 10 Nepalese Ayurvedic medicine companies producing mercury-based Ras and Bhasma medicines as mentioned in **Annex 1: Table 24**.

A total of 3515 metric tons of Homeopathic medicaments, including pure ayurvedic and yunani, was imported largely from India, Switzerland, Pakistan, Thailand, including others during the base year 2016/17 (DOC) and some of them might be mercury based preparations.

2.8.6 Army Installation

According to Ministry of Defence, about 14 Kg of Mercury and Mercury compounds was found stored in army installation in 2018.

2.8.7 Vacuum Pumps and Photographic paper

According to Department of Customs, 146749 pieces of vacuum pumps and 98459 Kg of photographic papers were imported in 2016/2017 from various countries; however DOC informed that it could not be assured whether such vacuum pumps and photographic papers contain any mercury.

2.9 Stocks of mercury and/or mercury compounds, and storage conditions

There was no large stock of mercury and mercury compounds in Nepal, however small quantities were detected during the field survey while preparing the inventory.

- Stockpiles at Singhadurbar Vaidhyakhana – there are 30.11 Kg of elemental mercury and 110 Kg of Kajali (Mercurous Sulphide) available with Singhadurbar Vaidyakhana only;
- Army- Ministry of Defence, about 14 Kg of Mercury and Mercury compounds was found stored in army installation in 2018.
- Bir Hospital Dental Department has 200 Dental Mercury Amalgam Capsules stored safely. This might give about 0.24 Kg of mercury [200 capsule *1200 mg Hg/capsule].

2.10 Supply and trade of mercury and mercury containing compounds, including sources, recycling activities and quantities

Nepal does not have its own mercury mine and whatever is consumed is all imported. DOC has a record of an import of 215 Kg of elemental mercury imported from India for the year 2016/17. However, the amount used in gold plating is huge and does not fall in the DOC record. Mercury trade thus seems not as transparent as it should be. The amount of mercury and mercury compounds used in the academia is quite insignificant at the country level. Nepal. Also, there is no recycling of mercury in Nepal, however, an appropriate technology to recapture Hg emitted and released during gold plating activities would be highly desirable, in terms of environment, human health and economy.

2.11 Contaminated sites

The MIA process has not identified the sites contaminated by mercury or mercury compounds within the country. The assessment was mainly based on quantity of wastes and wastewater generated and disposed/released into the local environment. However, during MIA process, potential contaminated sites could be identified such as waste disposal sites in different municipalities, water bodies contaminated by wastewater discharged from households and industries and the immediate vicinity of the gold plating activities, especially residential area of north-eastern side of Lalitpur district.

There is no hazardous waste management system in Nepal. Generally, municipal wastes and hazardous waste generated from household, industries and different institutions are mixed up and finally disposed of in disposal sites. Except 5-6 municipalities, which have sanitary landfill sites, though not properly functioning, wastes generated in rest of municipalities are either openly dumped or controlled dumped. Similarly, except in the Kathmandu Valley, there are no wastewater treatment facilities, and also most of industries discharge their wastewater directly into domestic sewerage pipe or into the nearby water bodies without any treatment. During the MIA process, very high amount of

mercury was found used traditional gold plating practitioners within the residential area, indicating mercury as greatest hazard and high risk to the exposed population, as the mercury is blown with high heat without taking proper precautions without any air pollution control device and released into the environment.

The Government of Nepal has prepared (draft) Hazardous Wastes Management Regulation, Hazardous Waste Management Policy and Pesticides Act, which have the provisions of controlling the contamination by hazardous wastes. However, strategies specific to identification and assessment of mercury contaminated sites need to be developed.

2.12 Impacts of mercury in human health and the environment

There are limited studies with reference to human health and environmental impacts of the mercury in Nepal. Though small, such studies could reveal the fact that some sectors have very high level of mercury contamination, such as the fisher communities, hoteliers and gold plating workers in Nepal. Some of them are listed as follows.

- a. National Drugs Poisoning Information Centre (NDPIC) recorded **185** mercury poisoning cases in ten years from 1997 to 2007 (Lohani, SP, Nepal S., DNPIC).⁷
- b. A biomonitoring of mercury in 19 fish samples (15 from Phewa Lake, Pokhara and 4 from Kalimati Vegetable Market, Kathmandu) shows a range of contamination between 0.003 to 0.242 ppm.⁸
- c. A biomonitoring of mercury in fisher communities found all (100 %) the samples contaminated with mercury ranging from 345 to 1715 µg/Kg, in which 53% (8 of 15) had higher than reference doses of 1000 µg/Kg.⁹
- d. A biomonitoring of mercury among 50+ Dental Doctors and Nurses revealed 100% contaminated with mercury in this professional sector, ranging from 205 to 447 µg/Kg.¹⁰
- e. A biomonitoring of mercury among the fish consuming females (N=20) of child bearing age in Nepal showed a range of mercury contamination between 0.11 to 1 ppm.¹¹
- f. A biomonitoring of mercury in fisher communities from Begnas Lake, Kaski found a range of 0.18 to 1.18 ppm, with 9% (3 of 33) of the people having higher mercury than reference dose of 1 ppm.¹²
- g. A biomonitoring of mercury in women working in gold plating on metal sculptures in Lalitpur of the Kathmandu Valley found a range of 0.35 to 28.46 ppm with 75% (15 of 20) having higher than reference dose of 1 ppm.¹³

⁷<http://www.cephed.org.np/pdf/11420209854.pdf>

⁸NAST 2017, Proceeding of the Seminar on Waste Water. Bio Mornitoring of Mercury in Fress Water Fish and Depending Fisher Folk Community in Nepal

⁹http://nhrc.gov.np/wp-content/uploads/2017/02/Abstract_Book_2015.pdf

¹⁰http://nhrc.gov.np/wp-content/uploads/2017/02/Abstract_Book_2015.pdf

¹¹ZMWG/EEB 2013, Assessing hair mercury levels of women of child bearing age in 9 countries: A Civil Society Pilot Project Report, p 13. https://www.nuevatribuna.es/media/nuevatribuna/files/2013/10/02/global-hair-test_sept27final.pdf

¹²http://www.briloon.org/uploads/BRI_Documents/Mercury_Center/Publications/Mercury%20in%20Women%20of%20Child-Bearing%20Age%20in%2025%20Countries.pdf

¹³http://www.briloon.org/uploads/BRI_Documents/Mercury_Center/Publications/Mercury%20in%20Women%20of%20Child-Bearing%20Age%20in%2025%20Countries.pdf

- h. A study to quantify biomagnifications of mercury along the food chain by examining metal concentration in water and in the gill and liver of fish species showed the mean and maximum values of total mercury (Hg mg/ Kg w.w.) as 0.071 and 0.32 for *C. gariepinus*, 0.031 and 0.081 for *O. niloticus*, 0.116 and 0.21 for *T. putitora* and 0.079 and 0.22 for *M. armatus*. The relationship between Total Hg and total length and total weight were positive and significant in *C. gariepinus* and *M. armatus*.¹⁴
- i. The risk of mercury exposure through consumption of fish from Lake Phewa, Nepal was investigated. A total of 170 people were surveyed to know their fish consumption levels. The weekly mercury (Hg) intake in the form of methylmercury (MethHg) through fish was calculated by using the data on average MethHg concentrations in fish, the average consumption of fish per week, and the average body weight of the people. Hotel owners were consuming significantly high amounts of fish, followed by fishermen, in comparison to the government staff, army/police, locals and others (visitors). Some individuals exceeded the Provisional Tolerable Weekly Intake (PTWI) of 1.6 µg per Kg body weight of MethHg (FAO/WHO). The minimum intake of MethHg (0.05 µg/kg/week) was found in the visitors (others) category, whereas the hotel owners had the maximum intake (3.71 µg/Kg/week).¹⁵
- j. Economic implications of mercury exposure in the context of the global mercury treaty were studied using hair mercury levels and estimated lost economic productivity in selected developing countries. A total of 236 (including Nepal) participants provided hair samples for analysis, with an estimated population (11,302,582) at risk of mercury exposure in 15 sites. Average mercury levels were in the range of 0.48 ppm to 4.60 ppm, and 61% of the participants had hair mercury concentrations greater than 1 ppm, the level that approximately corresponds to the USA EPA reference dose. An additional 1310 cases of intellectual disability attributable to mercury exposure were identified annually (4110 assuming no reference level), resulting in 16,501 lost DALYs (51,809 assuming no reference level). A total of US \$77.4 million loss in economic productivity was estimated assuming a 1 ppm reference level and US \$130 million when no reference level was used. The study concluded that significant mercury exposures occurred in developing and transition country communities. The study suggested that a large economic burden could be avoided by timely implementation of measures to prevent mercury exposures. This study has estimated a loss of US\$37,600 – US \$572,000 to Nepalese community from mercury exposure.¹⁶

¹⁴<https://brage.bibsys.no/xmlui/bitstream/handle/11250/186784/Master-SureshBasnet.pdf?sequence=1>

¹⁵<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4113843/pdf/ijerph-11-06771.pdf>

¹⁶<https://www.ncbi.nlm.nih.gov/pubmed/27594689>

Chapter III

3. Policy, Regulatory and Institutional Framework Assessment

3.1 Policy and Regulatory Assessment

As ratification (or acceptance, approval or accession) by a country of the Minamata Convention on Mercury legally binds the country to the Convention's obligations, the ratification process involves carrying out a national situation analysis, identifying existing relevant domestic legislation and identifying legal or administrative actions that may be needed.

To facilitate this policy and regulatory assessment, **Tables 3-1 to 3-13** below are used as a starting point, in combination with the development of the mercury inventory. The tables are organized according to the provisions of the Minamata Convention. The tables present a summary assessment of existing national policies and regulatory measures (in place and under development), their scope and to what extent they already meet the requirements as stipulated in the provisions of the Minamata Convention. In addition, these tables also provide an analysis of existing gaps that would need to be addressed to ensure compliance with the Convention.

Table 3-1: Article 3

Article 3: Mercury supply sources and trade	
Description of Article:	<ul style="list-style-type: none"> • Not allow new primary mercury mining • Phase out existing primary mercury mining within 15 years • Prevent the import and use of mercury from primary mercury mining for artisanal and small-scale gold mining (ASGM) 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. • Obtain information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/y • 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. • 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)
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
(Annual) Financial Act	<ul style="list-style-type: none"> • Custom tax shall be applicable to items imported to Nepal from a foreign country or items exported from Nepal to foreign countries.

	<ul style="list-style-type: none"> • Inland Revenue will be imposed on items produced or prepared from Nepali industries, imported and exported items and services, and such revenue shall be decided by the concerned custom office. • When such revenue, in addition to production and import revenue shall be applicable to sale and distribution level, importers and retailers shall be accountable to take decisions on such revenues. • Any revenue paid while importing the raw materials, can be deducted from the revenue while exporting the items prepared from such raw materials.
Mines and Mineral Act 2042 (1985) and Rules 2056 (1999)	<ul style="list-style-type: none"> • Government of Nepal shall have the exclusive power (authority) to carry out mining operations, and the Department of Mines and Minerals may undertake mining operations by itself or it may cause to undertake by any person having issued a license, subject to this Act. • But, there is no mercury mining in Nepal
Customs Act and Regulations, 2064 (2007)	<ul style="list-style-type: none"> • Customs duty shall be chargeable on all goods to be exported or imported except those goods which enjoy customs duty exemption pursuant to this Act or the prevailing law. • Any person who exports or imports any goods shall fill up the declaration form, accompanied by the documents as prescribed, and submit it to the Customs Officer of the concerned area. • The exporter or importer may export or import goods only after the declaration form or a receipt of payment of the duty has been received, and after the Customs Officer has given permission to clear the goods. • The customs value of goods to be imported shall be determined on the basis of the transaction value of such goods. • The importer shall declare the transaction value, attaching therewith the description and documents proving the value of goods imported. • The invoice value declared by an exporter shall be the customs value of the goods to be exported
Export and Import (control) Act 2013 (1957)	<ul style="list-style-type: none"> • If the Government of Nepal considers that it is necessary to prohibit or control exportation or importation of any goods for the attainment of any of the stated objectives, it may, by a notified order, prohibit, or apply full or quantitative restriction on, the exportation or importation of such goods, with or without specifying any specific condition or period, e.g to protect the life or health of human, animal or plant life or health from adverse effect & to implement the Charter of the United Nations and any multilateral international convention or bilateral agreement to which Nepal is a party and fulfill the obligations arising there from.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
Though there are no clauses or rules specific to mercury, the prevailing legal provision can address the compliance with the convention's provision. However Government needs to address this while formulating new laws.	

Table 3-2: Article 4

Article 4: Mercury Added Products	
Description of Article:	<ul style="list-style-type: none"> • Not allow the manufacture, import, and export of products listed in Part I of Annex A not otherwise excluded following the phase out date listed in the Annex • Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A • Take measures to prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products • Discourage the manufacture and distribution of new mercury product types
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Environment Protection Act (EPA) 2053 (1997) & Environment Protection Rules (EPR) 2054 (1997)	<ul style="list-style-type: none"> • Nobody shall create any pollution that causes significant adverse impacts to environment and human health • Formation of Chimney height and emission standard of Incinerator based on EPR R-15
(Annual) Financial Act	<ul style="list-style-type: none"> • Government of Nepal through the annual Financial Act decides the articles that can be banned for impor.
Circular of Ministry of Health and Population (MOHP)	<ul style="list-style-type: none"> • MOHP circulated its decision (decision of 4 March 2013, effective from 16 July 2013) to limit the import, purchase and uses of all types of mercury based equipment in health institutions of Nepal
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Inclusion of banning of dental amalgam into the MOHP decision. • Need to change and improve the course curricula of medical, dental, general sciences and schools (BDS, MBBS, MDS, MD, and General Sciences) by incorporating the risk of mercury and avoiding the use of in theoretical, practical and examination practices. • Government needs to promote the mercury free alternatives through enabling environment e.g. health insurance policy for mercury free treatment only. • Effective implementation of the MOHP Decision of banning import, purchase and uses by making it mandatory through gazette notification. • Effective implementation of Incinerator standards and periodic stack emission monitoring. 	

Table 3-3: Article 8

Article 8: Emission	
Description of Article:	<ul style="list-style-type: none"> • Take measures to control emissions and prepare a national plan setting out the measures to be taken to control emissions and its expected targets, goals and outcomes • Submit plan to the Conference of the Parties within 4 years of the date of entry into force of the Convention for that Party • For new sources, require the use of best available techniques and best environmental practices to control and, where feasible, reduce emissions, as soon as practicable but no

	<p>later than 5 years after the date of entry into force of the Convention for that Party.</p> <ul style="list-style-type: none"> • For its existing sources, include in any national plan, and shall implement, one or more of the following measures, taking into account its national circumstances, and the economic and technical feasibility and affordability of the measures, as soon as practicable but not more than 10 years after the date of entry into force of the convention for it. • Apply the same measures to all relevant existing sources or may adopt different measures in respect of different source categories.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Solid Waste Management Act (SWMA) 2068 (2011) and SWM Rules (SWMR) 2070 (2013)	<ul style="list-style-type: none"> • The Local body shall have the responsibility to manage by endeavoring to minimize, as much as possible and without creating any pollution, the environmental impacts likely to be caused by the solid waste management within its area. • The Local level shall monitor or cause to monitor regularly the solid waste management and discharges.
EPA 2053 (1997) & EPR 2054 (1997)	<ul style="list-style-type: none"> • Nobody shall create any pollution that causes significant adverse impacts to environment and human health. • Standards for the Chimney height and emission standards for the incinerators based on EPR A-15. • Ministry of Forests and Environment will have authority to provide pollution control certificate to industries listed in Schedule 7. • Section (7)-1 of the EPA and EPR Rule 15 refer to "prevention and control of pollution" which states "Nobody shall create pollution or allow pollution to be caused in such a manner which is likely to have significant adverse impact on the environment or likely to be hazardous to human life and health, or shall not emit sound, heat, radioactive rays, wastes from any mechanical devices, identical enterprises or any other places contrary to the prescribed standard." • Section (7)-2 of the EPA: If it appears that anyone has carried out any act contrary to Sub-section (1) and caused significant adverse impacts on the environment, the concerned agency may prescribe necessary terms in regard thereto or may prohibit the carrying out of such an act. • Additionally, section (8) with the statement "In order to effectively carry out or cause to be carried out the acts of the mitigation, avoidance or control of pollution or the acts required to be carried out in accordance with the Initial Environmental Examination or the Environmental Impact Assessment report, the Ministry may, by fulfilling the procedures prescribed by the Public Service Commission, appoint Environmental Inspectors or designate any employee to carry out functions of such Inspectors", has made the Provision of environmental inspectors. <ul style="list-style-type: none"> ▪ All industries as referred to in schedule 7 shall apply for the provisional and permanent pollution control certificates.
Local Government Operation Act (LGOA) 2074 (2017)	<ul style="list-style-type: none"> • Pollution control as well as regulation and management of hazardous materials at local level. • Adopt low carbonization and environmental friendly development at local level.
Industrial Enterprises Act (IEA) 2073 (2016)	<ul style="list-style-type: none"> • Industries themselves shall be responsible to mitigate current or possible environmental impacts likely to occur during their operations (A-6).
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	

- Stop or prohibit open burning of any kind of waste generated at source.
- Installation of waste incineration plant with given national standard to reduce emission of mercury and mercury compounds to the air.
- The (draft) hazardous waste management regulations address the mercury as hazardous waste among other wastes.
- Develop a detail mercury emission inventory for the cement clinker production industries.
- Establish the stack emission limits of the mercury concentration for the cement clinker production industries.
- Establish the quality of pet coke (lowest concentration of mercury).
- Develop the best available technology for the mercury emission control, focusing on gold plating activity.
- Establish mercury emission reporting system for the cement production industry.
- Introduce best available technology/best environment practices to control the mercury emission and releases.

Table 3-4: Article 9

Article 9: Release	
Description of Article:	<ul style="list-style-type: none"> • Control release of mercury and mercury compounds to land and water from relevant point sources not addressed in other provisions of this Convention. • No later than 3 years after the date of entry into force of the Convention for it and on a regular basis thereafter, identify the relevant point source categories. • Take measures to control releases and prepare a national plan setting out the measures to be taken to control releases and its expected targets, goals and outcomes. Any plan shall be submitted to the Conference of the Parties within 4 years of the date of entry into force of the Convention. • The use of best available techniques and best environmental practices to control releases from relevant sources no later than 5 years after the date of entry into force of the Convention for it, conduct an inventory of releases from relevant sources.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
EPA 2053 (1997) and EPR 2054 (1997)	<ul style="list-style-type: none"> • Section (7)-1 of the EPA and Rule 15 of EPR refer to "prevention and control of pollution" and state "Nobody shall create pollution or allow pollution to be caused in such a manner which is likely to have significant adverse impact on the environment or likely to be hazardous to human life and health, or shall not emit sound, heat, radioactive rays, wastes from any mechanical devices, Identical enterprises or any other places contrary to the prescribed standard." • Nobody is allowed to create any pollution that causes significant adverse impact to environment and human health. • Ministry of Forests and Environment will have the authority to provide pollution control certificates to industries listed in Schedule 7. • Formation of various industrial effluent standards based on A-15. • Formation of Landfill site leachate discharge standard based on A-15. • Prescribe effluent standard limits EPR -15.
SWMA 2068 (2011) and SWMR 2070 (2013)	<ul style="list-style-type: none"> • The Local Body shall have the responsibility to manage by endeavoring to minimize, as much as possible and without creating any pollution, the environmental impacts likely to be caused by the solid waste management within its area. • The Local Body shall monitor or cause to monitor regularly the solid waste management and discharges.
LGOA 2074 (2017)	<ul style="list-style-type: none"> • Pollution control and regulation and management of hazardous materials at local level. • Adoption of Low carbonization and environmental friendly development at local level.

IEA 2073 (2016)	<ul style="list-style-type: none"> Industries themselves shall be responsible to mitigate current or possible environmental impacts likely occur during their operation (A-6).
Water Resource Act 2049 (1992) & Rules 2050 (1993)	<ul style="list-style-type: none"> No one shall pollute water resource by way of using or putting any litter, industrial wastes, poison, chemical or toxicant to the effect that the pollution tolerance limit of the water resource will be changed.
Drinking Water Regulation 2055 (1998)	<ul style="list-style-type: none"> Prohibits the drinking water supplier from doing any work or constructing any structure which will pollute the source of the water resource or have a substantial adverse impact on the environment.
National Urban Water Supply and Sanitation Sector Policy 2009	<ul style="list-style-type: none"> Government will review, develop, update and implement effluent standards for the treatment and disposal of raw sewage, hazardous chemicals, and industrial and hospital wastes prior to their discharge into local water bodies. Institutions and individuals found in violation of above shall be liable to pay for the pollutions caused in accordance with the provisions stipulated in environmental regulations.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> Strict enforcement of Effluent standards made for various industries. Distribution of pollution control certificates to industries and compliance monitoring regularly. Waste water treatment or management rule and policy is essential to address waste water generated from industrial and domestic sectors. The (draft) hazardous waste management regulations address the mercury as hazardous waste among the other wastes. Draft of new Pesticide Act has made provisions of banning the mercury containing pesticides and fungicides, listed under Prior Informed Consent (PIC) procedure of Rotterdam Convention. Identify and list in detail, possible significant mercury release sources. Develop the discharge standards for mercury from possible point sources. Introduce best available technology/best environment practices to control the mercury emission and releases. 	

Table 3-5: Article 10

Article 10: Interim Storage; on environmentally sound interim storage of mercury other than waste mercury	
Description of Article:	Take measures to ensure that the interim storage of such mercury and mercury compounds intended for a use allowed to a Party under this Convention is undertaken in an environmentally sound manner.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
<i>No such storage of mercury in Nepal and thus there are no legislation and policy formulated to address this.</i>	
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<i>No such storage of mercury in Nepal</i>	

Table 3-6: Article 11

Article 11: Mercury Waste	
Description of Article:	<ul style="list-style-type: none"> Mercury wastes means substances or objects: (a) Consisting of mercury or mercury compounds; (b) Containing mercury or mercury compounds; or (c) Contaminated with mercury or mercury compounds in a quantity above the relevant thresholds defined by the Conference of the Parties, in collaboration with the relevant bodies of the Basel Convention in a harmonized manner, that are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law or this Convention. Mercury waste is managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention. Only recovered, recycled, reclaimed or directly re-used for a use allowed to a Party under this Convention or for environmentally sound disposal For Parties to the Basel Convention, not transported across international boundaries except for the purpose of environmentally sound disposal in conformity with this Article and with that Convention. Parties are encouraged to cooperate with each other and with relevant intergovernmental organizations and other entities, as appropriate, to develop and maintain global, regional and national capacity for the management of mercury wastes in an environmentally sound manner.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
EPA 2053 (1997) and EPR 2054 (1997)	<ul style="list-style-type: none"> Nobody shall create pollution in such a manner as to cause significant adverse impacts on the environment or likely to be hazardous to public life and people's health, or dispose or cause to be disposed sound, heat radioactive rays and wastes from any mechanical devices, industrial enterprises, or other places contrary to the prescribed standards. If such appears, concerned agency can prohibit carrying out such act. If it appears that the use of any types of substance, fuel, tools or device has caused or is likely to cause significant adverse impacts on the environment, the Ministry may, by a notification in the Nepal Gazette, forbid the use of such substance, fuel, tools or device. Mandatory to conduct EIA for projects listed in Schedule 2 of EPR for hazardous waste management. Ministry of Forests and Environment will have authority to provide pollution control certificate to industries listed in Schedule 7. Formation of leachate discharge standard generated from sanitary landfill site based on A-15.
SWMA 2068 (2011) and SWMR 2070 (2013)	<ul style="list-style-type: none"> The responsibility for processing and management of hazardous waste, medical waste, chemical waste or industrial waste under the prescribed standards shall rest with the person or institution that has generated the solid waste. Local body may manage the solid waste generated by any industry or medical institution after processing of hazardous waste, medical waste, chemical waste and industrial waste or for using a Sanitary Landfill Site constructed by the Local Body. The Local Body shall have the responsibility to manage by endeavoring to minimize, as much as possible and without creating any pollution, the environmental impacts likely to be caused by the solid waste management within its area. Institutions that imports chemical pesticides or healthcare institutes that

	<p>generate health care wastes have to manage their waste by themselves in line with the prescribed standards.</p> <ul style="list-style-type: none"> The Local Body shall monitor or arrange to monitor regularly the solid waste management and discharges.
LGOA 2074 (2017)	<ul style="list-style-type: none"> Pollution control, regulation and management of hazardous materials at local level. Adopting Low carbonization and Environmental friendly development at local level.
IEA 2073 (2016)	<ul style="list-style-type: none"> Industries themselves will be responsible to mitigate current or possible environmental impacts likely occur during their operation (A-6).
Hazardous Waste Management Policy (HWMP) 2010 (draft)	<ul style="list-style-type: none"> Require registration of all persons or institutions dealing with hazardous waste and need to make obligatory and responsible for environmentally sound management of such wastes. Promote 3R principle to minimize hazardous waste at the source. Conduct study and prepare plan for development and establishment of environmentally sound management, transfer station and disposal sites for hazardous waste management.
Hazardous Waste Management Regulation (HWMR) (draft)	<ul style="list-style-type: none"> Prohibit import of hazardous waste that causes adverse impacts on human health and environment. Any industry generating hazardous waste by using hazardous materials will be responsible for managing such wastes on its own cost otherwise such industry will be penalized based on prevailing laws and conditions. Producers, importers or operators have to manage hazardous wastes on their own costs without causing any adverse impacts to human health and environment. MOFE will be responsible for identifying possible disposal sites within the country for hazardous waste management. Department of Environment will be responsible for regular monitoring or take action against those violating the prevailing regulation.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> Hazardous waste management policy and regulations are in the process of approval. Detail inventory or study on hazardous waste management and its regular update is needed. Adopt environmentally sound management of hazardous wastes through waste segregation, collection, storage, transportation, treatment and safe disposal. 	

Table 3-7: Article 12

Article 12: Contaminated Sites	
Description of Article:	<ul style="list-style-type: none"> Final approval of hazardous waste management policy and regulation in Nepal and its enforcement. Detail inventory or study on hazardous waste management in Nepal and its regular update. Adopt environmentally sound management of hazardous waste through waste segregation, collection, storage, transportation, treatment and safe disposal.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
SWMA 2068 (2011) and SWMR 2070 (2013)	<ul style="list-style-type: none"> The arrangement for final disposal should only be made after processing of harmful, chemical, organic or inorganic wastes into a general waste. The Local Governments may select the Sanitary Landfill Site under the prevailing laws for management and permanent disposal of solid wastes collected within its

	<p>area.</p> <ul style="list-style-type: none"> • The Local Governments shall carry out the operation and post closure management of the Sanitary Landfill Site in accordance with the prescribed environmental standards. • The Local Governments shall prepare the master plan for economic, social and physical development and environmental protections of the area affected by a Sanitary Landfill Site and also prepare and implement various programs for the execution of that plan. • Apply the measures for the mitigation of negative impacts on the environment of the area by leachate, gas, obnoxious odor, etc. coming out of the site after the closure of the discharging in the Sanitary Landfill site.
EPA 2053 (1997) and EPR 2054 (1997)	<ul style="list-style-type: none"> • Nobody shall create pollution in such a manner as to cause significant adverse impacts on the environment or likely to be hazardous to public life and people's health, or dispose or cause to be disposed sound, heat radioactive rays and wastes from any mechanical devices, industrial enterprises, or other places contrary to the prescribed standards. If such appears, concerned agency can prohibit carrying out such act. • Ministry of Forests and Environment will have the authority to provide pollution control certificates to industries listed in Schedule 7. • Formation of standard for leachate discharged from or generated by sanitary landfill site based on A-15. • In case, in consequence of creation or disposal of pollution, sound, heat or wastes by anybody contrary to this Act or Rules or guidelines framed hereunder, any person or organization happens to suffer any loss or damage, the person or organization affected from such actions may, if he/she desires to have compensation recovered from the person or institution or proponent doing such act, make an application to the prescribed authority setting out the details thereof.
LGOA 2074 (2017)	<ul style="list-style-type: none"> • Pollution control, regulation and management of hazardous materials at local level. • Adopt Low carbonization and environmentally friendly development practices at local level.
IEA 2073 (2016)	<ul style="list-style-type: none"> • Industries themselves will be responsible to mitigate current or possible environmental impacts likely to occur during their operations.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Identify all sites contaminated by the emission or release of mercury waste and its compounds in the environment within the country. • Study on potential environmental damage or impacts caused by contaminated sites and adopt proper mitigation measures. • Adopt environmentally sound technology to rehabilitate contaminated sites. • Penalize a person or institution based on prescribed laws and regulations for contaminating local environment by emitting or releasing mercury waste and its compound. • Develop standards related on waste water and gas emission for contaminated sites. 	

Table 3-8: Article 13

Article 13: Financial resources and mechanism	
Description of Article:	<ul style="list-style-type: none"> • Access domestic resources as may be needed to implement Convention obligations; • Access financial resources available under the Convention financial mechanism and other resources available from multilateral, regional, and bilateral funding sources.

Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Foreign Aid Policy 2071 (2014)	<ul style="list-style-type: none"> • The government recognizes that globally agreed principles, conventions, policies and frameworks increasingly guide development assistance from external sources. There is a large area of consensus and agreement on the development policies to be pursued, at national and international levels. Nepal has been a party to most of the international agreements, arrangements, and consensuses so far agreed upon. • In developing Nepal's development policies, and in utilizing foreign assistance, Nepal aims at achieving these internationally agreed measures and targets. • The foreign aid policy forms an integral part of the overall policy of mobilizing resources for development. The objective of this policy, including others, is to facilitate the transition to a more equal partnership between Nepal and donor institutions. This objective is aimed at transferring the spirit of development partnership emerging at the global level to the country level dialogue and operations.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Training and capacity building for responsible human resources in concerned agencies and stakeholders. • Adopt the policy of prioritizing the activities related to the protection of human health and protection of environment. 	

Table 3-9: Article 14

Article 14: Capacity-building, technical assistance and technology transfer	
Description of Article:	<ul style="list-style-type: none"> • Capacity-building and technical assistance may be delivered through regional, sub-regional and national arrangements, including existing regional and sub-regional centers, through other multilateral and bilateral means, and through partnerships, including partnerships with the private sector. • Developed country Parties and other Parties within their capabilities shall promote and facilitate, development, transfer and diffusion of, and access to, up-to-date environmentally sound alternative technologies to developing country Parties, in particular the least developed countries and small island developing States to strengthen their capacity effectively. • Shall make recommendations on how capacity-building, technical assistance and technology transfer could be further enhanced under this Article.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
SWMA 2011 and SWMR 2013	<ul style="list-style-type: none"> • Solid Waste Management Technical Support Center (SWMTSC) shall provide capacity building and technical assistance and innovative technology transfer related to SWM to the local body. • SWMTSC shall establish research center to develop skilled human resources and to enhance capacity of SWM.
EPA 1997 and EPR 1997	<ul style="list-style-type: none"> • MOFE can provide temporary or permanent pollution control certificates to industries.
Industrial Enterprises Act 2073 (2016)	<ul style="list-style-type: none"> • Industries themselves will be responsible to mitigate current or possible environmental impacts likely to occur during their operation.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
Development of policy on capacity building, technical assistance and technology transfer on hazardous waste	

management.

Table 3-10: Article 16

Article 16: Health Aspect	
Description of Article:	<ul style="list-style-type: none"> Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines. Promote occupational exposure educational and prevention programs. Promote prevention, treatment, and care services for affected populations.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Public Health Services Act 2075 (2018)	<ul style="list-style-type: none"> This act is formulated to implement the right of citizens to free basic and emergency health services as guaranteed by the Constitution Nepal and to regularize effective and easily accessible quality health services. Concerned employer must provide essential protective gears to protect the health of the employees working in risk zones and also provide health insurance to such employees.
National Health Policy, 2071 (2014)	<ul style="list-style-type: none"> National Health Policy (NHP) in Nepal was formulated in 2071(2014) with an objectives of a) providing free basic health services as a fundamental right of the citizen. b) Establishing effective health care system with required medicine, equipment's, technology and trained health care providers ensuring quality health care services to the citizens of the nation.
National Urban Policy, 2064 (2007)	<ul style="list-style-type: none"> promote healthy, livable, safe and economically vibrant urban environment through planned provision of infrastructure services, facilities and amenities, environment conservation
EPA 2053 (1997) and EPR 2054 (1997)	<ul style="list-style-type: none"> Provision of Initial Environment Examination (IEE), Environmental Impact Assessment (EIA), Pollution Certificate. Industries with potential mercury and mercury compounds uses like Cement, Paints, electro plating and galvanizing, foam, dry or wet cell (battery), textile painting dyeing, bricks, tiles, pharmaceuticals, matches, soap (including detergent and cleaning shampoo), bitumen and bitumen emulsion, ferrous and nonferrous, extremely hazardous Substance such as isocyanine, mercury compound etc. requires to obtain Pollution Control Certificates.
Circular of MOHP dated March 2013	<ul style="list-style-type: none"> Ban on Import, Purchase and Uses of Mercury based equipment in Nepal 2013.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> Banning of all mercury based equipment and dental amalgam in health sectors and strictly implement it. Proactive collection, dissemination of information on mercury and mercury compounds and associated health and environmental effects. Regular monitoring of mercury and mercury compounds in environmental and biological samples and publicly disseminate the information. Inclusion of mercury free theory, practical and examination system into the technical and medical education system of Nepal. 	

Table 3-11: Article 17

Article 17: Information Exchange	
Description of	Parties shall facilitate the exchange of :

Article:	<ul style="list-style-type: none"> • scientific, technical, economic and legal information concerning mercury and mercury compounds, including toxicological, ecotoxicological and safety information; • information on the reduction or elimination of the production, use, trade, emissions and releases of mercury and mercury compounds; • Information on technically and economically viable alternatives to mercury-added products, manufacturing processes and activities and processes that emit or release mercury or mercury compounds; • including information on the health and environmental risks and economic and social costs and benefits of such alternatives; and • Epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds, in close cooperation with the World Health Organization and other relevant organizations, as appropriate. • Shall have a designated national focal point for the exchange of information. • Collect and disseminate information on annual quantities of mercury and mercury compounds emitted, released, or disposed; and other information specified in Article 18. • Share information on the health and safety of humans and the environment as non-confidential, in accordance with Article 17.5. • Report to the COP on progress in implementing Convention obligations under Article 21.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Right to Information Act 2064 (2007) and Regulations 2065 (2009)	<ul style="list-style-type: none"> • Section 3(1) every citizen shall have the right to information subject to this Act. • Section 3(2) every citizen shall have access to the information held in the public bodies. • Section 5 update 20 years old information, publishing it and proactively update and disseminate every three month. • Section 6(1) arrange for an Information Officer for the purpose of disseminating information related to its office. • Section 6(3) set up an Information Section for the purpose of disseminating information as per necessity.
Right to Information Rule 2065 (2009)	<ul style="list-style-type: none"> • Rule 3 Public Body should publish following information by listing thereof: <ul style="list-style-type: none"> (a) Details of program or project conducted by the Public Body in the previous fiscal year, if any, (b) Details of website of the Public Body, if any, (c) Details of information of the Public Body published elsewhere or to be published, if any.
SWMA 2068 (2011) and SWMR 2070 (2013)	SWMTSC can draw attention of concerned agencies for proper management of hazardous, medical, chemical and industrial waste.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Policy on exchange of information and sharing of knowledge among concerned agencies within the country. • Strict enforcement of Constitutional and other legislative provisions on right to information and Occupational Safety and health. 	

Table 3-12: Article 18

Article 18: Public Information, Awareness and Education	
Description of Article:	<ul style="list-style-type: none"> • Provision to make public information available on: The health and environmental effects of mercury and mercury compounds; alternatives to mercury and mercury compounds, the results of its research, development and monitoring activities and activities to meet its obligations under this Convention. • Education, training and public awareness related to the effects of exposure to mercury and mercury compounds on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate. • Each Party shall use existing mechanisms for the collection and dissemination of information on estimates of its annual quantities of mercury and mercury compounds that are emitted, released or disposed of through human activities.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
EPA 2053 (1997) and EPR 2054 (1997)	<ul style="list-style-type: none"> • The ministry shall monitor and evaluate possible environmental impacts during implementation of project development activities approved under EIA/IEE. • The ministry may appoint Environmental Inspectors to inspect or monitor acts of mitigations, avoidance or control of pollution as given by prescribed standards under the Act. • Any person, institute, village or municipality can lodge complain in the ministry against any person, institute or industry who pollutes environment or generates waste against prescribed law and standards.
SWM Act 2068 (2011) and SWM Rule 2070 (2013)	<ul style="list-style-type: none"> • The local body may mobilize NGOs for awareness raising on solid waste management. • SWMTSC can draw attention of concerned agencies to management of hazardous waste, chemical waste, industrial and medical waste.
Labor Act 2074 (2017)	<ul style="list-style-type: none"> • Chapter 12 of Labor Act has specific provision of Occupational Safety and Health (OSH). • Section 68 of labor act allows formulating the Occupational Safety and Health related policy. • Section 76 directs to immediate closure of work if there is a danger condition. • Section 77 allows taking decision and issuing an order to stop work that may immediate cause and/or may cause damage to individual or labor's occupational safety and health. • Section 79, Information shall be provided to the concerned authority about accident, casualty from accident or spread of occupational related diseases.
Labor Regulations 2075 (2018)	Rule 39 have special provision related to occupational safety and health, especially protection of eye by having appropriate eye protection and treatment from the use of mercury and mercury related compound among others.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Proactive collection and dissemination of information on mercury and mercury compounds and associated health and environment effects. • Regular monitoring of mercury and mercury compounds in environmental and biological samples and publically disseminating the information. • Strengthen institutional capacity for public information and awareness raising on hazardous waste management. • Separate education curriculum on hazardous waste management including mercury waste in secondary and higher level education. 	

Table 3-13: Article 19

Article 19: Research, development and monitoring	
Description of Article:	<ul style="list-style-type: none"> • Conduct Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of mercury and mercury compounds; • Modeling and geographically representative monitoring of levels of mercury and mercury compounds in vulnerable populations and in environmental media, including biotic media such as fish, birds, etc. • Assessments of the impacts of mercury and mercury compounds on human health and the environment, in addition to social, economic and cultural impacts, particularly with respect to vulnerable populations; • Information on the environmental cycle, transport (including long-range transport and deposition), transformation and fate of mercury and mercury compounds in a range of ecosystems; • Information on commerce and trade in mercury and mercury compounds and mercury-added products; and • Information and research on the technical and economic availability of mercury-free products and processes and on best available techniques and best environmental practices to reduce and monitor emissions and releases of mercury and mercury compounds. • Build on existing monitoring networks and research programmes within Parties.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
EPA 1997 and EPR 1997	<ul style="list-style-type: none"> • A proponent has to carry out EIA or IEE of development activities which can have adverse impacts on human health and environment. • Proponent shall be responsible to carry out mitigation measures of all adverse impacts of the development activity.
SWMA 2011 and SWMR 2013	<ul style="list-style-type: none"> • The local body shall monitor or cause to monitor regularly the solid waste management and discharges. • SWMTSC can monitor and evaluate SWM activities implemented by local bodies and shall provide technical advice as necessary. • SWMTSC can conduct research and study on SWM and generate its statistical data and published its fact.
Outstanding regulatory or policy aspects that would need to be addressed/ developed to ensure compliance with the Convention's provision	
<ul style="list-style-type: none"> • Concerned agencies have to give priority to continuous research on hazardous waste management and its impact assessment. • Develop monitoring plan and strategy for hazardous waste management. 	

3.2 Institutional Assessment

In order to ensure effective implementation of the Minamata Convention through coordinated actions from institutions and stakeholders in the country, it is important to identify the relevant Government ministries, agencies and institutions as well as non-government institutions, private sector stakeholders and others as well as their respective roles and responsibilities.

In order to provide the necessary information for this Chapter, **Table 3-14 to 3-27** below are developed. The tables are organized according to the provisions of the Minamata Convention. The tables present a summary assessment of existing national institutions and stakeholders, their roles and an analysis of possible gaps, such as capacities and institutions needed for the implementation of the Minamata Convention and to ensure the sound management of mercury.

Table 3-14: Article 3

Article 3: Mercury supply sources and trade	
Description of Article:	<ul style="list-style-type: none"> • Not allow new primary mercury mining. • Phase out existing primary mercury mining within 15 years. • Prevent the import and use of mercury from primary mercury mining for artisanal and small-scale gold mining (ASGM) 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. • Obtain information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/yr. • 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. • 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).
National Stakeholders:	
Ministry of Finance (MOF)	Role with respect to above listed provisions: <ul style="list-style-type: none"> • Economic Analysis • Allocation of Economic / Financial Resources • Insurance • Revenue Policy and Planning • Policy Formulation, Coordination and Privatization of Public Enterprises
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> • MOF has the capacity to make policy, law not to finance and allow the manufacture, import, and export of products listed in Part I of Annex A

	<p>(Mercury based Medical equipment's e.g. Thermometer, Sphygmomanometer etc.) and Part II of Annex A (Dental Amalgam).</p> <ul style="list-style-type: none"> • MOF has the capacity to help in effective implementation of decision through its DOC to ban import, sale, distribution and use of mercury, mercury based products and practices taken by other line ministries such as MOHP and MOFE.
Department of Mines and Geology (DOMG)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Mineral exploration, evaluation and promotion of mineral based industries and administration of Mineral and Mining Rules and Regulation
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <p>DOMG has capacity to:</p> <ul style="list-style-type: none"> • Carry out scientific geological survey and investigation, • Conduct engineering and geo-environmental studies and risk identification • Carry out study on mineral resources, exploration, evaluation and promotion • Implement Mines and Minerals Act.
Department of Customs (DOC)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • DOC is the sole government organization to keep record of imported commodities, including mercury and mercury containing items, to meet the demands of prevailing practices, such as Hg in gold plating.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Custom officers at point of import to control illegal import/export of item and keep record of the imported items.
Department of Commerce, Supply and Protection of Consumer	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation, implementation, monitoring and evaluation of policy, plan and programmes relating to commerce, trade and supply • Study, research and survey of the internal (domestic) and international trade • Protection of rights and interests of the consumers
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <p>Institutional arrangement is made:</p> <ul style="list-style-type: none"> • To formulate, implement, monitor and evaluate the policy, plan and programmes related to export and import. • To implement bilateral and multilateral trade treaty and agreement
<p>Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:</p>	
<ul style="list-style-type: none"> • Inadequate capacity (knowledge, qualified staff, State of Procedures (SOPs), training programmes, and laboratory analysis) of DOC to effectively detect illegal import-export of mercury compounds • Weak inter agency coordination 	

Table 3-15: Article 4

Article 4: Hg-added Products (2020 phase out, except phase down for dental amalgams)	
Description of Article:	<ul style="list-style-type: none"> • Not allow the manufacture, import, and export of products listed in Part I of Annex A not otherwise excluded following the phase out date listed in the Annex. • Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A. • Take measures to prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products. • Discourage the manufacture and distribution of new mercury product types.
National Stakeholders:	
Ministry of Forests and Environment	Role with respect to above listed provisions: <ul style="list-style-type: none"> • Formulation and Enforcement of policy, laws (act & regulations) and Standards • Develop national level environmental information systems
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> • Capacity exists to formulate the required policy, law, standards to control air, water and soil pollution from mercury • Ministry can take decision and/or issue gazette information to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. dental amalgam).
Department of Environment (DOE)	Role with respect to above listed provisions: <ul style="list-style-type: none"> • Implementation and Enforcement of policy, laws (act & regulations) and Standards as well as monitoring related to environment and chemical pollution.
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> • Department undertakes regular monitoring of status of implementation and compliance of relevant policy, laws, standards. • Department undertakes relevant studies about the impacts of mercury and mercury added products and practices on environment and /or health.
Ministry of Health and Population (MOHP)	Role with respect to above listed provisions: <ul style="list-style-type: none"> • MOHP is responsible for overall policy formulation, planning, organization and coordination of the health sector at national, province, and local levels.
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> • Ministry has the capacity to formulate policies and, laws not to allow

	<p>the manufacture, import, and export of products listed in Part I of Annex A (Mercury based Medical equipment's e.g. Thermometer , Sphygmomanometer etc)</p> <ul style="list-style-type: none"> • Ministry can take decision to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. ayurvedic medicines, dental amalgam, including others). • Ministry can carry out relevant studies about the impact of Mercury and mercury added products and practices on environment and /or health. • Ministry can set the standard for Mercury in Ayurvedic Medicine, Cosmetics and do the periodic monitoring.
Department of Health Services (DOHS)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Help and Facilitate MOHP to formulate environmental health related policy, guidelines, standards, including others. • Help and facilitate study and research related to drinking water, air and environment in totality on health. • Compliance monitoring of standards set for health infrastructure and equipment. • Facilitate procurement and supply of required essential things like mercury based Vaccines, machines, equipments, medicines, etc. • Help and Facilitate for the formulation of policies, laws, guidelines, standards on oral health. • Carryout the research on Eye, ENT and Oral Health programs (e.g. biomonitoring of mercury among dental doctors, nurses and general people with mercury filling). • Help and facilitate the MOHP in the formulation of Vaccine (with mercury preservative) and Children Health related national policy, strategies, guideline, standards, protocols, to phase out the use of mercury.
Department of Drug Administration (DDA)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Ensure safety, quality and efficacy of medicines • Promotion of Rational Use of Medicines and health technology products. • Enforce and monitor the compliance of drug act for regulatory compliances. • Institutional and capacity development
Department of Ayurved and Alternative Medicine (DOAAM)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation of quality standards of medicines including Ayurvedic Medicine. • Facilitate in formulation of standards and operation of Ayurvedic Hospital and Pharmacy including private ones. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <p>(For all DOHS, DOAAM and DDA)</p> <ul style="list-style-type: none"> • Departments can develop and effectively implement policy, laws related to the manufacture, import, and export of products listed in Part I of Annex A (Mercury based Medical equipment's e.g. Thermometer , Sphygmomanometer etc) • Departments can effectively implement decisions made to phase down

	<p>or even phase out the use of dental amalgam</p> <ul style="list-style-type: none"> • Department can monitor and take needful action related to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. dental amalgam). • Departments can carry out studies on the impact of Mercury and mercury added products and practices on environment and /human health. • Department can help, facilitate and even effectively implement the standards on Mercury in Ayurvedic medicine, cosmetics and do the periodic monitoring of the mercury in Ayurvedic Medicine and Cosmetic . • Departments can discourage health insurance policy related to Mercury, mercury based chemicals, products and practices
Ministry of Education, Science and Technology (MOEST)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulate educational policies and to address health issues and implement them across the country. • The Central Level Agencies (CLAs) under the Ministry are responsible for designing and implementing the programs and monitoring them. • Regional Education Directorates (REDs) are responsible for monitoring the programs undertaken by the district level organizations. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOEST has capacity to make any policies, laws , curricula of academic sector (medical and general science) towards discouraging the import, purchase, use and practice of mercury based products, chemicals and equipment's in all relevant academic programs and institutions in the country. • MOEST has capacity to take decision and issue a gazette notification to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. dental amalgam) in academia. • Ministry has capacity to carry out relevant studies about the use and handling of mercury, mercury based equipment and chemicals in academia.
Department of Education (DOEd)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Responsible for the management and update of the Nepalese education system. • Serves as the main implementing agency of Nepal's educational plans and policies. • Responsible for the basic and secondary education system in Nepal. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Department of Education has capacity to make necessary improvements in curricula of school level education and discourage the import, purchase, use and practice of mercury based products, chemicals and equipment in all levels of academic programs in the country and propose safer alternatives (e.g. mercury free).
Curriculum Development Centre	<p>Role with respect to above listed provisions:</p>

(CDC)	<ul style="list-style-type: none"> • Develop, update, and revise curricula and textbooks for school education along with other instructional materials. • Conduct research studies on curricula and text books. • Receive/record feedbacks related to school curricula from the group of subject experts, as well as concerned institutions or persons. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • CDC has capacity to make necessary improvement in curricula of school education towards discouraging the purchase, use and practice of mercury based products, chemicals and equipment's in all school academic programs • CDC can initiate study on health and environmental impacts of mercury and use of mercury based products and practices at school level.
Ministry of Finance (MOF)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Economic Analysis • Allocation of Economic / Financial Resources • Insurance • Revenue Policy and Planning • Policy Formulation, Coordination and Privatization of Public Enterprises <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOF has the capacity to make policy, law not to finance and allow the manufacture, import, and export of products listed in Part I of Annex A (Mercury based Medical equipment's e.g. Thermometer, Sphygmomanometer etc.) and Part II of Annex A (Dental Amalgam). • MOF has the capacity to help in effective implementation of decision through its DOC to ban import, sale, distribution and use of mercury, mercury based products and practices taken by other line ministries such as MOHP and MOFE. • MOF has the capacity to discourage insurance policy related to the use of mercury, mercury based chemicals, products and practices and encourage the insurance policy based on use of safer alternatives.
Department of Customs (DOC)	<p>Role with respect to above listed provisions: 339525.20</p> <ul style="list-style-type: none"> • Ensure compliance with the prevailing laws and protect the society. • Compile and maintain imports and exports statistics including an information database <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • DOC has the capacity not to allow the import and export of products listed in Part I of Annex A (Mercury based Medical equipment's e.g. Thermometer, Sphygmomanometer etc.) and Part II of Annex A (Dental Amalgam). • DOC can help in effective implementation of decisions made to ban import, sale, distribution and use of mercury, mercury based products (Thermometer, Sphygmomanometers etc.) and practices (e.g. dental amalgam) by other line ministries such as MOHP and MOFE.

	<ul style="list-style-type: none">• DOC supports insurance policy related to discourage mercury, mercury based chemicals, products and practices and encourages safer alternative based insurance policy.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:	
<ul style="list-style-type: none">• Training and capacity building for responsible human resources in concerned agencies and stakeholders including in academic institutions and NGOs.• Regular monitoring of mercury, mercury based chemicals, products and practices and associated release and emission to air, water and land.• MOHP can discourage health insurance policy related to use of mercury, mercury based chemicals, products and practices.• Monitoring the impacts of mercury among most vulnerable population (health care professionals, handcraft workers, fish, fisher communities, hotelier, jewelers, laboratory personnel, person engaged in standardization & calibration of mercury based equipment).• Mercury specific information and education materials are not included into the school and university level curricula.	

Table 3-16: Article 5

Article 5: Manufacturing processes in which mercury or mercury compounds are used	
Description of Article:	<ul style="list-style-type: none"> • Phase out use of mercury or mercury compounds in Acetaldehyde production by 2018 and Chlor-alkali production by 2025 • Measures to restrict the use of mercury or mercury compounds in Vinyl Chloride Monomer (VCM) production for PVC • Address emissions and releases of mercury and mercury compounds from these processes • Discourage the use of mercury or mercury compounds in new processes.
Not Relevant for Nepal	

Table 3-17: Article 8

Article 8: Emission	
Description of Article:	<ul style="list-style-type: none"> • Take measures to control emissions and prepare a national plan setting out the measures to be taken to control emissions and its expected targets, goals and outcomes. • Submit plan to the Conference of the Parties within 4 years of the date of entry into force of the Convention for that Party. • For new sources, require the use of best available techniques and best environmental practices to control and, where feasible, reduce emissions, as soon as practicable but no later than 5 years after the date of entry into force of the Convention for that Party. • For its existing sources, include in any national plan, and shall implement, one or more of the following measures, taking into account its national circumstances, and the economic and technical feasibility and affordability of the measures, as soon as practicable but no more than 10 years after the date of entry into force of the Convention for it. • Require best available techniques/ best environmental practices (BAT/BEP) or associated emission limit values (ELVs) for new (as defined in Article 8.2 (c) sources listed in Annex D • 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.

National Stakeholders:	
Ministry of Forests and Environment	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation and enforcement of policy, rules standards to limit mercury emission and release. • Carry out activities to fulfill the obligations of chemicals related with international agreements and regional associations (Stockholm, Minamata, Rotterdam, Basel as well as the UNEP, SACEP/SAARC, Male Declaration). • Monitoring of development projects on the basis of EMP of EIA approved by the GON.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Ministry has developed acts and regulations to limit emission and release of pollutants (mercury considered as one of the pollutants). • Environmental Monitoring and Standard Section has developed emissions and release standards for different pollutants including mercury. • EIA section of the ministry conducts compliance monitoring of different industries based on their approved EIA. • Ministry carries out regular monitoring of individual, institute, or industry that is related to mercury emission.
Ministry of Industry, Commerce and Supplies (MOICS)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulate and enforce policy, laws and standards related to industries. • Identify industrial corridors, industrial parks or villages and Export Processing Centers. • Develop policy, laws and standards for industrial estates and special economic zones and regulate them.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOICS has the capacity to formulate and enforce legal instruments to promote Best Environment Practice (BEP) and Best Available Technology (BAT). • There are technical human resources in its institutional arrangement.
Department of Environment	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Enforcement, monitoring and evaluation of prevailing policies, laws and standards. • Monitoring of development projects on the basis of EMP of EIA approved by the GON.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Department has environmental inspectors to monitor and assess the level of compliance, yet monitoring of activities which emit and release mercury has not started.

Local Governments	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Implementation of sanitation standard for urban and rural sectors. • Enforcement, as well as monitoring and evaluation of pollution control measures of drinking water, air and noise pollution and ensuring of food quality. • Health care waste management and promotion of sanitation awareness. • Promote Public private partnership for sanitation and cleaning as well as health care waste management. • Solid waste management at local level. • Identify and manage environmental protection zone or area at local level. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Elected bodies and institutional arrangements are in place, but such new arrangements may need considerable time to be familiar with the assigned role responsibilities.
Associations (Industrial and professional)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Carry out monitoring studies of industries and take an update on status of operation and compliance with prevailing laws and emission standards. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Some have laboratory facilities to analyze the samples and are collaborating with the government in determining the emission levels of different industries.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:	
<ul style="list-style-type: none"> • Training and capacity building for responsible human resources in concerned agencies. • Regular monitoring of mercury emission at various sources. • Development of laboratory facilities to support monitoring of mercury levels in different environmental compartments. • Needs to establish the mercury releases monitoring reporting system and the establish database on mercury in air. • Needs to develop guidelines for the mercury emission control and adopt best environment technology. 	

Table 3-18: Article 9

Article 9: Release	
Description of Article:	<ul style="list-style-type: none"> • Control release of mercury and mercury compounds to land and water from relevant point sources not addressed in other provisions of this Convention. • No later than 3 years after the date of entry into force of the Convention for it and on a regular basis thereafter, identify the relevant point source categories. • Take measures to control releases and prepare a national plan setting out the measures to be taken to control releases and its expected targets, goals and outcomes. Any plan shall be submitted to the Conference of the Parties within 4 years of the date of entry into force of the Convention.

	<ul style="list-style-type: none"> The use of best available techniques and best environmental practices to control releases from relevant sources no later than 5 years after the date of entry into force of the Convention for it, conduct an inventory of releases from relevant sources.
National Stakeholders:	
MOFE and Department of Environment	Role with respect to above listed provisions: <ul style="list-style-type: none"> Enforcement, monitoring and evaluation of policies, laws and standards prescribed by MOFE. Carry out activities to fulfill the obligations of chemicals related with international agreements and regional associations (Stockholm, Minamata, Rotterdam, Basel as well as the UNEP, SACEP/SAARC, Male Declaration). Monitoring of development projects on the basis of EMP of EIA approved by the GON.
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> EIA section of the ministry conducts compliance monitoring of different industries based on their approved EIA. Environment Monitoring Section is formulating environment release standards, developing and implementing environment protection and management plan. Department has limited institutional capacity for the assessment and research but they need to be upgraded for mercury related activities.
Department of Industry	Role with respect to above listed provisions: <ul style="list-style-type: none"> Approve industry registration and provide license to industries, including gold plating enterprises, which require permission. Approval of IEE of development projects on the basis of EMP. Prepare raw material consumption norms of the industry.
	Relevant institutional capacity in place to comply with the above listed provisions: <p>DOI needs to strengthen institution and its capacity to comply with the above listed provision.</p>
Department of Water Supply and Sewerage (DWSS)	Role with respect to above listed provision: <ul style="list-style-type: none"> Lead implementing agency to provide drinking water (mercury less than 0.01 ppm) supply and sanitation facilities to general public. Improve sewerage facilities including construction and monitoring of waste water treatment plants.
	Relevant institutional capacity in place to comply with the above listed provision: <ul style="list-style-type: none"> DWSS is developing sewerage facilities including the construction of wastewater treatment plants. Occasional monitoring of sewerage before discharge to surface water in place.
Local Governments	Role with respect to above listed provisions:

	<ul style="list-style-type: none"> • Implementation of sanitation standard for urban and rural sectors. • Enforcement, as well as monitoring and evaluation of pollution control measures of drinking water, air and noise pollution and ensuring of food quality. • Health care waste management and promotion of sanitation awareness. • Promote Public private partnership for sanitation and cleaning as well as health care waste management. • Solid waste management at local level. • Identify and manage environmental protection zone or area at local level.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Elected bodies and institutional arrangements are in place, but such new arrangements may need considerable time to be familiar with the assigned role responsibilities.
Associations (Industrial and professional)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Carry out monitoring studies of industries and take an update on status of operation and compliance with prevailing laws and effluent standards.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Some have laboratory facilities to analyze the effluent samples and are supporting the government in studying the levels of pollution caused by different industries.
<p>Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:</p>	
<ul style="list-style-type: none"> • Needs to strengthen the existing laboratory facility and capacity building of the human resources at the Department of Environment for determination of mercury in environmental samples. • Needs to establish the mercury releases monitoring reporting system and the establish database on mercury in soil and water. • Needs to develop guidelines for the mercury release control and adopt best environment technology. • Development of policy, plan, legislation and programs on sewerage management throughout the country. • Strengthening local and provincial government in the construction of sewerage facilities. • Regular monitoring and evaluation of sewerage discharge and surface water quality. 	

Table 3-19: Article 10

Article 10: Interim Storage; on environmentally sound interim storage of mercury, other than waste mercury	
Description of Article:	Take measures to ensure that the interim storage of such mercury and mercury compounds intended for a use allowed to a Party under this Convention is undertaken in an environmentally sound manner.
Not applicable in Nepalese context	

Table 3-20: Article 11

Article 11: Mercury Waste	
Description of Article:	<ul style="list-style-type: none"> Mercury wastes means substances or objects: (a) Consisting of mercury or mercury compounds; (b) Containing mercury or mercury compounds; or (c) Contaminated with mercury or mercury compounds in a quantity above the relevant thresholds defined by the Conference of the Parties, in collaboration with the relevant bodies of the Basel Convention in a harmonized manner, that are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law or this Convention. Mercury waste is managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention. Only recovered, recycled, reclaimed or directly re-used for a use allowed to a Party under this Convention or for environmentally sound disposal For Parties to the Basel Convention, not transported across international boundaries except for the purpose of environmentally sound disposal in conformity with this Article and with that Convention. Parties are encouraged to cooperate with each other and with relevant intergovernmental organizations and other entities, as appropriate, to develop and maintain global, regional and national capacity for the management of mercury wastes in an environmentally sound manner.
National Stakeholders:	
Ministry of Forests and Environment	Role with respect to above listed provisions: <ul style="list-style-type: none"> Development of necessary policy, legislations, and standards related to hazardous waste management. Ratification of Minamata Convention, being the focal point ministry of Nepal. Prepare National Mercury Profile based on UNEP toolkit and Minamata Convention Initial Assessment for the country. Monitoring of development projects on the basis of EMP of EIA approved by the GON.
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> MOFE has institutional arrangement and capacity for developing legislations, standards and policies, as well as such for EIA. MOFE is undertaking monitoring and evaluation of development activities at different stages of their construction and operations.
Ministry of Health and Population	Role with respect to above listed provisions: <ul style="list-style-type: none"> MOHP is responsible for overall policy formulation, planning, organization and coordination of the health sector at national, provincial and local levels. Research, Planning & Development of Public Sector Health Services Conduct environmental Health Programme Formulate policy and standards for drugs management Standards setting and implementation guidelines of the physical products to be utilized in the hospitals Establish effective and new health information systems Coordinate with relevant stakeholders in a multi-sector concern related issues, including environmental health, pollution, and occupational health.

	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Ministry can carry out relevant studies about the impact of Mercury and mercury added products and practices on environment and /or health. • Ministry can fix the standards limits of Mercury in Ayurvedic Medicine, Cosmetics and do the periodic monitoring of the mercury in Ayurvedic Medicine and even Cosmetic • Ministry can issue a gazette notification to ban the Import, Purchase and uses of all mercury based equipment, chemicals and practices including mercury dental amalgam.
Department of Environment	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Enforcement, monitoring and evaluation of policies, laws and standards prescribed by MOFE. • Monitoring of development projects on the basis of EMP of EIA approved by the GON.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Department has environmental inspectors to monitor and assess the level of compliance, yet monitoring of activities which emit and release mercury has not started.
Department of Industry	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Approve industry registration and provide license to industries, including gold plating enterprises, which require permission. • Approval of IEE of development projects on the basis of EMP. • Prepare raw material consumption norms of the industry.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • DOI needs to strengthen institution and its capacity to comply with the above listed provision.
Local Governments	<p>Role with respect to above listed provision:</p> <ul style="list-style-type: none"> • Implementation of sanitation standards for urban and rural sectors. • Enforcement, as well as monitoring and evaluation of pollution control measures of drinking water, air and noise pollution, and ensuring of food quality. • Health care waste management and promotion of sanitation awareness. • Promote public private partnership for sanitation and cleaning as well as for health care waste management. • Monitoring and evaluation and control of any hazardous materials at local level that will have impacts of human health and environment. • Solid waste management at local level. • Identify and manage environmental protection zone or area at local level.
	<p>Relevant institutional capacity in place to comply with the above listed provision:</p> <ul style="list-style-type: none"> • Elected bodies and institutional arrangements are in place, but they may need considerable time to be familiar with the assigned role responsibilities.

Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:

- Detail study on situation of hazardous waste management especially substances containing mercury or consisting of or contaminated with mercury or products by concerned agency.
- Hazardous waste management policy, regulations, plan and programs at central, provincial and local level need to be developed and implemented.
- Capacity building and awareness raising at central, provincial and local levels on wastes and potential contamination with mercury.
- Regular Monitoring and evaluation by central, provincial and local levels to minimize substances or wastes consisting, containing or contaminated with mercury or mercury compounds.

Table 3-21: Article 12

Article 12: Contaminated Sites	
Description of Article:	<ul style="list-style-type: none"> • Develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds. • Any actions perform to reduce the risks posed by such sites in an environmentally sound manner. • Encourage to cooperate in developing strategies and implementing activities for identifying, assessing, prioritizing, managing and, as appropriate, remediating contaminated sites. • Adopt guidance on managing contaminated sites that may include methods and approaches.
National Stakeholders:	
MOFE and Department of Environment	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Monitoring and evaluation of enforcement of policy, legislations and standards prescribed by MOFE related to hazardous waste management. • Monitoring of development projects on the basis of EMP of EIA approved by the GON and with support of DOE. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOFE and DOE have limited institutional capacity and human resources to carry out regular monitoring required for an effective management or rehabilitation of contaminated sites.
Local Governments	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Final disposal of solid waste after processing of harmful, chemical, organic or inorganic wastes. • Selection/Identification of sanitary landfill site, operation and post closure of sanitary landfill site without impact on human health and environment. • Local governments shall be responsible to apply overall mitigation measure to reduce environmental pollution in final disposal. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Elected bodies and institutional arrangements are in place, but such new arrangements may need considerable time to be familiar with the assigned

role responsibilities.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:
<ul style="list-style-type: none"> • Define clearly the roles and responsibilities of concerned agencies to avoid jurisdictional contradictions for proper management and restoration of contaminated sites. • Proper assessment of contaminated sites and their regular update. • Strengthening the institutional capacity to identify contaminated sites. • Regular monitoring and evaluation of such sites.

Table 3-22: Article 13

Article 13: Financial resources and mechanism	
Description of Article:	<ul style="list-style-type: none"> • Access domestic resources as may be needed to implement Convention obligations; • Access financial resources available under the Convention financial mechanism and other resources available from multilateral, regional, and bilateral funding sources.
National Stakeholders:	
Ministry of Finance	Role with respect to above listed provisions: <ul style="list-style-type: none"> • Economic Policy, Financial Administration and Control • Pursue efficient, effective and equitable resource allocation policy for the identified prioritized sectors. • International economic cooperation coordination Division (IECCD) of the MOF is the GEF Political Focal Point. • Allocation of Economic / Financial Resources and management of public expenditure. • Mobilization and optimal utilization of both internal and external resources through foreign aid/ assistance (from development partners)
	Relevant institutional capacity in place to comply with the above listed provisions: <ul style="list-style-type: none"> • MOF has the IECCD to mobilize and facilitate external resources (available from multilateral, regional and bilateral). Financial resources made available by all development partners should be approved by the MOF.
Ministry of Foreign Affairs (MOFA)	Role with respect to above listed provisions: <ul style="list-style-type: none"> • Engagement with United Nations and other international and regional organizations. • Negotiations and agreements with foreign governments and at regional and multilateral forums.

	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> As required MOFA coordinates with relevant government agencies, 39 Nepali missions abroad as well as international organizations accredited to Nepal.
Development partners (UN organizations and INGOs)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Development partners have provision of supporting Nepal's development activities, including chemicals and wastes management.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> Such partners have their own established mechanisms.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:	
<ul style="list-style-type: none"> Training and capacity building for responsible human resources in concerned agencies and stakeholders. Adopt the policy of prioritizing the activities related to the protection of human health and protection of environment. 	

Table 3-23: Article 14

Article 14: Capacity-building, technical assistance and technology transfer	
Description of Article:	<ul style="list-style-type: none"> Capacity-building and technical assistance may be delivered through regional, sub-regional and national arrangements, including existing regional and sub-regional centers, through other multilateral and bilateral means, and through partnerships, including partnerships involving the private sector Developed country Parties and other Parties within their capabilities shall promote and facilitate, development, transfer and diffusion of, and access to, up-to-date environmentally sound alternative technologies to developing country Parties, in particular the least developed countries and small island developing States to strengthen their capacity effectively Shall make recommendations on how capacity-building, technical assistance and technology transfer could be further enhanced under this Article
National Stakeholders:	
MOFE	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Capacity building of National Focal Point for the required technical assistance and technology transfer Prepare the list of national and international stakeholders to facilitate capacity building, technical assistance and technology transfer Establishment of new and strengthening of existing labs at national level. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p>

	<ul style="list-style-type: none"> MOFE has Minamata Convention Focal point and other technical capacities, but not enough to deal with all the activities related to technical assistance and technology transfer.
MOICS	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Formulation, implementation, monitoring and evaluation of policy, plan and programmes relating to foreign investments and technology transfers. Development and transfer of industrial technology Promote contact and coordinate with international industrial organizations.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> MOICS has technical capacity, though not at desired level, which understands new technologies and can support in technology transfer.
Associations (Industrial and professional)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Industrial associations of Nepal are cooperating with similar organizations abroad and are mutually working on technology transfer and capacity building, within the limits of their financial resources. Academic associations are sharing their knowledge with the relevant industries.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> Industrial associations have technical capacity, though not at desired level, who understand new technologies and import. But professional associations are weakly organized thus don not have significant contributions in this regards.
NGOs	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Research, Awareness and Capacity building on mercury, mercury added products and practices issues.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> Promote alternatives through lobbying for conducive legal and institutional framework.

Table 3-24: Article 16

Article 16: Health Aspects	
Description of Article:	<ul style="list-style-type: none"> Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines

	<ul style="list-style-type: none"> • Promote occupational exposure educational and prevention programs • Promote prevention, treatment, and care services for affected populations
National Stakeholders:	
Ministry of Health and Population (MOHP)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • MOHP is responsible for overall policy formulation, planning, organization and coordination of the health sector at national, provincial and local levels. • Research, Planning & Development of Public Sector Health Services • Research and Development of Preventive, Promotive, Curative, and Rehabilitative services associated with Allopathy, Ayurved, Homeopathy & Unani System of Medicine • Research, production, quality Control, price control and sales & distribution of drugs and control of narcotic drugs and control in sales & distribution, import, export & use of unsafe & poor quality drugs. • Conduct environmental Health Programme • Health & Nutrition Education • Policy formulation to produce and regulate quality ayurvedic medicine. • Coordinate with health and health education providing hospitals and academic institutions. • Standard formulation, implementation, Monitoring and Evaluation for health care services, health education, alternative medicine, ayurvedic medicine, laboratory, radiology and imaging services. • Formulate policy and standards for drugs management • Standards setting and implementation guidelines of the physical products to be utilized in the hospitals • Establish effective and new health information systems • Coordinate with relevant stakeholders in a multi-sector concern related issues, including environmental health, pollution, and occupational health. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOHP has the capacity to formulate required policies and laws not allow the manufacture, import, and export of products listed in Part I of Annex A (Mercury based Medical equipment's e.g. Thermometer , Sphygmomanometer etc) • Ministry can carry out relevant studies about the impact of Mercury and mercury added products and practices on environment and /or health. • Ministry can fix the standards limits of Mercury in Ayurvedic Medicine, Cosmetics and do the periodic monitoring of the mercury in Ayurvedic Medicine and even Cosmetic • Ministry can issue a gazette notification to ban the Import, Purchase and uses of all mercury based equipment, chemicals and practices including mercury dental amalgam.
Department of Health Services	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Help and Facilitate MOHP to formulate environmental health related policy, guideline, standards, etc.

	<ul style="list-style-type: none"> • Help and facilitate study and research related to drinking water, air and environment in totality on health. • Help MOHP to formulate the Health Care Waste Management related national laws, policies, regulation, standards and protocol. • Facilitate central, provincial and local level governments for scientific management of health care wastes generated from healthcare institutions, and also monitor and evaluate this. • Facilitate the inspection, compliance monitoring of standards of health infrastructure and equipment. • Help and facilitate the formulation of national policy, guideline, standards, protocol, guidelines on oral health • Carryout the research on Oral Health programs.
Department of Drug Administration	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Ensuring safety, quality and efficacy of medicines • Promotion of Rational Use of Medicines and health technology products. • Ensuring access to medicines and health care technology products. • Enforce and monitor the provisions of drug law
Department of Ayurved and Alternative Medicine (DOAAM)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation of quality standards of Ayurvedic Medicine. • Research on herbal, mineral, ayurvedic medicines • Formulate treatment protocols, manual, guidelines related to Ayurvedic Medicine. • Facilitate in formulation of standards and implementation related to operation of Ayurvedic Hospital and Pharmacy. <p>Relevant institutional capacity in place to comply with the above listed provisions (in DOHS, DOAAM, DDA):</p> <ul style="list-style-type: none"> • Departments can develop effectively implement policy, laws, guidelines and standards on health care equipments, occupational health and safety, mercury level in air, water and food and medicines. • Departments can carry out relevant studies on the impacts of mercury and mercury added products and practices on environment and human health. • Departments can help, facilitate and even effectively implement the standards limits of mercury in Ayurvedic medicine, Cosmetics and make the public aware of impacts of mercury. • Departments can discourage health insurance policy related to Mercury, mercury based chemicals, products and practices.
Ministry of Labor, Employment and Social Securities	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation of rules, policy, standards related to occupational health and safety • Monitoring of occupational health and safety <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MoLESS has Labor and Social Security Division supported by Child Labor Prohibition and Occupational Safety Section to develop required policies and legislation and also implement them • MoLESS has a commission to inspect labor and occupational health and

	<p>safety of employee</p> <ul style="list-style-type: none"> • Policy on employment oriented skilled and occupational training is in place. • Policy, law and standard on occupational health and safety are in place.
Department of Labor and Occupational Safety	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Provide the labor force with safety and healthy working environment in the industrial occupation and informal region.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • This Department has Occupational Safety and Health Section to implement the policies and legislation and carry out compliance monitoring related to occupational health and safety.
<p>Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:</p>	
<ul style="list-style-type: none"> • Populations at risk, especially those exposed to mercury during different professional activities and patients using Ayurvedic medicines, need to be identified and exposure level determined. • Regular monitoring of mercury, mercury based chemicals, products and practices and associated release and emission to air, water and land. • Developing technical guidelines for occupational health and safety, with focus on hazardous chemicals including mercury. • Mercury specific information and education materials need to be included into the school and university level curricula. • Academic curricula on chemical safety, health and environment need to be developed at all levels (School, college and University) for general science and medical sciences. 	

Table 3-25: Article 17

Article 17: Information Exchange	
Description of Article:	<p>Parties shall facilitate the exchange of :</p> <ul style="list-style-type: none"> • scientific, technical, economic and legal information concerning mercury and mercury compounds, including toxicological, ecotoxicological and safety information; • Information on the reduction or elimination of the production, use, trade, emissions and releases of mercury and mercury compounds; • Information on technically and economically viable alternatives to Mercury-added products, Manufacturing processes and Activities and processes that emit or release mercury or mercury compounds • including information on the health and environmental risks and economic and social costs and benefits of such alternatives; and • Epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds, in close cooperation with the World Health Organization and other relevant organizations, as appropriate. • Shall have a designated national focal point for the exchange of information • Collect and disseminate information on annual quantities of mercury

	<p>and mercury compounds emitted, released, or disposed; and other information specified in Article 18</p> <ul style="list-style-type: none"> • Share information on the health and safety of humans and the environment as non-confidential, in accordance with Article 17.5 • Report to the COP on progress in implementing Convention obligations under Article 21
National Stakeholders:	
MOFE	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Enhance the capacity of National Focal Point and update the list of stakeholders for an efficient information exchange among the stakeholders • Being the National focal point for Minamata Convention, MOFE's role is to exchange the information on mercury among the national stakeholders and timely reporting of the convention obligations to the convention secretariat. • Prepare the list of national and international stakeholders • Develop standard for mercury in different environmental media and share among the stakeholders and also monitor the compliance with the assistance of Department of Environment • Assess the mercury level in environmental media and exposed populations and disseminate such epidemiological information among the stakeholders and public (information of a study on the status of mercury done by the ministry in the past was shared among the relevant stakeholders).
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOFE is a Minamata Convention National Focal Point.
Other relevant government agencies (MOHP, MOF, MOEST, MOCIT, DOE and their divisions and departments)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Generate, update and disseminate information related to mercury emission/release and its impacts on the environment and human health with the assistance of research institutes and academia and disseminate among the stakeholders and public. • Establish a designated information unit in respective organizations for the exchange of information • Timely reporting on the progress of implementation of Convention 's obligations
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Government organizations have information unit with information officer (also Spokesperson).
Academia and Research Institutes	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Develop and conduct course curricula including research to generate

	<p>scientific, technical, legal, economic information on mercury its impacts including toxicological, eco toxicological and safety measures.</p> <ul style="list-style-type: none"> • Generate and collect information on environmental and health risks of exposed populations, social and economic costs and benefits of the alternatives.
<p>Development partners (WHO, ILO)</p>	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Academia and research institutions have limited capacity to carry out research and generate scientific, technical, economic and legal information, including toxicological, eco toxicological, and safety information and epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds. <p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Support in generating scientific, technical, economic and legal information including toxicological, eco toxicological, safety and epidemiological information • Support research on bio monitoring of mercury exposure, especially in the given occupational and institutional settings. • Support for establishing functional information unit with high capacity and good infrastructure. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <p>Such partners have enough capacity; however they may need to develop special programmes in consultation with concerned organizations.</p>
<p>I/NGOs and professional associations (e.g. Nepal Dental Association, Federation of Handicraft Associations of Nepal, Drugs Manufacturers Association, Nepal Paint Manufacturers Association)</p>	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Complimentary support to the government programmes in generated scientific, technical, economic and legal information including toxicological, eco toxicological, safety and epidemiological information. • Carry out research and/or participate in bio monitoring of mercury exposure in the given occupational and institutional setting. • Support for information dissemination and public awareness. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Mostly limited to their jobs based activities and have thus have inadequate resources to generate scientific, technical, economic and legal information including toxicological, ecotoxicological, safety and epidemiological information.
<p>Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:</p>	
<ul style="list-style-type: none"> • Enhance the capacity to carryout researches on mercury exposure and associated health and environmental impacts • Lack of capacity to generate the required scientific, technical, economic and legal information including toxicological, ecotoxicological, safety and epidemiological information. 	

- Effectively functioning information units with good infrastructures and capacity need to be established
- Lack of dedicated media house/mass communication on specific mercury issues

Table 3-26: Article 18

Article 18: Public Information, Awareness and Education	
Description of Article:	<ul style="list-style-type: none"> • Provision to the public of available information on: The health and environmental effects of mercury and mercury compounds; Alternatives to mercury and mercury compounds, the results of its research, development and monitoring activities and Activities to meet its obligations under this Convention. • Education, training and public awareness related to the effects of exposure to mercury and mercury compounds on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate. • Each Party shall use existing mechanisms for the collection and dissemination of information on estimates of its annual quantities of mercury and mercury compounds that are emitted, released or disposed of through human activities.
National Stakeholders:	
MOEST	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • MOEST is responsible for overall development of education in the country. • Ministry is responsible for formulating educational policies and plans and managing and implementing them across the country. • The Central Level Agencies (CLAs) under the Ministry are responsible for designing and implementing of programs and monitoring them. • Regional Education Directorates (REDs) are responsible for monitoring the programs undertaken by the district level organizations. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Ministry develops plans and programmes, and curricula for different levels of education (medical and general science), which also includes discouraging the import, purchase, use and practice of hazardous substances/ wastes and chemicals. • Ministry can make decision to phase down, even phase out, the use of dental amalgam and recommend alternative dental filling materials and practices in the curricula of vocational education and dental/medical education. • Ministry takes decision to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. dental amalgam) and shares this information among the stakeholders. • Ministry can carry out relevant studies about the use and handling of mercury, mercury based equipment and chemicals and their impacts on environment and human health. • Ministry can issue a gazette notification to ban the Purchase and uses

	<p>of mercury based equipment, chemicals and practices including mercury dental amalgam in academic setting (University, medical college and schools) and share this among the wider public.</p>
MOFE	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation and Enforcement of policy, laws (act & regulation), guidelines and Standards • Ensuring environment conservation and cleanliness of aquatic ecosystems by envisioning related policies, laws, standards and monitoring • Air and Air Pollution, standards, monitoring and evaluation. • Control chemical pollution. • Develop national level environmental information systems • Formulate policy, laws, standard and monitoring related to environment impacts studies.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOFE coordinates with Ministry of Education, Science and Technology to develop curricula, textbooks along with the introduction of Mercury and its harmful effects in human health and environment for school education. • MOFE carries out awareness raising programs for populations at risk due to the exposure of Mercury. • Ministry can carry out relevant studies about the impact of Mercury and mercury added products and practices on environment and /or health.
Ministry of Labor, Employment and Social Securities (MOLESS)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Formulation, enforcement and dissemination of rules, policy, and standards related to occupational health and safety. • Monitoring of occupational health and safety and create awareness on occupational health and safety.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • MOLESS has Labor and Social Security Division supported by Child Labor Prohibition and Occupational Safety Section to develop required policies and legislation and also implement them. • MOLESS has a commission to create awareness among the employees on occupational health and safety of employee.
Development partners (WHO, ILO)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Support in generating scientific, technical, economic and legal information including toxicological, eco toxicological, safety and epidemiological information • Support research on bio monitoring of mercury exposure, especially in the given occupational and institutional settings. • Support for establishing functional information unit with high capacity and good infrastructure.
	<p>Relevant institutional capacity in place to comply with the above listed</p>

	<p>provisions:</p> <ul style="list-style-type: none"> Such partners have enough capacity; however they may need to develop special programmes in consultation with concerned organizations.
Academia and professional associations	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Carry out awareness on occupational health and safety and on use of personal protective equipment. Assist the government in formulating policies, legislations and standards. Carry out studies on the status of occupational health and safety and use of health safety gears.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> Trained academicians and professionals are in the country, enough to start with the awareness raising activities and to develop awareness raising materials and prepare status report on occupational health and safety.
NGOs	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> Research, Awareness and Capacity building on mercury, mercury added products and practices issues.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> Promote alternatives through lobbying for conducive legal and institutional framework.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:	
<ul style="list-style-type: none"> Training and capacity building for responsible human resources in concerned agencies Developing technical guidelines and policy related to sound management of mercury containing waste. Chemical Safety, Health and Environment friendly academic curricula development at all level (School, college and University) for general science and medical sciences. 	

Table 3-27: Article 19

Article 19: Research, development and monitoring	
Description of Article:	<ul style="list-style-type: none"> Conduct Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of mercury and mercury compounds; Modeling and geographically representative monitoring of levels of mercury and mercury compounds in vulnerable populations and in environmental media, including biotic media such as fish, marine mammals, sea turtles and birds etc. Assessments of the impact of mercury and mercury compounds on human health and the environment, in addition to social, economic and cultural impacts, particularly in respect of vulnerable populations

	<ul style="list-style-type: none"> • Information on the environmental cycle, transport (including long-range transport and deposition), transformation and fate of mercury and mercury compounds in a range of ecosystems; • Information on commerce and trade in mercury and mercury compounds and mercury-added products; and • Information and research on the technical and economic availability of mercury-free products and processes and on best available techniques and best environmental practices to reduce and monitor emissions and releases of mercury and mercury compounds; • Build on existing monitoring networks and research programmes within parties.
National Stakeholders:	
MOFE	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Prepare the inventory of institutions involved in mercury research activities • Establishment of a network for cooperation, data and information exchange among the stakeholders • Development of standards for quality assurance and control <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Environment Standard and Monitoring Section of the MOFE conducted a study on the status of mercury and mercury containing products in the country and it undertakes monitoring of compliance of standards by different industries. • Environmental Impact Assessment (EIA) Section makes it mandatory to include management of pollutants including hazardous chemicals in EIA of all development activities and/or requires proper impact mitigation measures.
MOEST	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • MOEST is responsible for overall development of education in the country. • Ministry is responsible for formulating educational policies and plans and managing and implementing them across the country. • The Central Level Agencies (CLAs) under the Ministry are responsible for designing and implementing of programs and monitoring them. • Regional Education Directorates (REDs) are responsible for monitoring the programs undertaken by the district level organizations. <p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Ministry develops plans and programmes, and curricula for different levels of education (medical and general science), which also includes discouraging the import, purchase, use and practice of hazardous substances/wastes and chemicals. • Ministry can make decision to phase down, even phase out, the use of dental amalgam and recommend alternative dental filling materials and practices in the curricula of vocational education and dental/medical education. • Ministry takes decision to ban import, sale, distribution and use of mercury, mercury based products and practices (e.g. dental amalgam) and

	<p>shares this information among the stakeholders.</p> <ul style="list-style-type: none"> • Ministry can carry out relevant studies about the use and handling of mercury, mercury based equipment and chemicals and their impacts on environment and human health. • Ministry can issue a gazette notification to ban the Purchase and uses of mercury based equipment, chemicals and practices including mercury dental amalgam in academic setting (University, medical college and schools) and share this among the wider public.
Academia (universities, medical colleges and academies)	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • Development of research on current environmental issues • Establishment of new and strengthening of existing labs at national level • Establishment of a network for cooperation, data and information exchange within the academia and among the relevant stakeholders
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Academia has the capacity to conduct classes on the significance of mercury and its adverse impacts on the environment and human health. • Medical and dental colleges can comply with the government policy, towards phase down and phase out of mercury in different sectors.
National Health Research Council	<p>Role with respect to above listed provisions:</p> <ul style="list-style-type: none"> • NHRC is the research wing of Ministry of Health and Population, and its role is to conduct research in the various fields relating to health within the Nepal aligning with the health priorities identified in the National Health Policy of the Government of Nepal • Monitor and evaluate research works related to health and make appropriate recommendations. • Coordinate with foreign researchers and research institution to carry out some part of the research in a foreign country if there is no facility to carry out such research within the Nepal. • Obtain information as to the study and research or works done on health-related various problems appearing in the world and give information to the Government of Nepal.
	<p>Relevant institutional capacity in place to comply with the above listed provisions:</p> <ul style="list-style-type: none"> • Institutional structure of NHRC includes health research section, capacity building section and it is supported by committees such as Health research Monitoring, Communication and Advocacy, Ayurved and Complimentary Medicine.
Remaining Capacity Gaps at National level that need to be addressed before provisions can be met:	
<ul style="list-style-type: none"> • Despite having the provisions of proper institutional mechanism, institutional memory is not effective at the desired level and this often lead to very low outputs of the institutions. • The organizations need to review the current set up and develop mechanism to have good institutional memory and retain the right capacity at the right position. 	

Chapter IV

4. Identification of Populations at Risks and Gender Dimensions

Mercury is a naturally occurring element, which is found in various forms: elemental, inorganic and organic. Exposure to mercury at very low levels may cause serious health problems. According to WHO, mercury may have toxic effects on the nervous, digestive and immune systems, and on lungs, kidneys, skin and eyes.¹⁷ Both environmental and occupational exposures to mercury can be severe to people who are regularly exposed to mercury for a long time. In Nepal, following potential communities and populations are identified to be at high risk by the exposure of mercury.

4.1 Populations engaged in Gold plating business

The gold plating is an important, traditional and unique practice that manufactures religious sculptures. It is a durable and conventional technology that uses metallic mercury to coat gold on sculptures, and also the roofs and pinnacles of the temples. As mentioned earlier, in Nepal, more than 400 families (with 10 workers in each family) are involved in this business. Around 4000 people are directly exposed to mercury during gold plating process. The inventory of Hg also showed that gold plating business is the highest contributor in emitting and releasing mercury into the environment. People involved in this business are directly exposed to the mercury vapor released when mercury is burned off leaving a gold coating on the sculptures. The exposure to workers is metallic vapor inhalation and dermal absorption as they directly handle mercury in the workplace, often without necessary Personal Protective Equipments (PPEs).

During the MIA project period, an interaction program "Source of Mercury (Hg), its use and safe management" was jointly organized by Ministry of Forests and Environment and Federation of Handicraft Associations of Nepal (FHAN) on 5 July, 2018 at FHAN, Thapathali. Around 40 participants from different businesses related to arts, crafts and gold plating participated in the program (**Annex 1: Table 25**). The main objectives of the program were:

- To share about the MIA project activities and get information about the use of Hg in gold plating business.
- To share the objectives of the Minamata Convention and the future activities that Nepal need to carry out while implementing this convention and the role of stakeholders.
- To inform the participants about the role stakeholders and the impacts of mercury on human health and environment, the role of MOFE in implementing the convention and the possible fields of collaboration between MOFE and FHAN.
- To get feedback from participants on how Hg can be managed in their business without affecting the environment and protecting the health of the exposed populations.

¹⁷ <http://www.who.int/en/news-room/fact-sheets/detail/mercury-and-health>

During the discussion session, many participants expressed their concerns and provided their suggestions, as follows:

- People involved in gold plating knew that there were serious health impacts due to the use of Hg in their businesses. The gold plating using conventional Hg-technology and electroplating greatly differ both in quality and durability; electroplating gold plating on sculptures lasts only 10 to 15 years and also fades in the course of time, whereas conventional gold plating lasts over several centuries without any changes in its shining and appearance. As the sculptures gold plated with this technology is in demand, they have been practicing this technology, which is associated with the traditional profession of an ethnic community in Nepal.
- They would prefer to have a safe workplace with proven technology (e.g. filters fitted) or improvement in this practice by installing some devices to recapture mercury.
- They acknowledged the effort of MOFE to organize such an important information sharing program to make them aware of Hg, its uses and impacts on their health and environment. They requested MOFE to organize such awareness raising programs frequently in the future.

The gold plating business needs immediate action and introduction of sound technology to minimize the adverse effects of Hg. Further, it was also found that the women engaged in gold plating business (often family business) had some health problems at their early age. The hair samples of 20 women of child bearing age involved in gold plating were tested and average Hg concentration was found to be 3.62 ppm (Bell, 2017). This finding reveals that populations involved in gold plating business are at high risks of mercury. Such populations need urgent attention and their workplace needs immediate improvement to make it safe and free from risks associated with the use of mercury.

4.2 Public and Healthcare Professionals affected by Dental Amalgam

Mercury has been used in dental practices as the tooth-filling material for a long time. This material or amalgam is made with a mixture of mercury and silver/copper/tin (consisting 50% Hg in the amalgam). Mercury is released while using such fillings in different forms: elemental mercury vapour, metallic ions, and/or fine particles (WHO, 2008). According to WHO, of the mercury vapour, some is inhaled into the lungs and absorbed into the blood, and some is retained in the saliva and swallowed together with amalgam particles. However, only a small fraction of the portion swallowed is absorbed through the gastrointestinal tract. Furthermore, dental practitioners and workers directly working with mercury fillings are also at high risks due to regular and prolonged exposure to mercury.

In Nepal, students of dental colleges have to perform number of dental amalgam fillings either in the people or in phantom heads using mercury. The inventory report also showed that about 28.59 Kg of Hg is being used in dental colleges in each year. Thus, health care professionals associated with dentistry are at risks. Also, a bio-monitoring study of mercury conducted among 50 dental practitioners in Nepal including high level policy makers, assistants and with mercury tooth filling confirmed positive mercury contamination with concentrations ranging between 0.097 to 0.547 ppm (NHRC, 2015).

As mentioned in chapter II, a decision of MOHP to limit the use of mercury based technologies in health services was circulated five years ago. However, use of mercury in dental amalgam still needs to be phased out by an official decree.

4.3 Use of Mercury added products in education sectors and hospitals

Mercury, that is liquid at room temperature and pressure, spills from broken thermometers, and vaporizes into the surrounding air; the concentration is largely subject to state of ventilation and uses, temperature of the locations, numbers of breakage and handling/safe recapture of the spilled mercury. Apart from breakage of these instruments, in-house calibration practices of mercury-containing sphygmomanometers can also be the source of mercury in indoor air as considerable amount of elemental mercury is often stored in the repair, maintenance and calibration departments of certain health care facilities. According to the study, thermometer breakage rate in the hospitals ranged from 0.48 to 3.44 per bed per year (CEPHED, 2010) indicating the healthcare professionals at risk due to such exposures. Many educational institutions likewise use Hg - thermometers in laboratories and the students and teachers are directly exposed to mercury if thermometers are broken and not properly recaptured and stored safely.

Chapter V

5. Awareness/Understanding of Workers and the Public; and Existing Training and Education Opportunities of Target Groups and Professionals

5.1 Awareness of Workers and Public

Awareness of workers and the public on the hazardous effects of Mercury is crucial for the successful implementation of the Minamata Convention. Article 18 on public information, awareness and education of the convention emphasizes on education training and public awareness related to the effects of exposure to mercury and mercury compounds on human health and the environment. The MIA project in Nepal commenced its operation through inception workshop on 2 April 2018. The main objective of the workshop was to involve the stakeholders by making them aware of mercury (Hg) as a potential health and environmental hazard. Further, the workshop raised awareness among concerned ministries and stakeholders about the Minamata Convention and the impacts of Mercury on human health and the environment.

The workshop was attended by more than 50 participants representing different ministries, departments, academia, Non- Governmental Organizations (NGOs), private sectors, civil society organizations, UN agencies, and media. An inventory training workshop was also organized to train relevant stakeholders on the use of mercury inventory toolkit. Around 20 participants were trained by experts from BRI in a two day workshop.

As mentioned in Chapter III, an interaction program "Source of Mercury (Hg), its use and safe management" was jointly organized by FHAN and MOFE on 5 July, 2018 at FHAN, Thapathali. Around 40 participants from different businesses related to fine arts, crafts and gold plating participated in the program. This program was organized to raise awareness about risks associated with the use of Hg in gold plating business. The participants contributed by sharing their problems and health related issues caused by the exposure to Hg. Workers and the immediate family members involved in the gold plating business were highly exposed to Hg, and some of them were already suffering from some ailments.

As a consultation process of MIA project, information and the updates of project and inventory toolkit were shared with NSC and NWG times and again. Their contributions and feedbacks were very helpful in producing the MIA report.

One of the major components of MIA project under Output 4 is to disseminate information among relevant stakeholder groups (academia, public and private sectors, and civil society). The Output 4

will be focused on the second phase of MIA project. The extensive awareness raising program will be launched after the validation of mercury inventory report and submission of MIA report.

5.2 Training and Education Opportunities of Target Groups and Professionals

As presented in Chapter III, three populations mainly at risk by the direct exposure of Hg are identified as follows.

1. Workers and families involved in gold plating;
2. Professionals and general public exposed to Hg through dental amalgam;
3. General public and professionals and students in education sector.

In the next phase of MIA project, above groups of people and professionals should be targeted for training and education opportunities. For people engaged in gold plating, training should be conducted on the possible technologies of trapping Hg to stop its release into the environment. MOFE should facilitate or conduct extensive research and offer proper techniques to reduce the risk of exposure to Hg. Further, proactive collection, dissemination of information on mercury and mercury compounds and associated health and environmental impacts of Hg should be conducted for different target groups. In education sector, mercury should not be the part of theory, practical and examinations, both in the vocational and medical education. In terms of mercury waste, inventory of hazardous waste should be developed and regularly updated. Similarly, environmentally sound management of waste through proper segregation, collection, storage, transportation, treatment and safe disposal of hazardous waste should be adopted.

Chapter VI

6. Implementation Plan & Priorities for Action

An implementation plan and priorities for action are developed according to the findings of policy, regulatory and institutional framework assessment and national mercury inventory. This section briefly describes the activities/actions to be undertaken to meet major obligations under the Minamata Convention. Six major objectives with proposed activities and actions are listed below from **Table 6-1 to 6-6**.

Objective 1: Ratification of Minamata Convention, its approval and implementation of its provision

Table 6-1: Objective 1

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Anticipated budget (US\$)	Time Frame
1	Endorsement of MIA report by Government of Nepal	GON	10,000.00	2019
1	Ratification by the Federal Parliament	MOFE	5,000.00	2019
1	Deposition of Instrument of ratification to the Convention Secretariat	MOFE	1,000.00	2019
1	Formulate policy for sound management of mercury containing wastes	MOFE	10,000.00	2019
1	Develop and establish required institutional, and legal framework for effective implementation of Convention	MOFE	10,000.00	2019-2020
2	Develop Post-MIA projects to address identified mercury issues of the country	MOFE	50000.00	2019

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: GON= Government of Nepal, MOFE = Ministry of Forests and Environment

Objective 2: Reduction of the use, emission and release of mercury from mercury-added products (Art. 4), manufacturing processes (Art. 5), ASGM (Art. 7), point and release sources (Art. 8 & 9).

Table 6-2: Objective 2

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Supporting Institution or stakeholder	Anticipated budget (US\$)	Time Frame
1	Update existing standards to limit release and emission of mercury	MOFE	MOICS, DOE, NEA, FNCCI	10,000.00	2019-2021
1	Develop standards for mercury emission, release for industries and limit contents for products	MOFE	MOICS, DOE, NEA, FNCCI	5,000.00	2019-2021
1	Develop standard for mercury in coal and determine the level of mercury in the imported coal	MOFE	DOC, NBSM	5,000.00	2019-2021
1	Put ban on Import, Purchase and Uses of Mercury added products listed one in Annex	MOFE, MOHP	MOF, MOICS, DOC, DDA, APHIN	5000.00	2019-2021
1	Prohibit open burning of all kinds of wastes at point or non-point source.	Local governments	Concerned ministries and departments	15000.00	2019-2021
2	Regular monitoring of mercury abatement techniques in industries.	DOE	Local Governments, third parties	10,000.00	2019-2021
2	Make inclusion of the mercury control/reduce technology mandatory for coal using industries.	MOFE	MOICS, concerned industries	10,000.00	2019-2021
2	Enforce standards on emissions from any new or existing waste incineration device or equipment installed in an institution	Local Governments	Concerned ministries and departments	30,000.00	2019-2024
2	Make waste water treatment mandatory for waste water generated from Municipalities and health care institutes under prescribed standard before discharge into surface water bodies	MOFAGA	Concerned ministries and departments	30,000.00	2019-2028

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: APHIN = Association of Private Health Institution Nepal, DDA= Department of Drug Administration, DOC= Department of Customs, DOE = Department of Environment, FNCCI = Federation of Nepalese Chamber of Commerce and Industry, MOF= Ministry of Finance, MOFAGA= Ministry of Federal Affairs and General Administration, MOFE= Ministry of Forests and Environment, MOHP= Ministry of Health and Population, MOICS= Ministry of Industry, Commerce & Supplies, NBSM= Nepal Bureau of Standards and Metrology, NEA= Nepal Electricity Authority, NHRC= National Health Research Council

Objective 3: Improvement of the interim storage of mercury (Art. 10), management of mercury wastes (Art. 11) and contaminated sites (Art. 12)

Table 6-3: Objective 3

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Supporting Institution or stakeholder	Anticipated budget (US\$)	Time Frame
1	Formulate and enforce guidelines for the environmentally sound management, including interim storage, of mercury and mercury compounds	MOFE	Concerned ministries, departments and local government	10,000.00	2019
2	Collect, safely store and initiate the long term sound management of all mercury added products	MOFE	MOHP, DOHS, NEA	50,000.00	2019-2028
2	Identify the sites contaminated by mercury or mercury compounds and determine the level of mercury.	DOE	Concerned ministries and departments, Local government	10,000.00	2019-2021
2	Remediation of sites contaminated by mercury or mercury compounds.	DOE	Concerned ministries and departments, Local government	50,000.00	2019-2024

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: DOE= Department of Environment, DOHS= Department of Health Services, MOFE= Ministry of Forests and Environment, MOHP= Ministry of Health and Population, NEA= Nepal Electricity Authority

Objective 4: Access to financial resource (Art. 13), and building capacity, providing technical assistance and technology transfer (Art. 14).

Table 6-4: Objective 4

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Supporting Institution or stakeholder	Anticipated budget (US\$)	Time Frame
1	Enhance Capacity of lead agency for an efficient information exchange and technology transfer	MOFE	Concerned ministries, departments and Academia	10,000.00	2019-2020
1	Design and implement the safe handling procedures while using mercury	MOFE	MOF, MOICS, FHAN	20,000.00	2019-2022

	during gold plating				
1	Develop technical and financial mechanism to support the gold plating entrepreneurs in establishing the mercury recycling/recapturing technology	MOFE	FHAN	50,000.00	2019-2020
1	Introduce efficient mercury recapture technology in cooperation with party countries having such technology	MOFE	DOE, MOICS, FHAN	10,000.00	2019-2020
2	Expand capacity building program at central, provincial and local level	MOFE	MOFAGA, MOHP, MOICS, Local government	10,000.00	2019-2024
2	Support for technical assistance and technology transfer from international organizations in order to reduce emission and release of mercury or mercury compound	MOFE	Development Partner, Local stakeholders	100,000.00	2019-2024

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: DOE= Department of Environment, FHAN= Federation of Handicraft Association MOFAGA= Ministry of Federal Affairs and General Administration, MOF= Ministry of Finance, MOFE= Ministry of Forests and Environment,

MOHP= Ministry of Health and Population, MOICS= Ministry of Industry, Commerce & Supplies

Objective 5: Protection of public health (Art. 16)

Table 6-5: Objective 5

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Supporting Institution or stakeholder	Anticipated budget (US\$)	Time Frame
1	Bio-monitoring of mercury in environmental samples and samples of exposed populations focused on gold plating workers, health workers, fisher folks, etc.	DOE, DOHS	NHRC, Academia, Fishery Department, MOFE, NGOs	40,000.00	2019-2024
1	Put ban on the use of mercury Dental Amalgam filling in Children and Pregnant Women first and then move to general public	MOHP	MOFE, NDA, APHIN	10,000.00	2019-2020
2	Carry out research on safer alternatives (equipment, chemicals, products, practices) that are reliable, affordable and cost effective	MOFE	MOHP, MOF/DOC, NGOs, Aca-	50,000.00	2019-2024

	tive.		demia		
3	Prepare database of mercury level in human population and environmental samples	MOFE	DOE, CBS, Academia, NGOs	30,000.00	2019-2024

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: APHIN= Association of Private Health Institute Nepal, CBS= Central Bureau of Statistics, DOC= Department of Customs, DOHS= Department of Health Services, DOE= Department of Environment, MOF= Ministry of Finance, MOFE= Ministry of Forests and Environment, MOHP= Ministry of Health and Population, NDA= Nepal Dental Association, NGOs= Non-Governmental Organizations, NHRC= Nepal Health Research Council

Objective 6: Promotion of information Exchange/Awareness-Raising (Art. 17 & 18).

Table 6-6: Objective 6

Priority*	Proposed Actions/Activities:	Lead Institution or Stakeholder	Supporting Institution or stakeholder	Anticipated budget (US\$)	Time Frame
2	Establish dedicated information desk and information officer in all public and private hospital and institutions with provision of all required facilities.	MOFE	Concerned ministries, departments and local governments	30,000.00	2019-2024
2	Develop and execute awareness raising and information exchange programs at all level (local to high level policy maker to political leaders)	MOFE	Concerned ministries and departments	100,000.00	2019-2024
3	Develop IEC (Information, Education and Communication) materials and raise awareness raising to educational institutions and various stakeholders through media group and sensitization programs	MOFE	Local Governments, Schools, Academia, NGOs,	100,000.00	2019-2024

*Indicate the level of priority for each of the proposed Actions/Activities using the following indications: 1= very high; 2 = high; 3 = medium; 4 = low; 5 = very low.

Note: MOFE= Ministry of Forests and Environment, NGOs= Non-Governmental Organizations

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Annex 1: Stakeholder Engagement Process and Data compilation and collection from source

Table 1: List of Identified stakeholders for MIA

Organizations and Persons to be invited in the **Inception workshop of MIA**

Ministries	Departments and Government Organizations	Other Organizations	Academic Institutions
Ministry of Finance	Department of Environment (Director General, Deputy Director General, Officers -3)	Nepal Health Research Council,	Central Department of Ayurved Studies,
Ministry of Federal Affairs and General Administration	Nepal Bureau of Standards and Metrology	Federation of Nepalese Chamber of Commerce and Industry	Central Department of Environmental Sciences, TU
Ministry of Education, Science and Technology	Department of Health Services	Federation of Nepalese Cottage and Small Scale Industries	Central Department of Chemistry, TU
National Planning Commission	Department of Mines and Geology	Nepal Handicraft Association	Tribhuvan University Teaching Hospital, Dental Department
Ministry of Energy and Water Resources	Department of Customs	NESS Pvt. Ltd	Kathmandu University, School of Medicine (Dental Department),
Ministry of Industry, Commerce and Supplies	Department of Industry	Nepal Dental Association	Dental Hospital
Ministry of Health and Population	Department of Cottage and Small Scale Industries	Federation of Nepal Brick Industries	
Ministry of Law and Parliamentary Affairs	Kathmandu Metropolitan office	Nepal Federation of Environmental Journalists	
Ministry of Forests and Environment (Secretary – Environment, Joint Secretaries – 3, Under Secretaries – 10)	Lalitpur Sub-Metropolitan office	Nepal Bar Association (Environment Committee)	
	Nepal Electricity Authority,		
	Singhadurbar Vaidhyakhana		
	Solid Waste Management Technical Support Centre		
	Department of Ayurved		
	Department of Labour		
MOFE, Environmental Standard and Monitoring Section staffs - 4 MIA Project Team - 5 BRI – 2 Journalists- 5 Total no. of participants – 69			

Table 2: List of participants of Inception Workshop

S.N.	Name	Designation	Organisation
1	Prakash Mathema	Secretary	Ministry of Forests and Environment
2	Rameshwor Dangal	Joint Secretary	Ministry of Forests and Environment
3	Bipin Rajbhandari	Senior Divisional Engineer	Ministry of Forests and Environment
4	Akhanda Sharma	Senior Divisional Engineer	Ministry of Forests and Environment
5	Anuradha Gyawali	Chemist	Ministry of Forests and Environment
6	Milabh Shrestha	Officer	Federation of Nepalese Chambers of Commerce and Industries
7	Vincent Spagnuolo	Mercury Specialist	Biodiversity Research Institute (BRI)
8	Molly Taylor	Director of International Programs	Biodiversity Research Institute
9	Hem Ratna Shakya	IP President	Federation of Handicraft Association Nepal
10	Prachanda Shakya	Vice President	Federation of Handicraft Association Nepal
11	Shatish Paudel	Planning Officer	Singhadurbar Vaidyakhana
12	Bishnu Thakali	President	WEPCO
13	Mukesh Pokhrel	Reporter	Himal Media
14	Ribita Tamrakar	Chemist	NBSM
15	Purushottam Ghimire	Camera Person	Nepal TV
16	Khema Basnet	Reporter	Nefej
17	Dr. Madhab Pd. Lamsal	Deputy Health Administrator	Ministry of Health and Population
18	Kabita Aryal	Com Nsg Admin	Ministry of Health and Population
19	Sunita Khanal	Environment Inspector	Department of Environment
20	Birendra Bikram Malla	Environmental Manager	Nepal Electricity Authority
21	Kumar Ghimire	Deputy General Secretary	PABSON
22	Jitendra Sharma	Engineer	Department of Industry
23	Dipak Kumar Hitan	Chemist	Department of Customs
24	Santosh Shrestha	Waste and contaminated sites Expert	MIA Project/MOFE
25	Prajwal Raut	Industry Sector Expert	MIA Project/MOFE
26	Kishor Khanal	Engineer	Solid Waste Management Technical Support Center
27	Safala Shrestha	Deputy Director General	Department of Environment
28	Prakash Sigdel	Environmental Inspector	Department of Environment
29	Prem Shyangtan	Reporter	Rajdhani Daily
30	Mohan Dev Joshi	Scientific Officer	Department of Environment
31	Babi Kr. Kafle	Chemistry Faculty	Kathmandu University
32	Padmira Dangol	Senior Chemist	Department of Environment
33	Raja Ram P. Shrestha	NPU	World Health Organisation
34	Anjani Kr. Adhikari	SDC, Senior Divisional Chemist	Department of Mines and Geology
35	Bishnu Tamang	Correspondent	Nagarik Daily

36	Chandan Kumar Mandal	Reporter/Sub-editor	The Kathmandu Post
37	Shrijana Shrestha	Senior Public Health Administrator	Department of Health Services
38	Surendra Shahi	Senior Divisional Engineer (Chemical)	Ministry of Industry, Commerce & Supplies
39	Achyut Das Pandey	Research Officer	Nepal Health Research Council
40	Sarita Gurung	Planning Officer	National Planning Commission
41	Gagan	Reporter	The Rajdhani Daily
42	Vivek Sharma	NPA	UNDP/GEF-SGP
43	Dr. Binod K. Yadav	Head & Associate Professor	Institute of Medicine, TU Teaching Hospital
44	Pratima Manandhar	Library Chief	MOFE
45	Uday Kr. Mahato	Health Assistant	Department of Labor
46	Suman Man Shrestha	Assistant Professor	Central Department of Environment, TU
47	Ram Charitra Sah	Expert, Health and Education	MIA Project/MOFE
48	Salil Devkota	Environment Expert	NESS (P) Ltd
49	Janaki Pradhan	Vice President CWEC	FNCSI
50	Bhisma Raj Ojha	Reporter	National News Agency (RSS)
51	Raju Phuyal	Advocate	Nepal Bar Association (Environment Committee)
52	Bhupendra Devkota	National Project Coordinator	MIA Project/MOFE
53	Tulsi Narayan Maharjan	Mechanical Engineer	MOFE
54	Rabindra Singh Lama	Section Officer	MOFE
55	Shankar Singh Dhama	Mechanical Engineer	Ministry of Industry, Commerce & Supplies
56	Purushottam Nepal	Under Secretary	MOFE
57	Jwala Shrestha	Under Secretary	MOFE
58	Doma T Sherpa	National Project Assistant	MIA Project/ MOFE

Table 3: List of Members of National Steering Committee

S.N.	Name	Designation	Organization
	Mr. Yajna Nath Dahal	Joint-Secretary	Ministry of Forests and Environment
2	Er. Bipin Rajbhandari	Under Secretary, Senior Divisional Engineer	Ministry of Forests and Environment
3	Mr. Shiva Sharma	Under Secretary	Ministry of Finance
4	Mr. Prabhat K. Singh	Under Secretary, Senior Divisional Engineer (Chemical)	Ministry of Industry, Commerce and Supplies
5	Mr. Ram Krishna Lamichhane	Under Secretary	Ministry of Health and Population
6	Mr. Buddhi Raj Ghimire	Under Secretary (Tech.)	Department of Environment
7	Dr. Megnath Dhimal	Senior Research Officer and Head, Research section	Nepal Health Research Council
8	Mr. Hem Ratna Shakya	IP President	Federation of Handicraft Association Nepal
9	Dr. Bhupendra Devkota	NPC to MIA in Nepal	Ministry of Forests and Environment

Table 4: List of member of National Working Groups

S.N	Name	Institution/Organization
Waste and Contaminated Sites Sector		
1	Mr. Mahesh Bhattarai	Ministry of Federal Affairs and General Administration
2	Ms. Shila Khatiwada	Department of Environment
3	Mr. Manoj Nidhi Wagle	Department of Customs
4	Mr. Dipendra Bahadur Oli	Solid Waste Management Technical Support Centre
5	Dr. Suman Man Shrestha	Central Department of Environmental Science, T.U., Kirtipur
6	Mr. Rajendra Kunwar	Nepal Reuse and Recyclable Goods Entrepreneurs Association (NRRGEA)
7	Mr. Tikaram Dahal	Non-Government Organisations' Federation for Environment Conservation (NGOFEC)
8	Mr. Padam Bahadur Shrestha	Nepal Bar Association
9	Ms. Anuradha Gyawali	Chemist, Environment Standards and Monitoring Section, MOFE
10	Mr. Santosh Shrestha	Waste and Contaminated Site Expert , MIA Project
Industrial Sector		
1	Mr. Manoj Nidhi Wagle	Department of Customs
2	Mr. Jitendra Prasad Sharma	Department of Industry
3	Ms. Sunu Dawadi	Department of Mines and Geology
4	Mr. Surya Subba	Department of Cottage and Small Scale Industries
5	Mr. Prachanda Shakya	Federation of Handicraft Association, Nepal (FHAN)
6	Er. Milabh Shrestha	Federation of Nepalese Chambers of Commerce and Industry (FNCCI)
7	Mr. Mahendra Chitrakar	Federation of Nepal Brick Industries
8	Mr. Kapoor Khadka	Nepal Cement Association
9	Mr. Purshottam Nepal	Under Secretary, MOFE/ (law)
10	Mr. Tulsi Narayan Maharjan	Mechanical Engineer, Environment Standards and Monitoring Section, MOFE
11	Er. Prajjwal Raut	Industrial Sector Expert, MIA Project
Health and Education Site Sector		
1	Ms. Ram Pyari Sunuwar	Ministry of Law, Justice and Parliamentary Affairs
2	Dr. Bhakta K.C.	Department of Health Services
3	Mr. Manoj Nidhi Wagle	Department of Customs
4	Dr. Buddi Prasad Poudel	Department of Ayurveda
5	Mr. Purna Bahadur Darji	Department of Education, Sanothimi
6	Dr. Binod Shah	Singh Durbar Vaidyakhana (Bikash Samiti)
7	Dr. Khagaraj Sharma	Central Department of Chemistry, TU
8	Dr. Manoj Humagain	Nepal Dental Association
9	Mr. Rabindra Singh Lama	Section Officer, Environment Standards and Monitoring Section, MOFE
10	Mr. Ram Charitra Sah	Health and Education sector Expert, MIA Project

Table 5: List of Participants of Inventory Training Workshop

S.N.	Organization	Number of participants
1	Ministry of Forests and Environment , Singh Durbar	4
2	Department of Environment, Kupondol	2
3	Ministry of Industry, Singh Durbar	1
4	Department of Ayurved, Teku	1
5	Department of Customs, Tripureswor	1
6	Department Of Mines and Geology, Lainchaur	1
7	Central Department of Chemistry, TU, Kortipur	1
8	Department of Health Services, Teku	1
9	Department of Cottage and Small Scale Industries, Tripureswor	1
10	Solid Waste Management Technical Support Centre, Pulchok	1
11	Federation of Nepalese Chamber of Commerce and Industries	1
12	Federation of Nepalese Cottage and Small Scale Industries	1
13	Federation of Handicraft Association of Nepal	1
14	NESS Pvt. Ltd., Thapathali	1
15	ENPHO, Kathmandu	1
16	MIA Project Team	5
	Total	24

Table 6: Import Data of Coal Consumption

S.N	HS Code	Description	Partner Country	Unit	Quantity
1	27011100	Anthracite, not agglomerated	India	KG	38620
2	27011200	Bituminous coal, not agglomerated	India	KG	650
3	27011900	Other coal, not agglomerated, nes	Bangladesh	KG	58980
4	27011900	Other coal, not agglomerated, nes	Bhutan	KG	7788050
5	27011900	Other coal, not agglomerated, nes	China	KG	20414
6	27011900	"Other coal, not agglomerated, nes	India	KG	480523733
7	27011900	Other coal, not agglomerated, nes	Indonesia	KG	109888780
8	27011900	Other coal, not agglomerated, nes	Mozambique	KG	4130200
9	27011900	Other coal, not agglomerated, nes	Not specified	KG	202640
10	27011900	Other coal, not agglomerated, nes	South Africa	KG	389820620
11	27011900	Other coal, not agglomerated, nes	United Arab Emi- rates	KG	30
12	27011900	Other coal, not agglomerated, nes	United States	KG	861
13	27012000	Briquettes, ovoids and similar solid fuels manufac- tured from coal	China	KG	80
14	27012000	"Briquettes, ovoids and similar solid fuels manufac- tured fr"	India	KG	11775
15	27012000	Briquettes, ovoids and similar solid fuels manufac- tured fr	Malaysia	KG	10190.5
16	27030000	Peat (incl peat litter)	Lithuania	KG	20450
17	27040000	Coke and semi-coke of coal, of lignite or f peat; re- tort	China	KG	660
18	27040000	Coke and semi-coke of coal, of lignite or f peat; retort carbon	India	KG	134950164
19	27040000	Coke and semi-coke of coal, of lignite or f peat; re- tort	Not specified	KG	79350
		TOTAL QUANTITY		KG	1127546247
		Total quantity		MT	1127546.247

Source: Nepal Foreign Trade Statistics, DOC, 2016/2017

Table 7: Import data of Petroleum coke

S.N	HS Code	Description	Partner Country	Unit	Quantity
1	27131100	Petroleum coke, not calcined	India	KG	21184010
2	27131100	Petroleum coke, not calcined	Saudi Arabia	KG	7500000
3	27131200	Calcined petroleum coke	India	KG	682000
		Total Import		KG	29366010
		Total Import		MT	29366.010

Source: Nepal Foreign Trade Statistic,DOC, 2016/2017

Table 8: Import data of Heavy Oil

S.N	HS Code	Description	Partner Country	Unit	Quantity
1	27101950	Fuel Oil (Furnace Oil)	Australia	KL	2802
2	27101950	Fuel Oil (Furnace Oil)	Austria	KL	200.41
3	27101950	Fuel Oil (Furnace Oil)	Bahrain	KL	3639
4	27101950	Fuel Oil (Furnace Oil)	Djibouti	KL	259
5	27101950	Fuel Oil (Furnace Oil)	India	KL	19112
6	27101950	Fuel Oil (Furnace Oil)	Kuwait	KL	1040.28
7	27101950	Fuel Oil (Furnace Oil)	Malaysia	KL	3121
8	27101950	Fuel Oil (Furnace Oil)	Not specified	KL	40
9	27101950	Fuel Oil (Furnace Oil)	Oman	KL	1235
10	27101950	Fuel Oil (Furnace Oil)	Singapore	KL	7589
11	27101950	Fuel Oil (Furnace Oil)	United Arab Emirates	KL	7623
		TOTAL IMPORT		KL	46660.69
		TOTAL IMPORT		MT	49926.9383

Source: Nepal Foreign Trade Statistics, DOC, 2016/2017

Table 9: Data of Petroleum products in Nepal

S.N	Fuels	Total import MT	Conversion factor
1	LPG (MT)	312,928	
2	Kerosene (KL)	19607	1.285
3	Petrol (KL)	407270	1.41
4	Diesel (KL)	1319873	1.21

Source: Nepal Oil Corporation, Kathmandu Office, year 2016/2017

Table 10: Import Data of Distillates

Source: Nepal Foreign Trade Statistics fiscal year, DOC 2016/2017

HS Code	Description	Partner Country	Unit	Quantity
27071000	Benzol (benzene)	India	KG	1184
27072000	Toluol (toluene)	India	KG	64457.5
27072000	Toluol (toluene)	Malaysia	KG	14320
27072000	Toluol (toluene)	Thailand	KG	14320
27073000	Xylol (xylenes)	India	KG	29286
		Total	KG	123567.5
			MT	123.5675

Table 11: Bio Mass consumption

Source	Unit	Quantity	Quantity in MT
Fuel wood	toe	8376000	23379091
Agriculture residue	toe	414000	1238097

Source: Economic Survey Report 2016/2017

Table 12: Paper Production in Nepal

S.No.	Name of Industry	Paper Production	Bio consumption	Name of Bio mass	Pollution control technology
1	Shree Maruti Paper Industry	25000	45000	Waste paper	Dust filter
2	Sun Rise Paper Industry	7075	8844	Waste paper	Dust filter
3	Baba Paper Industry	5206	11,082	Bagasse/ waste paper	Dust filter
4	Everest Paper Industry	9589	29746	Bagasse/ waste paper	Dust filter
5	Reliance Paper Industry	30000	60000	Waste paper	Dust filter
6	Mk Paper Industry	25000	45000	Waste paper	Dust filter

Source: Personal Communication and Field Visit

Table 13: Total production of recycled ferrous metals (iron and steel) in Nepal

S. No	Industry	Amount of RFM(ton /year)
1	Jagdamba Steel	60000
2	Ashok Steel	24000
3	Ambe Steel	22678
4	Narayani Steel	30000
5	Laxmi Steel	24000
	Total	160,678

Source: Field survey 2018 and personal communication

Table 14: Health care waste incinerated or burned in Nepal

Hospitals	No.	No. of Bed 1*	HCW per bed/day2*	HCW generation per day	Percentage of HCW incinerated or burned	HCW incinerated or burned per day	HCW incinerated or burned per year (kg/yr)	HCW incinerated or burned per year (ton/yr)
Private Hospital	548	33000	1.35	44550	45%	20047.5	7317337.5	7317.338
Government Hospital	123	8172	1.35	11032	50%	5516.1	2013276.5	2013.377
Total	671	41172		55582.2		25563.6	9330714	9330.714

Source: field survey 2018; 1*: MOHP 2018; 2*:MOHP 2015

Table 15: Health care waste incinerated or burned in Government Hospitals

S. No	Government Hospitals	Address	Total Bed	Bed Occupancy Rate	Total HCW (kg/day)	% of HCW openly burned or incinerated in 2016-2017	Remarks 2018	Source
1	Hetauda Hospital	Hetauda SMC	120	60%	60	100		Samana Sharma , Hospital Manager
2	Udayapur District Hospital	Gaighat, Udayapur	50	90%	40	100		Dr. Pawan Kumar Sah, Acting Medical Superintendent
3	Patan Hospital	Lalitpur MC	558	70%	497	30	no more incineration at present	Rachana Shrestha, Patan Hospital
4	Teaching Hospital , TU	Maharajgunj, Kathmandu	700	90%	1000	30		Dharam Laxmi Shrestha, TU
5	Bhaktapur Hospital,	Bhaktapur	75	70%	50	30	no more incineration at present	Administration Office, Bhaktapur Office
6	Bhaktapur Cancer Hospital	Bhaktapur	135	80%	78	32		Raja ram Tajale, Hospital Administrator
7	Shree Memorial Hospital	Banepa	150	61%	280	46		Sundar Thapa Magar, Shree Memorial
8	Dhulikhel Teaching Hospital	Dhulikhel	475	65%	450	30	no more incineration at present	Bedana Maharjan, Dulikhel Hospital
9	Dhankuta zonal Hospital	Dhankuta	27	100%	14	50	stopped incinerating	SWMTSC/OBA, 2017 , Ram Charitra Sah; Upen-dra Khanal, Dhankuta Municipality
	Total / Average total		2290	76%	2469	49.78		

Table 16: List of Municipalities in Nepal with Sanitary landfill sites and controlled dumped sites

S. N.	Municipalities with sanitary landfill sites	Population	S. N.	Municipalities with controlled dump sites	Population
1	Municipalities of Kathmandu District + Lalitpur MC	1,984,211		Province 1	
	Budhanilkhantha Municipality	107,918	1	Damak Municipality	75,102
	Chandragiri Municipality	85,198	2	Mechinagar Municipality	111,737
	Dakshinkali Municipality	24,297	3	Khandabari Municipality	31,177
	Gokarneshwor Municipality	107,351		Province 2	
	Kageshwori Manahara Municipality	60,237	4	Lahan Municipality	91,766
	Kathmandu Metropolitan City	975,453	5	Chandrapur Municipality	72,059
	Kirtipur Municipality	65,602	6	Bardibas Municipality	64,212
	Nagarjun Municipality	67,420	7	Lalbandi Municipality	59,395
	Shankharapur Municipality	25,338	8	Hariwan Municipality	43,924
	Tarakeshwor Municipality	81,443		Province 3	
	Tokha Municipality	99,032	9	Bhaktapur Municipality	81,748
		1,699,289	10	Nilkhantha Municipality	58,515
	Lalitpur Metropolitan City	284,922	11	Kamalamai Municipality	64,386
		1,984,211	12	Bharatpur Metropolitan City	280,502
			13	Hetauda Sub-Metropolitan City	152,875
2	Tansen Municipality	50,405	14	Bhimeshwor Municipality	32,486
3	Ghorahi Sub-Metropolitan City	156,164			
4	Pokhara Lekhnath Metropolitan City	402,995		Province 4	
5	Dhankuta Municipality	36,619	15	Gorkha Municipality	49,272
			16	Walling Municipality	51,243
			17	Kawasoti Municipality	62,421
			18	Baglung Municipality	57,823
			19	Province 5	
				Resunga Municipality	32,548
			20	Butwal Sub-Metropolitan City	138,742
			21	Tulsipur Sub-Metropolitan City	141,528

			22	Sainamaina Municipality	55,822
			23	Province 6	
				Birendranagar Municipality	100,458
			24		
				Narayan Municipality	27,037
			25		
				Amargadhi Municipality	21,245
			26	Parashuram Municipality	34,983
	Total	2,630,394		Total	2,025,168

Note: Source of data on sanitary landfill site and controlled dump site is provided by Mr. Dipendra B. Oli, SWMTSC, while population status is obtained from CBS report 2017

Table 17: Estimation of MSW disposed in sanitary landfill and controlled dump

Description	Unit	Value	Source
Total Population in 2011	No.	4,623,400	CBS 2017
Population growth rate in 2016 (PGR)	%	1.35	CBS 2011
Population projection in 2016		4,944,020	CBS 2014
Per capita MSW generation	Kg/day /person	0.317	ADB, 2013
Total MSW Generation	Kg/per day	1,567,254	
Total MSW Generation	ton/day	1,567.25	
2/3 of MSW in landfill or controlled dumped ¹	ton/day	1,045	ADB,2013 / SWMTSC 2016
MSW in landfill and controlled dumped	(ton /y)	381,365	
Total Hg release	Kg/Y	1907	

Table 18: Estimation of Informal Dumping of General Waste or MSW

Description	Unit	Value	Source of Data
Total Population in 2011	No.	12,137,479	CBS 2011
Population growth rate in 2016	%	1.35	CBS 2016
Population projection in 2016	No.	12,979,180	CBS 2017
Per capita MSW generation	Kg/day /person	0.317	ADB 2013

Total MSW Generation	Kg/per day	4,114,400	
Total MSW generation	T/day)	4,114	
Waste Collection Efficiency		62%	ADB 2013
Informal dumping of General Waste or MSW	T/day	2,551	
Informal dumping of General Waste or MSW	T/y	931,089	
Total Hg release	Kg/y	4655	

Table 19: Total Waste Water Generation at Domestic level

	Projected Population 2016	LPCD ² (liter)	Water Consumption (liters)	Waste water Generation 85% of TWC ¹	m3/day	m3/year
Rural	10,700,190	45	481,508,549.90	409,282,267.42	409,282.27	149,388,027.61
Urban	17,731,304	100	1,773,130,400.22	1,507,160,840.18	1,507,160.84	550,113,706.67
Total Waste Water Generation at Domestic level					1,916,443.11	699,501,734.27

Note : ¹Based on Data Source in State of Environment 2001 Nepal;

² based on National Urban Water Supply and Sanitation Policy 2009

Table 20: List of industrial zone in Nepal generating waste water per year

Industrial District (ID)	Total industries	Total water consumption	(unit)	Total water consumption per year	Total consumption per year (unit)	Waste Water Estimation (m ³ /year)	Source of Data
Dharan	35	100000	liter/ day	36500000	liters/year	31025	KishorPandey, Dharan ID
Pokhara	78	453600	liter/ day	165564000	liters/year	140729	Pokhara ID
Nepalgunj	35	200000	liter/ day	73000000	liters/year	62050	Nepalgunj ID
Birendranagar	28	12446000	liters/year	12446000	liters/year	10579	Birendranagar ID
Gajendranarayan Singh, Rajbiraj	4	240	m ³ /month	2880	m ³ /year	2448	http://www.idm.org.np/index.php/2014-12-30-08-23-17/gajendranarayan-singh;September2,2018
Patan	116	120	m ³ /day	43800	m ³ /year	37230	Patan ID, field visit
Bhaktapur	37	0		0	m ³ /year	0	Bhaktapur ID
Butwal	72	10000	m ³ /month	120000	m ³ /year	102000	Butwal ID, GopalBhandari
Balaju, Kathmandu	144	393266004	liter/year	393266004	liters/year	334276	Balaju ID, field visit
Hetauda 1*	91	550	m ³ /day	200750	m ³ /year	200750	Hetauda ID, field visit, Suraj Prasad Sah
Total						921088	

Note: 1*in case of Hetauda, waste water generation per day is 550 m³.

Table 21: Estimation of Crematoria and Cemeteries in Nepal¹based on population projection of CBS Census 2011 and religious distribution of population 2011

Population according to religion	2016 ¹	Population who are Cremated according to religion	Population who are Cemeteries according to religion
Hindu	23,127,103	23,127,103	
Buddist	2,571,276	2,571,276	
Muslim	1,247,350		1,247,350
Kirat	866,180		866,180
Christian	403,166		403,166
Prakriti	130,900	130,900	
Bon	13,957	13,957	
Jain	3,449	3,449	
Bahai	1,377		1,377
Sikhism	654	654	
Undefined	66,083		66,083
Total	28,431,494	25,847,339	2,584,156
Crude death Rate	7.2		
Total		186101	18606
Total Hg release (Kg/Year)		465	47

Table 22: Estimation of Mercury release in Gold Plating Industries in Nepal

Pieces of Sculptures	Au-Hg Amalgam (tola/piece)	Au (gm/piece)	Tola Au (gm)	Hg (gm/Piece)	Total Hg (gm)	weight (Kg/piece)	Total Weight
114127.2	4	2.9	330968.88	43.5	4964533.2	5	570636

28531.8	2	1.45	41371.11	21.75	620566.65	2	57063.6
19021.2	10	7.25	137903.7	108.75	2068555.5	9	171190.8
19021.2	15	10.875	206855.55	163.125	3102833.25	14	266296.8
9510.6	20	14.5	137903.7	217.5	2068555.5	20	190212
190212			855002.94		12825044.1		1255399.2
Total					12825.0441		

Note: 1 Tola = 11.66 grams

Source: Department of Archeology 2016/2017 and FHAN 2016/2017

Table 23: Mercury release in air, water and land from Gold Plating Industries in Nepal

Mercury release	total mercury release input (kg/yr)	Air (95%)	Water (3%)	Soil (2%)
Hg(kg)	12825.0441	12183.7919	384.751323	256.500882

Source: Field survey 2018

Table 24: Nepali Ayurved Companies producing mercury based Ras and Bhasma medicines

S.No.	Name of the Ayurved Companies producing mercury based Ras and Bhasma medicines	Locations
1	Arogyabhawan Works Pvt,Ltd	Dhapasi,Kathmandu
2	Astanga Pharmaceuticals (P)Ltd	Itahari, Sunsari
3	Bhaskar Herbaceutical Pvt.Ltd.	Birgunj, Parsa
4	Dekha Herbals Nepal	Dhapakhel, Lalitpur
5	Gorakhnath Herbaceuticals Pvt.Ltd	Panauti, Kavrepalanchowk
6	Gorkha Ayurved Company	Gorkha
7	Sagarmatha Ayurvedic Aushadhi Udhog	Gokarna, Kathmandu
8	Shree Krishna Ayu. Aushadhalaya	Bagbazar,Kathmandu
9	Singhadarbar Baidhyakhana	Anamnagar, KATHmandu
10	Sri Pashupatinath Ayurved Bhawan	Rautahat

11	Suri Herbal Product Industry	Thimi, Bhaktapur
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Source: Mr. Prakash Gayawali, Chief. Ayurveda Division, DDA, Babarmahal, Kathmandu, Ministry of Health and Population.

Table 25: List of participants of interaction program "Source of Mercury (Hg), its use and safe management"

S.N.	Name	Designation/Organization
1	Prachanda Shakya	President, FHAN
2	Nabin Shakya	Joint President, FHAN
3	Pradip Shakya	Member, FHAN
4	Raj Man Bajracharya	Member, FHAN
5	Purna Kaji Shakya	Member, FHAN
6	Hem Ratna Shakya	Ex- President, FHAN
7	Surendra Bhai Shakya	Vice President, FHAN
8	Ratneshwori Shakya	Vice President, FHAN
9	Jivan Ratna Shakya	Working Committee Member, FHAN
10	Leela Sharma	Working Committee Member, FHAN
11	Karuna Ratna Shakya	Member, FHAN
12	Sharad Shakya	Member, FHAN
13	Raju Shakya	Member, FHAN
14	Purshottam Bajracharya	Member, FHAN
15	Sudarshan Shakya	Member, FHAN
16	Manik Man Shakya	Member, FHAN
17	Binaya Bajracharya	Member, FHAN
18	Manohar Maharjan	Member, FHAN
19	Nem Ratna Dhakhwa	Member, FHAN
20	Bhumi Raj Chawalagain	Member, FHAN
21	Kabindra Raj Tamrakar	Member, FHAN
22	Kishor Shakya	Member, FHAN
23	Gyani Shova Shakya	Member, FHAN

24	Ram Krishna Prajapati	Member, FHAN
25	Dinesh Shakya	Member, FHAN
26	Rajendra Raj Bajracharya	Member, FHAN
27	Purna Sarki	Member, FHAN
28	Rekha Aryal	Member, FHAN
29	Jyoti Shrestha	Member, FHAN
30	Rachana Shakya	Member, FHAN
31	Dipendra Silpakar	Member, FHAN
32	Bipin Rajbhandari	Under Secretary, MOFE
33	Tulsi Narayan Maharjan	Mechanical Engineer, MOFE
34	Anuradha Gyawali	Chemist, MOFE
35	Rabindra Singh Lama	Section Officer, MOFE
36	Bhupendra Devkota	National Project Coordinator, MIA/MOFE
37	Prajwal Raut	Industrial sector Expert, MIA/MOFE
38	Santosh Shrestha	Waste and Contaminated Sites Expert, MIA/MOFE
39	Ram Charitra Sah	Health and Education Expert, MIA/MOFE
40	Doma Tshering Sherpa	National Project Assistant, MIA/MOFE

Table 26: Professionals consulted as part of preparation of Mercury Inventory Profile

S.No.	Name	Designation	Organization	Address
1	Abhishek Tulsian	Executive Officer	Ashok Steel Pvt. Ltd	Bara
2	Alok Singh	Director	NBSM	
3	Ananda Sighhal	Manager	Shree Maruti Paper Industry	Bara
4	Ashish Ghimire	Project Manager	High Power Committee for Integrated Development of Bagmati Civilization	Guweshwori, Kathmandu
5	Bhupendra Das	PhD scholar	Central Department of Environmental Science, Tribhuvan University	TU, Kirtipur Municipality
6	Chandra Krishna Singh	Marketing Manager	Ambe Steel Pvt. Ltd.	Teku, Kathmandu
7	Kapoor Khadka	Representative	Cement Manufacturer Association of Nepal	Kathmandu

8	Devi Bhattarai	Production Manager	Sunrise Paper Industry	Sunsari
9	Dharma Laxmi Shrestha	Incharge Nurse	Teaching Hospital, TU	Maharjgunj, Kathmandu
10	Dipendra B. Oli	Legal Officer	Solid Waste Management Technical Support Center/MoFAGA	Pulchowk, Lalitpur Metropolitan City
11	Ghanshyam Chaudhari	Sub-Engineer	Triyoga Municipality	Gaighat, Udayapur
12	Junu Thapa	Administration Officer	Patan Industrial District	Lagankhel, Lalitpur
13	Kalpana Baral		Sanitation and Health Department	Pokhara
14	Kishor Kumar Shrestha	Lecturer	Western Regional Engineering College	Pokhara
15	Krishna Jamarkattel		District Coordination Committee	Kaski
16	Leela Krishna Bhurtel	Proprietor	Aarati Paints Industry	Pokhara
17	Mahendra Godar	Chief	Phewatal Conservation Project	Kaski
18	Manoj Nidhi Wagle	Senior Divisional Chemist	Department of Customs	Tripureswor, Kathmandu
19	Nanibabu Dhakal		District Coordination Committee	Kaski
20	Nawal K. Chaudhary	General Manager	Shivam Cement Industry	Hetauda
21	Padam Raj Acharya		District Public Health Office	Kaski
22	Prajwal Shrestha	Consultant	AEPC, MOFE	
23	Pawan Gupta	Director	Jagdamba Steel Pvt. Ltd	Bara
24	Pawan Kumar Sah	Medical Superintendent	Udaypur District Hospital	Gaighat, Udayapur
25	Rabi Chandra Paudel	Program Officer	Udaypur Cement Industry	Udayapur
26	Rabi Manandhar	Executive EHS Officer	Unilever Industry	
27	Rajaram Tajale	Hospital Administrator	Bhaktapur Cancer Hospital	Bhaktapur
28	Ritesh Kail		Narayan Rolling Mills (Narayani Steel)	Birgunj, Kathmandu
29	Samana Sharma	Hospital Manager	Hetauda Hospital	Hetauda Sub Metropolitan City, Makwanpur
30	Santosh Dahal	Manager	Everest Paper Industry	Janakpur
31	Saroj Shrestha	Chairperson	Nepal Reuse and Recyclable goods Entrepreneur Association	Balkhu, Kathmandu MC
32	Shree Krishna Shrestha	Executive EHS Officer	Asian Paint Industry	Hetauda
33	Shrijana Shrestha	Senior Public health Administrator	MIA section, Department of Health Service	Teku, Kathmandu
34	Sudan Panthi	National Programme-Coordinator	World Health Organization	PaniPokhari, Kathmandu
35	Sukudev Yadav	Production Manager	Baba Paper Industry	Sunsari
36	Sundar Thapa	Senior Executive Officer	Scheer Memorial Adventist Hospital	Banepa, Kavre

37	Suraj Prasad Sah	Civil Engineer	Wastewater Treatment Plant/ Hetauda Industrial District	Hetauda Sub Metropolitan City, Makwanpur
38	Surat Kumar Bam	Senior Division Engineer	Project Implementation Directorate/ Kathmandu UpatyakaKhanepani Limited (KUKL)	Anamnagar/Kathmandu
39	Tika bahadur Chaudhari	Senior Division Engineer	Sewerage Development and Management Section, Department of Water Supply and Sewerage	Panipokhari, Kathmandu
40	Upendra Khanal	Environmental Officer	Dhankuta Municipality Office	Dhankuta
41	Uttam Kunwar	Project Manager	Nepal Energy Efficiency Project, GIZ/ FNCCI	
42	Uttam Shrestha	Assistant Officer	Ministry of Health and Population	Ramshah Path, Kathmandu



च.नं. १(अ)

नेपाल सरकार

स्वास्थ्य तथा जनसंख्या मन्त्रालय

नीति, योजना तथा अन्तर्राष्ट्रिय सहयोग महाशाखा



रामशाहपथ,
काठमाण्डौ
फोन : ४२६२८६२,
फ्याक्स : ४२६२८९६

मिति : २०६९/१२/१५

विषय : मर्करीयुक्त उपकरणहरुको आयात बन्द गर्ने सम्बन्धमा ।

श्री स्वास्थ्य सेवा विभाग, टेकू ।

श्री औषधि व्यवस्था विभाग, विजुलीवजार ।

श्री आयुर्वेद विभाग, टेकू ।

नेपाल सरकार (सचिवस्तर) वाट २०६९/११/२१ मा आगामी आ.व. २०७०/७१ देखि नेपाल सरकारले मर्करीयुक्त उपकरणहरु खरिद र उपयोग बन्द गर्ने र निजी क्षेत्रलाई पनि खरिद उपयोग नगर्न अनुरोध गर्ने निर्णय भएको हुँदा सोही अनुसार गर्न गराउनु हुन निर्देशानुसार अनुरोध गर्दछु ।

(कविराज खनाल)

उप सचिव

श्री जहा स्वास्थ्य तथा जनसंख्या प्रवर्द्धन केन्द्र,

डुम्राडोल, ललितपुर ।

MOHP's circular regarding the stop on import of mercury containing equipment

(English Translation)



च.नं. १(अ)

Government of Nepal
Ministry of Health and Population
Policy, Planning and International Cooperation Division

Ramshahpath
Kathmandu
Phone: 4262862
Fax: 4262896

Date: 2069/12/15
(28th March 2013)

Subject: **Regarding the Stop on Import of Mercury containing equipment**

Department of Health Services, Teku,
Department of Drug Administration, Bijulibajar,
Department of Ayurveda, Teku.

As the decision of 2069/11/21 (04 March 2013) made by the Government of Nepal (Secretary level), Government of Nepal will not procure and use any mercury containing equipment effective from the FY 2070/71 (2014/15) and also requests the private sector, as instructed, not to procure and use such equipment.

SD
Kabiraj Khanal,
Under Secretary

CC

Centre for Public Health and Environmental Development (CEPHED), Imadol, Lalitpur

Annex 2: UNEP TOOLKIT Calculation spreadsheet

UN Environment's Toolkit for identification and quantification of mercury releases - Inventory Level 1 Calculation Spread sheet

MERCURY INVENTORY FOR (INSERT COUNTRY NAME):	Nepal		
General population data			
Population (select country below to find population)	28,043,744		
Year and reference for population data			
GDP (Gross Domestic product)	NPR 28733 per capita with a growth rate of 6.94% (at constant price)		
Year and reference for GDP data	2016/2017		
Main sectors in the economy of country (list)			
Contact point responsible for inventory			
Full name of institution	Ministry of Forests and Environment		
Contact person	Mr. Bipin Rajbhandari, Under-Secretary (Tech.)		
E-mail address	bipin.rajbhandari@nepal.gov.np		
Telephone number	+977-1-4211567		
Fax number	+977-1-4211868		
Website of institution	http://www.mofe.gov.np		
BACKGROUND DATA NEEDED FOR DEFAULT CALCULATIONS AND RANGE TEST			
Compulsory: Click cell below and select country from list	Population in 2010 (or as recent as available data allow; UNSD, 2012)	Dental personnel per 1000 inhabitants	Electrification rate, % of population with access to electricity
Nepal	28,043,744	0.017	44

Notes: See Appendix 1 to Inventory Level 1 Guideline on background for numbers.

For references, see the relevant sections in the Toolkit Reference report.

Non-country inventories: In case you make this inventory for a non-country territory (a city, a region, etc.), you should select a country relevant to the conditions prevailing in the territory, as this adjusts the calculated estimates according to the conditions. You need however ALSO to enter the population of the territory MANUALLY in cell B6 above (overwrite the automatically stated number).

Note also: Worksheets and workbook are protected with password to avoid un-intentional damages to calculations.

Disclaimer:

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement. This publication is intended to serve as a guide. While the information provided is believed to be accurate, UN Environment (UNEP) disclaims any responsibility for possible inaccuracies or omissions and consequences that may flow from them. Neither UN Environment (UNEP) nor any individual involved in the preparation of this publication shall be liable for any injury, loss, damage or prejudice of any kind that may be caused by persons who have acted based on their understanding of the information contained in this publication.

Version:

January, 2017

DOMESTIC PRODUCTION OF METALS AND RAW MATERIALS												
Source category	Source present?	Activity rate Annual consumption/p roduction	Unit	Include Hg controls in estimation? (y/n)	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						Cat. no.
	Y/N/?				Standard estimate	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatm. /disposal	
Primary metal production												
Mercury (primary) extraction and initial processing	N		Mercury produced, t/y		-	-	-	-	-	-	-	5.2.1
Production of zinc from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	5.2.3
Production of copper from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	5.2.4
Production of lead from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	5.2.5
Gold extraction by methods other than mercury amalgamation	N		Gold ore used, t/y		-	-	-	-	-	-	-	5.2.6
Alumina production from bauxite (aluminium production)	N		Bauxit processed, t/y		-	-	-	-	-	-	-	5.2.7
Primary ferrous metal production (pig iron production)	N		Pig iron produced, t/y		-	-	-	-	-	-	-	5.2.9
Gold extraction with mercury amalgamation - from whole ore	N		Gold produced, kg/y		-	-	-	-	-	-	-	5.2.2
Gold extraction with mercury amalgamation - from concentrate	N		Gold produced, kg/y		-	-	-	-	-	-	-	5.2.2
Other materials production												
Cement production	Y	2,805,000	Cement produced, t/y	Y	384	287.8	0.0	0.0	95.9	0.0	0.0	5.3.1
				1) WITH WASTE USED as fuel (>3% of energy); relevant pollution abatement options		No filter	Simple particle control (ESP / PS / FF)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FF)	Efficient air pollution control (FF+DS / ESP+DS / ESP+WS / ESP+SNCR)	Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+S NCR)		
				Enter per cent of total activity rate per type:		25	25					
				2) NO/LOW WASTE use as fuel; relevant pollution abatement options		No filter	Simple particle control (ESP / PS / FF)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FF)	Efficient air pollution control (FF+DS / ESP+DS / ESP+WS / ESP+SNCR)	Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+S NCR)		
				Enter per cent of total activity rate per type:		25	25					
Pulp and paper production	Y	157,972	Biomass used for production, t/y	Y	5	4.7	0.0	0.0	0.0	0.0	0.0	5.3.2
				Relevant pollution abatement options (guide: click white cells)		No filters used	PM control with general ESP, or PS					
				Enter per cent of total activity rate per type:		100.0						

GENERAL WASTE MANAGEMENT SET-UP IN THE COUNTRY

Please answer questions about the current waste treatment set-up in your country:		Y/N			Y/N							
a) Is more than 2/3 (two thirds = 67%) of the general waste collected and deposited on lined landfills or incinerated in closed incinerators?		N			N	These two questions must be answered for product-related mercury releases to be calculated						
b) Is more than 1/3 (one third = 33%) of the mercury-added products waste safely collected and treated separately?												
WASTE HANDLING AND RECYCLING												
Source category	Source present?	Activity rate Annual production /waste disposal	Unit	Include Hg controls in estimation? (y/n)	Estimated Hg input, Kg Hg/y Standard estimate	Estimated Hg releases, standard estimates, Kg Hg/y					Sector specific waste treatment /disposal	Cat. no.
Production of recycled metals	Y/N/?					Air	Water	Land	By-products and impurities	General waste		
Production of recycled mercury ("secondary production")	N		Mercury produced, kg/y		-	-	-	-	-	-	-	5.7.1
Production of recycled ferrous metals (iron and steel)	Y	73,035	Number of vehicles recycled/y		80	26.5	0.0	27.3	0.0	26.5	0.0	5.7.2
Waste incineration												
Incineration of municipal/general waste	N		Waste incinerated, t/y	N	-	-	-	-	-	-	-	5.8.1
Incineration of hazardous waste	Y	31	Waste incinerated, t/y	N	1	0.7	0.0	0.0	0.0	0.0	0.0	5.8.2
Incineration / burning of medical waste	Y	9,331	Waste incinerated, t/y	N	224	223.9	0.0	0.0	0.0	0.0	0.0	5.8.3
Sewage sludge incineration	N		Waste incinerated, t/y		-	-	-	-	-	-	-	5.8.4
Open fire waste burning (on landfills and informally)	Y	154,691	Waste burned, t/y		773	773.5	0.0	0.0	0.0	0.0	0.0	5.8.5
Waste deposition/landfilling and waste water treatment												
Controlled landfills/deposits	Y	381,365	Waste landfilled, t/y		1,907	19.1	0.2	0.0	-	-	-	5.9.1
Informal dumping of general waste *1	Y	931,089	Waste dumped, t/y		4,655	465.5	465.5	3,724.4	-	-	-	5.9.4
Waste water system/treatment	Y	700,422,822	Waste water, m ³ /y	N	3,677	0.0	3,309.5	0.0	0.0	367.7	0.0	5.9.5

Waste default input factor test (see IL1 Guideline Appendix 4; the test here requires that all relevant results are calculated):
 Calculated total Hg inputs to general waste: #VALUE!
 Calculated total Hg outputs to general waste from intentional mercury use: #VALUE!
 Test result for general waste (quote in your report): #VALUE!

Wastewater default input factor test (see IL1 Guideline Appendix 4; the test here requires that all relevant results are calculated):
 Calculated total Hg input to wastewater treatment: 3,677
 Calculated total Hg outputs to water from intentional mercury use: 785
 Test result for general waste (quote in your report): The calculations made indicate that the default input factors for wastewater may over-estimate the mercury releases from these sources.

Jakob Maag:
 INPUT FACTOR TEST WAS CHECKED AND LANGUAGE ADJ

CREMATORIA AND CEMETERIES

Source category	Source present? Y/N/?	Activity rate Annual numbers dead	Unit	Estimated Hg input, Kg Hg/y Standard estimate	Estimated Hg releases, standard estimates, Kg Hg/y						Sector specific waste treatment /disposal	Cat. no.
					Air	Water	Land	By-products and impurities	General waste			
Crematoria	Y	186,101	Corpses cremated/y	465	465.3	0.0	0.0	-	0.0	0.0	5.10.1	
Cemeteries	Y	18,606	Corpses buried/y	47	0.0	0.0	46.5	-	0.0	0.0	5.10.2	

Miscellaneous mercury release sources not quantified on Inventory level 1

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

INVENTORY LEVEL 1 - EXECUTIVE SUMMARY

Source category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						Total releases *3*4*5	Percent of total releases *3*4
		Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal		
Coal combustion and other coal use	150.3	150.3	0.0	0.0	0.0	0.0	0.0	150	2%
Other fossil fuel and biomass combustion	753.3	753.3	0.0	0.0	0.0	0.0	0.0	753	11%
Oil and gas production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Primary metal production (excl. gold production by amalgamation)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Gold extraction with mercury amalgamation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Other materials production*6	388.5	292.5	0.0	0.0	95.9	0.0	0.0	388	6%
Chlor-alkali production with mercury-cells	-	-	-	-	-	-	-	0	0%
Other production of chemicals and polymers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Production of products with mercury content*1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Application, use and disposal of dental amalgam fillings	114.4	2.3	50.4	9.2	6.9	22.9	22.9	114	2%
Use and disposal of other products	2,475.9	381.6	734.9	381.6	0.0	769.8	207.9	2,476	36%
Production of recycled metals	80.3	26.5	0.0	27.3	0.0	26.5	0.0	80	1%
Waste incineration and open waste burning*2	998.1	998.1	0.0	0.0	0.0	0.0	0.1	998	15%
Waste deposition*2	1,906.8	19.1	0.2	0.0	-	-	-	19	0%
Informal dumping of general waste *2*3	4,655.4	465.5	465.5	3,724.4	-	-	-	931	14%
Waste water system/treatment *4	3,677.2	0.0	3,309.5	0.0	0.0	367.7	0.0	368	5%
Crematoria and cemeteries	511.8	465.3	0.0	46.5	0.0	0.0	0.0	512	8%
TOTALS (rounded) *1*2*3*4*5*6	5,230	3,550	1,250	460	100	1,190	230	6,790	100%

Notes:

*1 To avoid double counting of mercury in products produced domestically and sold on the domestic market (including oil and gas), only the part of mercury inputs *released* from production are included in the input TOTAL.

*2: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration, waste deposition and informal dumping is included in the total for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Toolkit. See Appendix 1 to the Inventory Level1 Guideline for more explanation.

*3: The estimated quantities include mercury in products which has also been accounted for under each product category.

To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS.

*4: The estimated input and release to water include mercury amounts which have also been accounted for under each source category.

To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS.

*5: Total inputs do not necessarily equal total outputs due to corrections for double counting (see notes*1-*3) and because some mercury follows products/metal mercury which are not sold in the same country or in the same year.

*6 To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the TOTALS.

INVENTORY LEVEL 1 - SUMMARY OF MERCURY INPUTS

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
Energy consumption				
Coal combustion in large power plants	N	0	Coal combusted, t/y	-
Coal combustion in coal fired industrial boilers	N	0	Coal combusted, t/y	-
Other coal uses	Y	1,127,546	Coal used, t/y	150
Combustion/use of petroleum coke and heavy oil	Y	82,932	Oil product combusted, t/y	5
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	1,575,812	Oil product combusted, t/y	9
Use of raw or pre-cleaned natural gas	N	0	Gas used, Nm ³ /y	-
Use of pipeline gas (consumer quality)	N	0	Gas used, Nm ³ /y	-
Biomass fired power and heat production	Y	24,617,188	Biomass combusted, t/y	739
Charcoal combustion	Y	13,000	Charcoal combusted, t/y	2
Fuel production				
Oil extraction	N	0	Crude oil produced, t/y	-
Oil refining	N	0	Crude oil refined, t/y	-
Extraction and processing of natural gas	N	0	Gas produced, Nm ³ /y	-
Primary metal production				
Mercury (primary) extraction and initial processing	N	0	Mercury produced, t/y	-
Production of zinc from concentrates	N	0	Concentrate used, t/y	-
Production of copper from concentrates	N	0	Concentrate used, t/y	-
Production of lead from concentrates	N	0	Concentrate used, t/y	-
Gold extraction by methods other than mercury amalgamation	N	0	Gold ore used, t/y	-
Alumina production from bauxite (aluminium production)	N	0	Bauxite processed, t/y	-
Primary ferrous metal production (pig iron production)	N	0	Pig iron produced, t/y	-
Gold extraction with mercury amalgamation - from whole ore	N	0	Gold produced, kg/y	-
Gold extraction with mercury amalgamation - from concentrate	N	0	Gold produced, kg/y	-
Other materials production				
Cement production*4	Y	2,805,000	Cement produced, t/y	384
Pulp and paper production	Y	157,972	Biomass used for production, t/y	5

Production of chemicals					
Chlor-alkali production with mercury-cells	N		0	Cl ₂ produced, t/y	-
VCM production with mercury catalyst	N		0	VCM produced, t/y	-
Acetaldehyde production with mercury catalyst	N		0	Acetaldehyde produced, t/y	-
Production of products with mercury content					
Hg thermometers (medical, air, lab, industrial etc.)	N		0	Mercury used for production, kg/y	-
Electrical switches and relays with mercury	N		0	Mercury used for production, kg/y	-
Light sources with mercury (fluorescent, compact, others: see guideline)	N		0	Mercury used for production, kg/y	-
Batteries with mercury	N		0	Mercury used for production, kg/y	-
Manometers and gauges with mercury	N		0	Mercury used for production, kg/y	-
Biocides and pesticides with mercury	N		0	Mercury used for production, kg/y	-
Paints with mercury	?		0	Mercury used for production, kg/y	?
Skin lightening creams and soaps with mercury chemicals	N		0	Mercury used for production, kg/y	-
Use and disposal of products with mercury content					
Dental amalgam fillings ("silver" fillings)	Y	28,043,744		Number of inhabitants	114
Thermometers	Y	488,861		Items sold/y	489
Electrical switches and relays with mercury	N	28,043,744		Number of inhabitants	-
Light sources with mercury	Y	3,594,064		Items sold/y	87
Batteries with mercury	?		0	t batteries sold/y	?
Polyurethane (PU, PUR) produced with mercury catalyst	N	28,043,744		Number of inhabitants	-
Paints with mercury preservatives	?		0	Paint sold, t/y	?
Skin lightening creams and soaps with mercury chemicals	?		0	Cream or soap sold, t/y	?
Medical blood pressure gauges (mercury sphygmomanometers)	Y	15,341		Items sold/y	1,227
Other manometers and gauges with mercury	Y	28,043,744		Number of inhabitants	61
Laboratory chemicals	Y	28,043,744		Number of inhabitants	122
Other laboratory and medical equipment with mercury	Y	28,043,744		Number of inhabitants	489
Production of recycled of metals					
Production of recycled mercury ("secondary production")	N		0	Mercury produced, kg/y	-
Production of recycled ferrous metals (iron and steel)	Y	73,035		Number of vehicles recycled/y	80
Waste incineration					
Incineration of municipal/general waste	N		0	Waste incinerated, t/y	-
Incineration of hazardous waste	Y	31		Waste incinerated, t/y	1
Incineration / burning of medical waste	Y	9,331		Waste incinerated, t/y	224
Sewage sludge incineration	N		0	Waste incinerated, t/y	-
Open fire waste burning (on landfills and informally)	Y	154,691		Waste burned, t/y	773
Waste deposition/landfilling and waste water treatment					
Controlled landfills/deposits	Y	381,365		Waste landfilled, t/y	1,907
Informal dumping of general waste *1	Y	931,089		Waste dumped, t/y	4,655
Waste water system/treatment	Y	700,422,822		Waste water, m ³ /y	3,677
Crematoria and cemeteries					
Crematoria	Y	186,101		Corpses cremated/y	465
Cemeteries	Y	18,606		Corpses buried/y	47
TOTAL of quantified inputs*1*2*3*4					5,210

Notes:

*1: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration sources, waste deposition and informal dumping is included in the total for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Toolkit.

See Appendix 1 to the Inventory Level1 Guideline for more explanation.

*2: The estimated quantities include mercury in products which has also been accounted for under each product category.

To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS.

*3: The estimated input and release to water include mercury amounts which have also been accounted for under each source category.

To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS.

*4 To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the TOTALS.

INVENTORY LEVEL 1 - SUMMARY OF RELEASES

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Energy consumption						
Coal combustion in large power plants	-	-	-	-	-	-
Coal combustion in coal fired industrial boilers	-	-	-	-	-	-
Other coal uses	150.3	0.0	0.0	0.0	0.0	0.0
Combustion/use of petroleum coke and heavy oil	4.6	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	8.7	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	-	-	-	-	-	-
Use of pipeline gas (consumer quality)	-	-	-	-	-	-
Biomass fired power and heat production	738.5	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	1.6	0.0	0.0	0.0	0.0	0.0
Fuel production						
Oil extraction	-	-	-	-	-	-
Oil refining	-	-	-	-	-	-
Extraction and processing of natural gas	-	-	-	-	-	-
Primary metal production						
Mercury (primary) extraction and initial processing	-	-	-	-	-	-
Production of zinc from concentrates	-	-	-	-	-	-
Production of copper from concentrates	-	-	-	-	-	-
Production of lead from concentrates	-	-	-	-	-	-
Gold extraction by methods other than mercury amalgamation	-	-	-	-	-	-
Alumina production from bauxite (aluminium production)	-	-	-	-	-	-
Primary ferrous metal production (pig iron production)	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from whole ore	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from concentrate	-	-	-	-	-	-
Other materials production						
Cement production*3	287.8	0.0	0.0	95.9	0.0	0.0
Pulp and paper production	4.7	0.0	0.0	0.0	0.0	0.0

Production of chemicals						
Chlor-alkali production with mercury-cells	-	-	-	-	-	-
VCM production with mercury catalyst	-	-	-	-	-	-
Acetaldehyde production with mercury catalyst	-	-	-	-	-	-
Production of products with mercury content						
Hg thermometers (medical, air, lab, industrial etc.)	-	-	-	-	-	-
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury (fluorescent, compact, others: see guideline)	-	-	-	-	-	-
Batteries with mercury	-	-	-	-	-	-
Manometers and gauges with mercury	-	-	-	-	-	-
Biocides and pesticides with mercury	-	-	-	-	-	-
Paints with mercury	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	-	-	-	-	-	-
Use and disposal of products with mercury content						
Dental amalgam fillings ("silver" fillings)	2.3	50.4	9.2	6.9	22.9	22.9
Thermometers	97.8	146.7	97.8	0.0	146.7	0.0
Electrical switches and relays with mercury	-	-	-	-	-	-
Light sources with mercury	26.2	0.0	26.2	0.0	34.9	0.0
Batteries with mercury	?	?	?	?	?	?
Polyurethane (PU, PUR) produced with mercury catalyst	-	-	-	-	-	-
Paints with mercury preservatives	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	?	?	?	?	?	?
Medical blood pressure gauges (mercury sphygmomanometers)	245.5	368.2	245.5	0.0	368.2	0.0
Other manometers and gauges with mercury	12.2	18.3	12.2	0.0	18.3	0.0
Laboratory chemicals	0.0	40.3	0.0	0.0	40.3	41.6
Other laboratory and medical equipment with mercury	0.0	161.4	0.0	0.0	161.4	166.3
Production of recycled of metals						
Production of recycled mercury ("secondary production")	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	26.5	0.0	27.3	0.0	26.5	0.0
Waste incineration						
Incineration of municipal/general waste	-	-	-	-	-	-
Incineration of hazardous waste	0.7	0.0	0.0	0.0	0.0	0.1
Incineration / burning of medical waste	223.9	0.0	0.0	0.0	0.0	0.0
Sewage sludge incineration	-	-	-	-	-	-
Open fire waste burning (on landfills and informally)	773.5	0.0	0.0	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment						
Controlled landfills/deposits	19.1	0.2	0.0	-	-	-
Informal dumping of general waste *1	465.5	465.5	3,724.4	-	-	-
Waste water system/treatment *2	0.0	3,309.5	0.0	0.0	367.7	0.0
Crematoria and cemeteries						
Crematoria	465.3	0.0	0.0	-	0.0	0.0
Cemeteries	0.0	0.0	46.5	-	0.0	0.0
TOTAL of quantified releases*1*2*3	3,540.0	1,250.0	460.0	100.0	1,190.0	230.0

Production of chemicals											
Chlor-alkali production with mercury-cells	N	0	Cl ₂ produced, t/y	-	-	-	-	-	-	-	5.4.1
VCM production with mercury catalyst	N	0	VCM produced, t/y	-	-	-	-	-	-	-	5.4.2
Acetaldehyde production with mercury catalyst	N	0	Acetaldehyde produced, t/y	-	-	-	-	-	-	-	5.4.3
Production of products with mercury content*4											
Hg thermometers (medical, air, lab, industrial etc.)	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.1
Electrical switches and relays with mercury	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.2
Light sources with mercury (fluorescent, compact, others: see guideline)	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.3
Batteries with mercury	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.4
Manometers and gauges with mercury	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.6.2
Biocides and pesticides with mercury	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.5
Paints with mercury	?	0	Mercury used for production, kg/y	?	?	?	?	?	?	?	5.5.6
Skin lightening creams and soaps with mercury chemicals	N	0	Mercury used for production, kg/y	-	-	-	-	-	-	-	5.5.7
Use and disposal of products with mercury content											
Dental amalgam fillings ("silver" fillings)	Y	28,043,744	Number of inhabitants	114	2.3	50.4	9.2	6.9	22.9	22.9	5.6.1
Thermometers	Y	488,861	Items sold/y	489	97.8	146.7	97.8	0.0	146.7	0.0	5.5.1
Electrical switches and relays with mercury	N	28,043,744	Number of inhabitants	-	-	-	-	-	-	-	5.5.2
Light sources with mercury	Y	3,594,064	Items sold/y	87	26.2	0.0	26.2	0.0	34.9	0.0	5.5.3
Batteries with mercury	?	0	t batteries sold/y	?	?	?	?	?	?	?	5.5.4
Polyurethane (PU, PUR) produced with mercury catalyst	N	28,043,744	Number of inhabitants	-	-	-	-	-	-	-	5.5.5
Paints with mercury preservatives	?	0	Paint sold, t/y	?	?	?	?	?	?	?	5.5.7
Skin lightening creams and soaps with mercury chemicals	?	0	Cream or soap sold, t/y	?	?	?	?	?	?	?	5.5.8
Medical blood pressure gauges (mercury sphygmomanometers)	Y	15,341	Items sold/y	1,227	245.5	368.2	245.5	0.0	368.2	0.0	5.6.2
Other manometers and gauges with mercury	Y	28,043,744	Number of inhabitants	61	12.2	18.3	12.2	0.0	18.3	0.0	5.6.2
Laboratory chemicals	Y	28,043,744	Number of inhabitants	122	0.0	40.3	0.0	0.0	40.3	41.6	5.6.3
Other laboratory and medical equipment with mercury	Y	28,043,744	Number of inhabitants	489	0.0	161.4	0.0	0.0	161.4	166.3	5.6.3, 5.6.5
Production of recycled of metals											
Production of recycled mercury ("secondary production")	N	0	Mercury produced, kg/y	-	-	-	-	-	-	-	5.7.1
Production of recycled ferrous metals (iron and steel)	Y	73,035	Number of vehicles recycled/y	80	26.5	0.0	27.3	0.0	26.5	0.0	5.7.2
Waste incineration											
Incineration of municipal/general waste*1	N	0	Waste incinerated, t/y	-	-	-	-	-	-	-	5.8.1
Incineration of hazardous waste*1	Y	31	Waste incinerated, t/y	1	0.7	0.0	0.0	0.0	0.0	0.1	5.8.2
Incineration and open burning of medical waste*1	Y	9,331	Waste incinerated, t/y	224	223.9	0.0	0.0	0.0	0.0	0.0	5.8.3
Sewage sludge incineration*1	N	0	Waste incinerated, t/y	-	-	-	-	-	-	-	5.8.4
Open fire waste burning (on landfills and informally)*1	Y	154,691	Waste burned, t/y	773	773.5	0.0	0.0	0.0	0.0	0.0	5.8.5
Waste deposition/landfilling and waste water treatment											
Controlled landfills/deposits *1	Y	381,365	Waste landfilled, t/y	1,907	19.1	0.2	0.0	-	-	-	5.9.1
Informal dumping of general waste *1*2	Y	931,089	Waste dumped, t/y	4,655	465.5	465.5	3,724.4	-	-	-	5.9.4
Waste water system/treatment *3	Y	700,422,822	Waste water, m ³ /y	3,677	0.0	3,309.5	0.0	0.0	367.7	0.0	5.9.5
Crematoria and cemeteries											
Crematoria	Y	186,101	Corpses cremated/y	465	465.3	0.0	0.0	-	0.0	0.0	5.10.1
Cemeteries	Y	18,606	Corpses buried/y	47	0.0	0.0	46.5	-	0.0	0.0	5.10.2
TOTAL of quantified releases *1*2*3*4*5				5,210	3,540.0	1,250.0	460.0	100.0	1,190.0	230.0	

Notes:

*1: To avoid double counting of mercury inputs from waste and products in the input TOTAL, only 10% of the mercury input to waste incineration sources, waste deposition and informal dumping is included in the total for mercury inputs. These 10% represent approximately the mercury input to waste from materials which were not quantified individually in Inventory Level 1 of this Toolkit. See Appendix 1 to the Inventory Level1 Guideline for more explanation.

*2: The estimated quantities include mercury in products which has also been accounted for under each product category.

To avoid double counting, the release to land from informal dumping of general waste has been subtracted automatically in the TOTALS.

*3: The estimated input and release to water include mercury amounts which have also been accounted for under each source category.

To avoid double counting, input to, and release to water from, waste water system/treatment have been subtracted automatically in the TOTALS.

*4 To avoid double counting of mercury in products produced domestically and sold on the domestic market (including oil and gas), only the part of mercury inputs *released* from production are included in the input TOTAL.

*5 To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the TOTALS.

Data shown in green font, if any, were entered in the sheet "Insert IL2 results". Such data overrule the calculated IL1 results for the same source sub-categories, and the IL2 data are shown in all summary and chart sheets, See entered IL2 results in the sheet "Insert IL2 results".

Default output scenarios in case controls are NOT included in the calculations
JAM, 25Oct2016

						Cat. no.		
Coal combustion in large power plants	Relevant pol	0: No filters used	1: Simple particle filters	2: Fabric filters	3: Efficient APC	4: Very efficient APC	5: Mercury specific	5.1.1
	Enter per ce	0	100	0	0	0	0	
Coal combustion in coal fired industrial boilers	Relevant pol	0: No filters used	1: Simple particle filters	2: Fabric filters	3: Efficient APC	4: Very efficient APC	5: Mercury specific	5.1.2.1
	Enter per ce	100	0	0	0	0	0	
Combustion/use of petroleum coke and heavy oil	Relevant pol	No filters used	ESP or scrubber	cESP and FGD				5.1.3
	Enter per ce	100	0	0				
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Relevant pol	No filters used	ESP or scrubber	cESP and FGD				5.1.3
	Enter per ce	100	0	0				
Extraction and processing of natural gas	Relevant pol	Without mercury removal	With mercury removal					5.1.4
	Enter per ce	50	50					
Production of zinc from concentrates	Relevant pol	No filters used or coarse, dry PM retention	Wet gas cleaning	Wet gas cleaning and acid plant	Wet gas cleaning, acid plant and Hg specific filter			5.2.3
	Enter per ce	0	0	100	0			
Production of copper from concentrates	Relevant pol	No filters used or coarse, dry PM retention	Wet gas cleaning	Wet gas cleaning and acid plant	Wet gas cleaning, acid plant and Hg specific filter			5.2.4
	Enter per ce	0	0	100	0			
Production of lead from concentrates	Relevant pol	No filters used or coarse, dry PM retention	Wet gas cleaning	Wet gas cleaning and acid plant	Wet gas cleaning, acid plant and Hg specific filter			5.2.5
	Enter per ce	0	0	100	0			
Gold extraction with mercury amalgamation - from whole ore	Relevant pol	No retorts used	Use of retorts					5.2.2
	Enter per ce	100	0					
Gold extraction with mercury amalgamation - from concentrate	Relevant pol	No retorts used	Use of retorts					5.2.2
	Enter per ce	100	0					
Cement production								5.3.1
	1) WITH WA	No filter	Simple particle control (ESP / PS / FF)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FF)	Efficient air pollution control (FF+DS / ESP+DS / ESP+WS / ESP+SNCR)	Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+SNCR)		
	Enter per ce	25	25	0	0	0		
	2) NO/LOW	No filter	Simple particle control (ESP / PS / FF)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FF)	Efficient air pollution control (FF+DS / ESP+DS / ESP+WS / ESP+SNCR)	Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+SNCR)		
	Enter per ce	25	25	0	0	0		
Pulp and paper production	Relevant pol	No filters used	PM control with general ESP, or PS					5.3.2
	Enter per ce	100	0					
Incineration of municipal/general waste	Relevant pol	No emission reduction devices	PM reduction, simple ESP, or similar	Acid gas control + high efficiency FF or ESP PM retention	Mercury specific absorbents + FF			5.8.1
	Enter per ce	0	100	0	0			
Incineration of hazardous waste	Relevant pol	No emission reduction devices	PM reduction, simple ESP, or similar	Acid gas control + high efficiency FF or ESP PM retention	Mercury specific absorbents + FF			5.8.2
	Enter per ce	0	100	0	0			
Incineration and open burning of medical waste	Relevant pol	No emission reduction devices	PM reduction, simple ESP, or similar	Acid gas control + high efficiency FF or ESP PM retention	Mercury specific absorbents + FF			5.8.3
	Enter per ce	100	0	0	0			
Waste water system/treatment								5.9.5
	Relevant pol	No treatment	Mechanical treatment only	Mechanical and biological treatment; no land application of sludge	Mechanical and biological treatment; with >40% of sludge used for land application			
	Enter per ce	0	100	0	0			
Dental amalgam fillings	Relevant pol	Clinics where only simple chair strainers/filters are used	Clinics where high efficiency amalgam separators are used					5.6.1
	Enter per ce	100	0					

