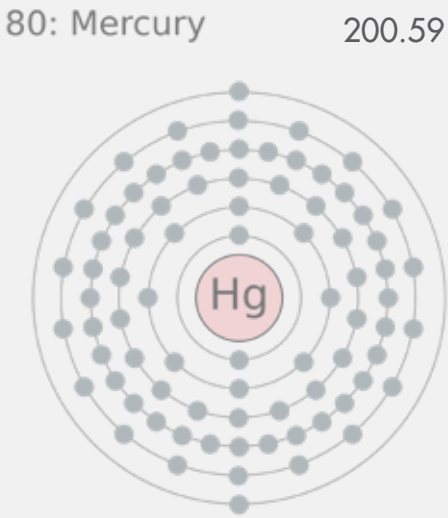
Mercury Initial Assessment

FIRST NATIONAL REPORT



JORDAN
2018

Acknowledgements

We would like to thank everyone who participated in the development of this document with special thanks to the Minister of the environment and General Secretary of the Ministry and to Dr. Mohammad Khashashneh/ The Director of Hazardous Substances and Waste Management Directorate in the Ministry of Environment for coordination and leadership during report development.

Disclaimer

This inventory was performed in accordance with UNEP's "Toolkit for identification and quantification of Mercury releases", Inventory Level 1 (version 1.02, April 2013, or newer)

Table of Contents

GLOSSARY 1

FOREWORD BY GOVERNMENT OFFICIAL (NEED DOCUMENT FROM JORDAN) 2

EXECUTIVE SUMMARY 3

RESULTS OF THE NATIONAL MERCURY INVENTORY 4

Amount of Mercury emitted into air 5

Amount of Mercury released to water 6

Amount of Mercury released to land 7

Major Findings of the policy, regulatory and institutional assessments 8

Priority areas for implementation of the Convention 9

INTRODUCTION 11

Minamata convention on Mercury 11

Mercury Initial Assessment report 12

Project Objective & Outcomes 12

Project approach and Stakeholder engagement; 14

CHAPTER 1: NATIONAL BACKGROUND INFORMATION 15

1.1 Country profile: The Hashemite kingdom of Jordan 15

1.1.1 Geography and natural resources 15

1.1.2 Population 16

1.1.3 Political and institutional profile 16

1.1.4 Economic Profile 17

1.1.5 Economic activities/source categories making Mercury input-outputs to society in Jordan 17

1.2 health and welfare 18

1.3 Environmental management system 18

CHAPTER II. MERCURY INVENTORY AND IDENTIFICATION OF EMISSIONS AND RESOURCES 19

2.1 Data gaps (Inventory methodology and limitations) 19

2.2 Summary of Mercury releases, stockpiles, and supply and trade 20

2.2.1. Mercury release source types present 22
2.2.2. Summary of Mercury inputs to society 27
2.2.3. Summary of Mercury releases 32
2.3 Data and inventory on energy consumption and fuel production 38
2.3.1 Other coal uses *38*
2.3.2 Combustion/Use of Petroleum Coke and Heavy Oil *39*
2.3.3 Combustion/Use of Diesel, Gasoil, Petroleum and Kerosene *39*
2.3.4 Use of Pipeline Gas (Consumer Quality) *40*
2.3.5 Biomass Fired Power and Heat Production *40*
2.3.6 Charcoal Combustion *41*
2.3.7 Fuel Production (Oil Extraction, Oil Refining, Extraction and Processing of Natural Gas) *42*
2.3.8 Extraction and processing of natural gas *42*
2.4 Data and inventory on domestic production of metals and raw materials. 43
2.4.1 Cement production *43*
2.5 Data and inventory on domestic production and processing with international Mercury use 44
2.5.1 Production of Chemicals *44*
2.5.2 Production of Products with Mercury Content *44*
2.6 Data and inventory on waste handling and recycling 44
2.6.1 Production of Recycled Mercury (“Secondary Production”) *44*
2.6.2 Production of Recycled Ferrous Metals (Iron and Steel) *44*
2.6.3 Incineration of Municipal/General Waste *45*
2.6.4 Incineration of Hazardous Waste *45*
2.6.5 Incineration and Open Burning of Medical Waste *45*
2.6.6 Sewage Sludge Incineration *45*
2.6.7 Open Fire Waste Burning (on landfills and informally) *45*
2.6.8 Controlled Landfills/Deposits *46*
2.6.9 Informal Dumping of General Waste *47*
2.6.10 Waste Water System/Treatment *48*
2.7 Data and inventory on general consumption of Mercury in products, as metal Mercury and as Mercury containing substances. 48
2.7.1 Dental amalgam fillings (“silver” fillings) *49*
2.7.2 Thermometers & Other Glass Hg Thermometers (air, laboratory, dairy, etc.) *51*
2.7.3 Electrical Switches and relays *52*

2.7.4 Light Sources with Mercury *53*
2.7.5 Batteries with Mercury *55*
2.7.6 Polyurethane with Mercury catalysts..... *57*
2.7.7Paints with Mercury..... *57*
2.7.8 Cosmetics with Mercury *57*
2.7.9 Manometers and gauges with Mercury *58*
2.7.10 Laboratory chemicals *59*
2.8 Data and inventory on crematoria and cemeteries..... 60
2.9 Data and inventory on stocks of Mercury and/or Mercury compounds, and storage conditions, supply and trade of Mercury and Mercury containing compounds..... 60

CHAPTER III: POLICY, REGULATORY AND INSTITUTIONAL FRAMEWORK ASSESSMENT.....61

3.1 Policy and regulatory assessment 61
3.2 Institutional assessment 83

CHAPTER IV: IDENTIFICATION OF POPULATIONS AT RISK AND GENDER DIMENSIONS 101

4.1 Preliminary review of potential populations at risk and potential health risks.....101
4.2 Assessment of potential gender dimensions related to the management of Mercury.....102
4.2.1 Occupational Exposure *102*
4.2.2 Mercury in fish *103*
4.2.3 Mercury In households..... *103*
4.2.4 Mercury in cosmetics *103*

CHAPTER V: AWARENESS/UNDERSTANDING OF WORKERS AND THE PUBLIC; AND EXISTING TRAINING AND EDUCATION OPPORTUNITIES OF TARGET GROUPS AND PROFESSIONALS 104

5.1 Awareness raising on Mercury and the Minamata Convention.....104
5.2 Future training needs for successful implementation of the Convention .104

CHAPTER VI: PRIORITY AREAS FOR IMPLEMENTATION OF THE CONVENTION..... **111**

Objective 1 – Strengthening the Legal and Institutional Framework 111
Objective 2 – Environmentally Sound Management of Mercury-containing Waste 112
Objective 3 – Education and Awareness Raising.....112

Objective 4 – Incorporation of BAT/BEP.....113
Objective 5 – Research, Monitoring and Reporting 114

CHAPTER VII: MAINSTREAMING OF MERCURY PRIORITIES..... 114

ANNEX I: STAKEHOLDER ENGAGEMENT PROCESS..... **126**

Establishing the taskforce.....127

ANNEX II: UNEP TOOLKIT CALCULATION SPREADSHEET **130**

ANNEX III. AVERAGE (+/- SD) TOTAL MERCURY CONCENTRATIONS (PPM, WW) IN FISH MUSCLE TISSUE FROM THE MEDITERRANEAN SEA BY SPECIES FROM THE GLOBAL BIOTIC MERCURY SYNTHESIS DATABASE (EVERS ET AL. 2017). **132**

LITERATURE CITED: **133**

Table of Tables

Table 1. Estimated total of Hg inputs in Jordan.....4

Table 2. Summary of Mercury inventory results.....20

Table 3. Identification of Mercury release sources in the country.....22

Table 4. Miscellaneous potential Mercury sources not included in the quantitative inventory; with preliminary indication of possible presence in the country.....25

Table 5. Summary of Mercury inputs to society. 27

Table 6. Summary of Mercury releases 32

Table 7. Description of the types of results. 37

Table 8. Detailed results for combustion/use of petroleum coke and heavy oil. 39

Table 9. Detailed results for combustion/use of diesel, gasoil, petroleum and kerosene. 39

Table 10. Detailed results for use of pipeline gas. 40

Table 11. Results for biomass fired power and heat production.....41

Table 12. Detailed results for charcoal combustion. 41

Table 13. Fuel Production (Oil Extraction, Oil Refining, Extraction and Processing of Natural Gas). 42

Table 14. Extraction and processing of natural gas.....42

Table 15. Cement production. 43

Table 16. Detailed results for the production of recycled ferrous metals (iron and steel).....44

Table 17. Detailed results for incineration and open burning of medical waste. 45

Table 18. Detailed results for open fire waste burning (on landfills and informally). 45

Table 19: Detailed results for disposal by controlled landfills. 46

Table 20. Detailed results for informal dumping of general waste. 47

Table 21. Detailed results for waste water systems/treatment. 48

Table 22. Background data for default calculations for dental amalgam and certain other product types.....49

Table 23. Detailed results for dental amalgam fillings.....50

Table 24. Thermometers, not with other instruments, liquid-filled for direct reading. 51

Table 25. Detailed results for Hg thermometers. 51

Table 26. Detailed results for electrical switches and relays. 52

Table 27. Light Sources with Hg. 54

Table 28. Detailed results for fluorescent tubes and CFLs.....54

Table 29. Detailed results for batteries. 56

Table 30. Detailed results for manometers and gauges containing Mercury. 58

Table 31. Detailed results for laboratory chemicals.....59

Table 32. Policy and Regulatory measures in place and remaining gaps 63

Table 33. Existing national institutional capacity and remaining gaps 85

Table 34. Interpreting Mercury concentrations and related risks of exposure. 102

Table 35 Awareness and communication plan 105

Table 36. A number of political documents adopted in the country on the Mercury-hazardous chemicals that are not directly related to the Minamata Convention 115

Table37 National Implementation Plan for Jordan 119

Table of Figures

Figure 1. Estimated Mercury releases to air (Kg Hg/y). 5
Figure 2. Estimated Mercury releases to water (Kg Hg/y)..... 6
Figure 3. Estimated Mercury releases to land (Kg Hg/y). 7
Figure 4. Topographical and hydrological map of Jordan.....16

Glossary

AAS	Atomic Absorption Spectrometry
CFL	Compact Fluorescent Lamp
COP	Conference of Parties
EDP	Executive Development Programme
EC	European commission
EPA	Environment Protection Agency
EU	European Union
FAO	Food and Drug Organi-zation
GDP	Gross Domestic Product
GEF	Global Environment Fa-cility
Hg	Mercury
H S code	Customs Harmonized System
ICCM	International Confer-ence on Chemicals Management
JFDA	Jordan Food and Drug Administration
JSMO	Jordan Standards and Metrology organization
JREDS	Jordanian Royal Envi-ronment Diving Society
JSMO	Jordan Standards and Metrology Organization

Glossary

JUST	Jordan University of Science and Technology
Km	Kilo meter
Ktoe	Kilotonne of oil equivalent
Kwh	Kilo Watt Hour
LHAP	Land and Human to Advocate Progress
LPG	Liquified Petroleum Gas
MEMR	Ministry of Energy and Mineral Resources
MIA	Mercury Initial Assessment
MoEnv	Ministry of Environment
MoH	Ministry of Health
MoIT	Ministry of Industry, Trade and Supply
NGO	Non-Governmental Organization
NRDC	Natural Resources Defense Council
PMA	Phenylmercuric Acetate
PUR	Polyurethane
RSS	Royal Scientific Society
SAICM	Strategic Approach to International Chemicals Management

Glossary

Sq. Km	Square Kilo meter
SDGs	Sustainable Development Goals
UoJ	University of Jordan
UNAF	United Nations Assistance Framework
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Programme
VCM	Vinyl Chloride Monomer
WHO	World Health Organization

Foreword

The Ministry of Environment on behalf of the Government of Jordan signed the MINAMATA convention on Mercury and its compounds on 10 October 2013 and ratified the convention on 12 November 2015. Jordan was one of the first countries that has signed and ratified the Minamata Convention on Mercury. The Convention is very important for Jordan as it aims to protect human health and the environment from the adverse effects of mercury. We understand and acknowledge the threat that mercury and mercury compounds poses to human health and the environment.

One of the Jordanian initiatives is conducting "Mercury Initial Assessment (MIA) project" which aims to undertake a Mercury Initial Assessment to enable the Government to determine the national requirements and needs for the implementation of the Minamata Convention and establish a sound foundation to undertake future work towards implementing convention provisions. This MIA report is very important because it presents the results of Mercury inventory which will assist the government in identifing national mercury priorities then, to assess opportunities for mainstreaming Hg priorities into national polices and plans.

Evidently, Jordan is not a producer of mercury, but nonetheless we are exposed and remain vulnerable to impacts of mercury emissions and releases because we still at the moment very much rely upon and use mercury-containing devices.

During the coming years; we must focus our attention at national level and explore the means for reducing our mercury emission. And to do so, we have set number of priorities for the implementation of the convention; includes the development and amendments of the related regulation to enhance Mercury management, to build national capacities toward the implementation of the convention provisions.

At the national level, we will also put in place proper disposal facilities and systems to deal with mercury-containing products and mercury waste.

To transit to a mercury-free society, there is a pressing need for education and sensitization on the subject of Mercury as an element, its uses but most importantly the alternatives to it in various industries in a manner that contributes to reducing the risks to health and environment. Equally, there is a need for strengthening capacities of the relevant authorities so as to better monitor and manage the use of Mercury. However, the responsibility

lies on every stakeholder involved with, using or trading mercury or products and items containing mercury to make the switch to the alternatives.

We are concerned with preserving the environment in all its components by working to institutionalize dealing with the management of hazardous materials and their waste in a scientific and secure manner, according to the best international technologies adopted in this field. One of the projects that will start during this year is the project of "Reduction and elimination of POPs project; through environmentally sound management of e-waste, health care waste and developing effective waste diversion/resource recovery capacity from Hazardous waste and Solid waste streams.

Mercury is a hazardous substance that requires management to ensure that it is not leaked and emitted by finding the best partnerships between government and private institutions to reach a ban in 2020 under the provisions of the Minamata Convention.

We believe that the Implementation of the Minamata convention in the Hashemite kingdom of Jordan among the Basel, Rotterdam and Stockholm (BRS) conventions at the national level will incoordinate and synergize matters that will enhance the sound management of chemicals and waste at the national level and will give a good example for others at the international level, it will also show the success of synergies between Basel, Rotterdam, Stockholm and Minamata (BRSM) conventions and benefit from this synergies at all levels.

Finally, I would like to thank all the national institutions that participated in preparing this report and provide everything possible to make the project successful.

Other thanks go to GEF and UNDP for providing technical and financial support for the implementation of the project.

Dr. Mohammad Khashashneh

Director of Hazardous Substances and Waste Management Directorate.

Executive summary

The Minamata Convention on Mercury is the first global legally binding agreement specifically designed to address contamination from a heavy metal. The Convention's main thrust is for countries to ban new Mercury mines and carry out a systematic phase-out of existing ones. It also provides for the phase-out of Mercury containing products and reducing Mercury supply and trade, to make a significant reduction in Mercury releases to air, water and land. The Convention also addresses: interim storage of Mercury and its disposal once it becomes waste; sites contaminated by Mercury; as well as human and environmental health issues related to exposure to Mercury. Under the Minimata Convention, individual countries seek to protect human health and the environment from the risks of Mercury exposure by systematically controlling Mercury emissions and releases, including phasing out the use of Mercury in certain products and processes.

Jordan signed the Minamata Convention on Mercury on October 10, 2013 and ratified it on December 11, 2015.

As a first step in preparing the country for meeting future obligations under the Minamata Convention and to take early action towards reducing releases of Mercury and safeguarding its population and environment, Jordan indicated the need for an inventory of Mercury releases in the country.

This report summarizes the results of the main outputs of the project "Strengthen national decision making towards ratification of the Minamata Convention and build capacity towards implementation of future provisions" (i.e., the MIA Project). It provides the review of inventory results and policy/regulatory and institutional frameworks assessment, as well as the review of potential future interventions that target major sectors responsible for Mercury and hazardous waste management in Jordan.

Results of the National Mercury Inventory[1]

The estimated total of Hg input into Jordan was 10,640 kg/year. The primary source category of Mercury releases in Jordan is the use and disposal of other products with estimated Mercury releases of 4,535 Kg Hg/year, followed by the application, use and disposal of dental amalgams with 3,074 Kg Hg/year.

Table 1. Estimated total of Hg inputs in Jordan

Source category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						
		Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal	Total releases *3*4*5
Coal combustion and other coal use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Other fossil fuel and biomass combustion	61.8	61.8	0.0	0.0	0.0	0.0	0.0	62
Oil and gas production	21.8	4.3	2.4	0.0	3.5	0.0	5.6	16
Primary metal production (excl. gold production by amalgamation)	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
Other materials production*6	1,518.5	1,138.9	0.0	0.0	379.6	0.0	0.0	1,519

1 This inventory was conducted based on the Toolkit's Inventory Level I. Accordingly, 2015 input data was used, where available. 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. Throughout the Level 1 Inventory, certain Mercury related data and information was obtained that was not required to complete the Level 1 inventory, however this data/information could prove useful for a future Level 2 Mercury inventory or specific Mercury management related activities. With the objective of safeguarding this information and allowing easy access to it for interested parties and/or a future Level 2 inventory, it was recorded and incorporated into specific sections of the report.

Chlor-alkali production with Mercury-cells	-	-	-	-	-	-	-	0
Other production of chemicals and polymers	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
Application, use and disposal of dental amalgam fillings	3,073.8	61.5	1,352.5	245.9	184.4	614.8	614.8	3,074
Use and disposal of other products	4,534.8	372.4	784.0	137.6	0.0	3,073.6	167.1	4,535
Production of recycled metals	130.4	43.0	0.0	44.3	0.0	43.0	0.0	130
Waste incineration and open waste burning*2	282.0	282.0	0.0	0.0	0.0	0.0	0.0	282
Waste deposition*2	8,925.0	89.3	0.9	0.0	-	-	-	90
Informal dumping of general waste *2*3	3,825.0	382.5	382.5	3,060.0	-	-	-	765
Waste water system/treatment *4	772.0	0.0	694.8	0.0	0.0	77.2	0.0	77
Crematoria and cemeteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
TOTALS (rounded) *1*2*3*4*5*6	10,640	2,440	2,520	430	570	3,810	790	10,550

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.

Amount of Mercury emitted into air

In 2016, a total of 2,440 kg of Mercury was emitted into the air in Jordan. The primary contributors of Mercury emissions and releases was other materials production (1,139kg), use and disposal of other products (372 kg). Therefore, reduction of Mercury emissions into air requires the environmental improvements of the activity of these sectors.

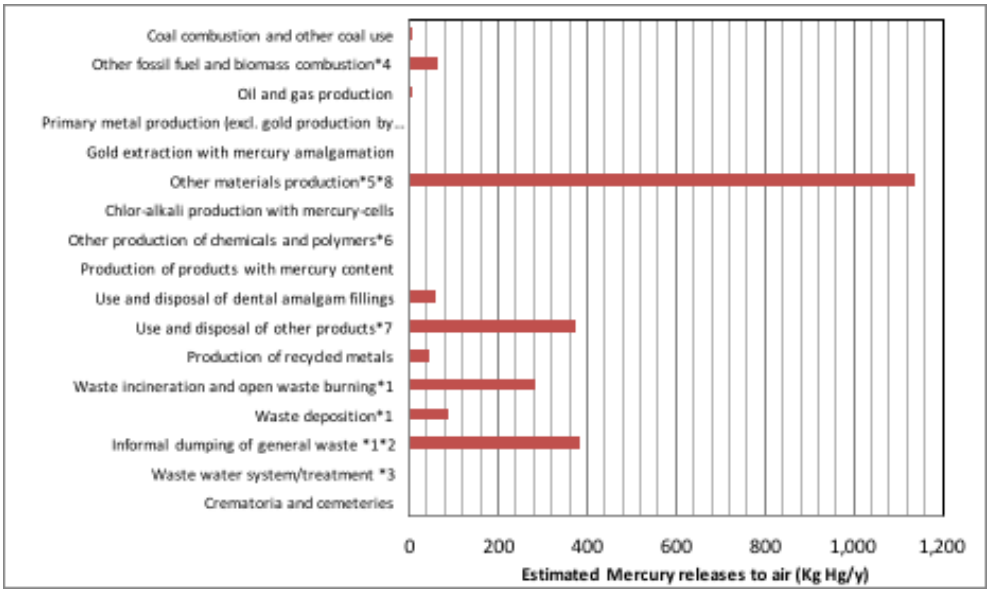


Figure 1. Estimated Mercury releases to air (Kg Hg/y).

Amount of Mercury released to water

The total amount of Mercury releases to water in Jordan is 2,520 kg. The main sources of Mercury-containing discharges are the disposal of dental amalgams (1,356 kg).

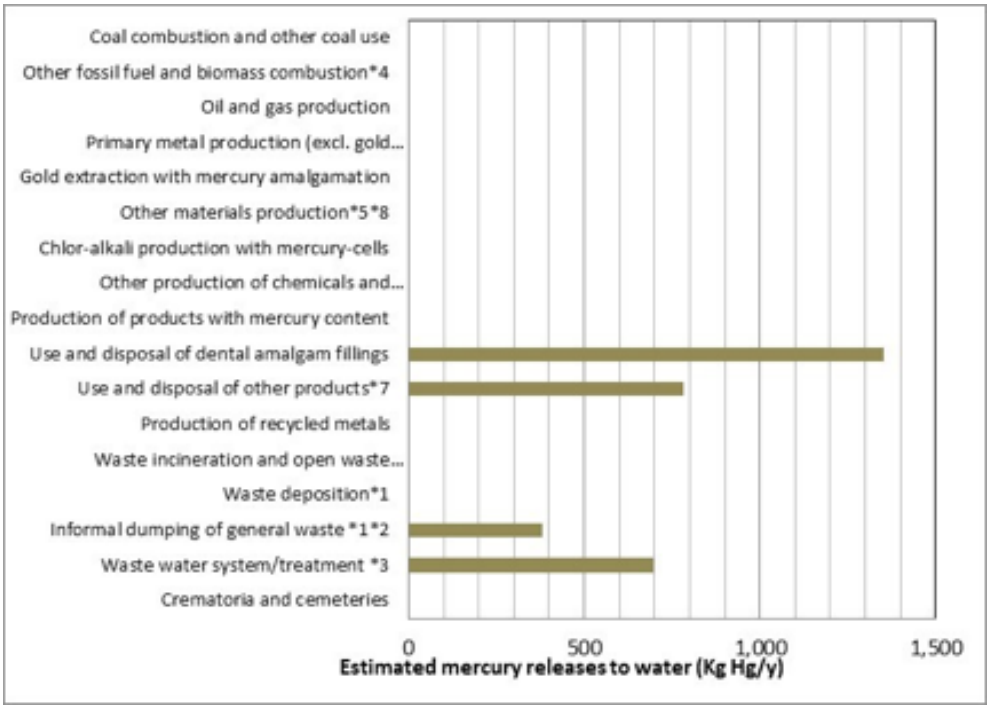


Figure 2. Estimated Mercury releases to water (Kg Hg/y).

Amount of Mercury released to land

A total of 430 kg of Mercury is released to soils in Jordan. The main sources of these releases are dental amalgams (246 kg) and informal dumping of general wastes (3,060 kg). Only 10% of the general waste is included in the total amount releases in the soils as this avoids double-counting as parts of this total are incorporated in other source types.

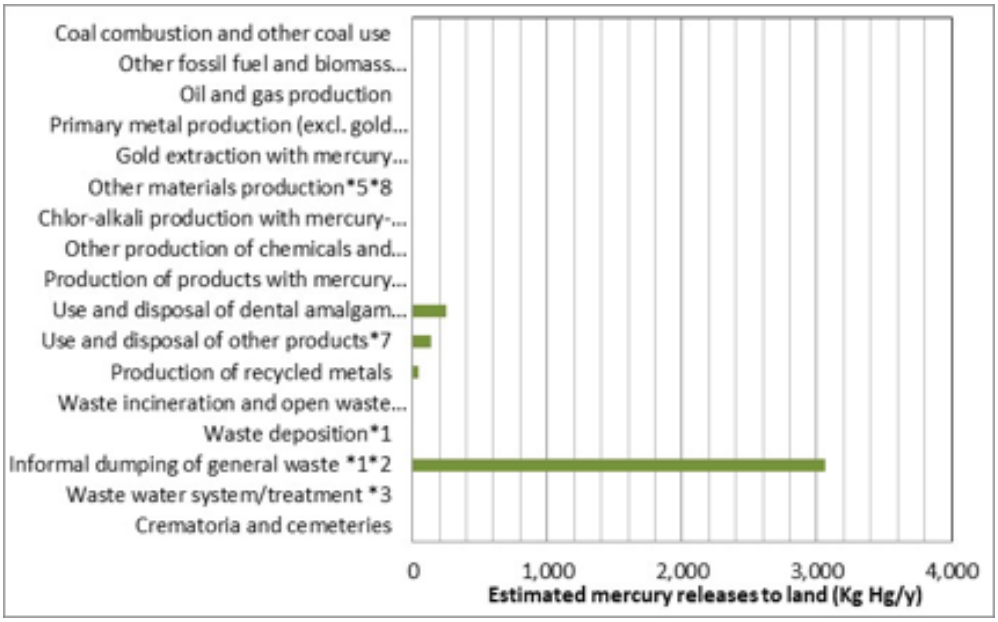


Figure 3. Estimated Mercury releases to land (Kg Hg/y).

Major findings of the policy, regulatory and institutional assessments

For Jordan, several articles of the Convention are not applicable and will not be included as part of the country's implementation plan, although these would be addressed in the legislation. The stated articles are with respect to: (1) supply/mining of Mercury (Article 3), (2) manufacturing processes, such as production of non-ferrous metals and other processes (Article 5), and (3) artisanal and small-scale gold mining (Article 7). Besides those listed above, the other articles of the Convention are quite applicable to Jordan. For the point source categories listed in Annex D of the Convention, coal fired power plants and coal fired industrial boilers is relevant for Jordan.

The assessment of the existing policy and regulatory framework resulted in the identification of the following gaps which require legislative and regulatory action:

- The need for legislation which covers additional exemptions in the legislation as defined by Part I of Annex A and measures to achieve the phasing down on the use of dental amalgams as suggested in Part II of the Annex
- The need for adoption of regulations fully aligned with the Minamata Convention, specifically related to a clear ban on all manufacturing processes defined in Part II of Annex B, including BATs and the prohibition of certain types of production etc.
- The need for the monitoring to establish, maintain and regularly update an adequate inventory of Mercury and Mercury-compound emissions and releases
- Respecting deadlines set out in laws to establish the funds for the National Implementation Plan for Mercury to be purposely stipulated in the state budget.
- The absence of appropriate data collection and reporting system at central level (in particular- waste generation)

The assessment of the existing institutional framework resulted in identification of following gaps:

- Administrative capacity in ministries for regulating the chemical management issues is insufficient.
- Administration for inspection capacity is inadequate (in terms of

professional qualifications and number of staff) and does not meet the actual needs for efficient inspection supervision in the area of chemicals.

- Capacity for inspection control of the legislation governing air emissions needs to be improved. This need is also clear for water monitoring, where there is a notable shortage of staff qualified for meeting the requirements relating to the collection and validation of data, as well as for quality assurance of data and reporting.
- Human resource capacity for implementation of the legislation governing air emissions is also insufficient for full implementation of the relevant legislation.
- For better understanding of BREF and BAT documents for certain branches of industry, additional professional training of staff is needed.
- A centralized data collection system for the types and quantities of waste is not at a satisfactory level yet.
- Need for establishment of regular channels of cooperation with state authorities in order to achieve knowledge transfer, as well as with nearby countries, on Mercury and Mercury compounds.
- Initiate establishment of regional working bodies with the task of improving Mercury pollution reduction and the information exchange at the broader level.

Priority areas for implementation of the Convention

1.1 Strengthening the legal framework	Responsibility	Budget (USD)	Timeframe
1.1.1 Amendments of the regulations	All related Ministries	50,000	2019-2021
1.1.1.a Legislative ban on the import and export of products listed in Part I, Annex A of the Convention			
1.1.1.b Legislative ban on manufacturing processes using Hg			
1.1.2 Obligation to collect and disseminate information on Hg emitted, released or disposed		50,000	2019-2021
1.1.3 Adoption of instructions to regulate the issues related to the collection and processing of data on waste	MoEnv		
1.1.4 Adoption of regulation to establish Mercury Management unit.	MoEnv		2019-2020
Budget		100,000	
1.2. Strengthening institutional capacity for the management of Mercury	**Responsibility**	**Budget**	**Timeframe**
1.2.1 Building capacities for the implementation of Minamata Convention.	MoEnv + partners	50,000	2019-2022
1.2.2 Improve the work of the poison center and staffed it with professional people that can respond in emergency and collect, analyses and disseminate information in the correct way.	MoH	50,000	2019-2022
1.2.3 Strengthening capacities of regulatory, implementing and enforcement institutions for implementation of chemicals management (Including Mercury) tasks, including monitoring, reporting, permitting etc.	MoEnv	50,000	2019-2022
1.2.4 Additional employment/diversification of tasks.	MoEnv	10,000	2019-2022
1.2.5 Training for Customs Officers and first responders on HS-codes for Mercury added products, Inspection on imported products.	Custom department, MoEnv	10,000	2019-2022
1.2.6 Sources of funding designated for capacity building activities of national state authorities to be defined and included in their annual budgets.	All relevant stakeholders		annually
Budget		**170,000**	

2. Storage and disposal	Responsibility	Budget	Timeframe
2.1 Enhancing storage facility for Mercury containing equipment/ recovery unit	MoEnv	100,000	2019-2021
2.2 Program for phasing out Mercury containing products from household level	MoEnv	100,000	2019 – 2020
Budget		200,000	

3. Education and awareness raising	Responsibility	Budget	Timeframe
3.1 Strengthen technical and internal communication, communication with representatives of government, institutions, agencies, professional associations with special emphasis on the associations of dentists, meetings with representatives of industry, political parties, local self-governments, and professional organizations in order to obtain their support.	MoEnv	10,000	2019-2022
3.1.1 Development and implementation of awareness program for decision makers on the importance of implementing the Minamata Convention	MoEnv		
3.1.2 Development and implementation of awareness program on the importance of implementing the Minamata Convention among state and public employees and officers on national levels	MoEnv		
3.2 Establish communications with vulnerable groups, NGOs, media, business sectors and all citizens	MoEnv	50,000	2018-2019
3.2.1 Arrange educational events and other methods of awareness raising to educate the general public on the dangers of exposure to Mercury and Mercury compounds	MoEnv		
3.2.2 Distribution of relevant brochures in all health institutions especially private dentists and gynecology ambulances, as well as gynecology ambulances in primary health institutions and hospitals	MoH		
	MoEnv, MoH		
3.3 Establish the e-based presence to ensure the visibility, knowledge sharing, and regular updates of information	MoEnv	50,000	2019-2021
Budget		**110,000**	

4. Incorporation of BAT/BEP	Responsibility	Budget	Timeframe
4.1. Training on BAT/ BEP for sources listed in Annex D and, more specifically towards solid waste and medical waste incinerators. Including providing related material	MoEnv	100,000	2020-2022
Budget		**100,000**	

5. Improving research, monitoring and reporting	Responsibility	Budget	Timeframe
5.1 Establishment of regular channels of cooperation with state authorities of other Parties to achieve knowledge transfer	MoEnv		2019-2022
5.2 Take part in the work of regional working bodies with the task of improving Mercury pollution reduction and information exchange at the broader level	MoEnv	50,000	2019-2022
5.3 Regularly take part in the work of EU chemicals management bodies	MoEnv	20,000	2019-2022
5.4 Updating the national inventory on Mercury to be submitted to convention secretariat /COP	MoEnv	50,000	2022
5.5 Introduce the new section on Mercury in the current Report on Chemical profile	MoEnv	10,000	2020
Budget		**130,000**	

Introduction

Minamata convention on Mercury

In view of the risks that Mercury poses to human health and the environment, the global community agreed in 2009 to start intergovernmental negotiations with the objective of developing a legally binding treaty to limit global Mercury emissions. The treaty known as the Minamata Convention was opened for signature on 10th October 2013 and entered into force on the 16th of August 2017.

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of Mercury. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water from a variety of sources. Controlling the anthropogenic releases of Mercury throughout its lifecycle has been a key factor in shaping the obligations under the Convention. Major highlights of the Minamata Convention include a ban on new Mercury mines, the phase-out of existing ones, the phase out and phase down of Mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses interim storage of Mercury and its disposal once it becomes waste, sites contaminated by Mercury as well as health issues.

The Government of Jordan represented by the Ministry of Environment signed the Minamata's binding treaty on Mercury and its compounds on 10 October 2013 and ratified the convention on 12 November 2015.

Given the dangers associated with Mercury and its compounds to public health and to the environment. The Government of Jordan represented by its Ministries and other governmental institutions has worked to target Mercury and its compounds within their national legislation to reduce its risks; for instance, Mercury and its compounds were regulated and targeted in the lists of restricted chemicals that should be handled as hazardous waste in order to be disposed in an environmentally sound management.

Ministry of Health encourage purchasing pneumatic and electronic pressure devices to replace Mercury devices in all medical equipment tenders. Instructions have been also developed to monitor the Mercury emissions resulting from the incineration of medical waste. Additionally, Ministry of Agriculture prevented the import and production of pesticides that contain Mercury according to Rotterdam Convention.

Mercury Initial Assessment report

Utilizing funding from the Global Environmental Facility (GEF) and with assistance from the United Nations Development Programme (UNDP), this report was developed to help prepare Jordan to meet its obligations under the Minamata Convention on Mercury and to take early action towards reducing releases of Mercury and safeguarding its population and environment.

This report summarizes the results of the main outputs of the project "Strengthen national decision making towards ratification of the Minamata Convention and build capacity towards implementation of future provisions". The project's objective is to undertake a Mercury Initial Assessment to enable the Government to determine the national requirements and needs for the implementation of the Minamata Convention and establish a sound foundation to undertake future work towards implementing convention provisions It also provides the review of inventory results and policy/regulatory and institutional frameworks assessment, as well as the review of potential future interventions that target major sectors responsible for Mercury and hazardous waste management in Jordan.

The MIA project is consistent with Jordan's national development priorities as well as the on-going UN operations as identified by the Country Assessment for Jordan and the United Nations Assistance Framework (UNAF). Like the UNAF, this project is aligned with the country's key national environmental and socio-economic plans: The National Agenda 2006-2015 and the Executive Development Programme 2015-2017 (EDP). This project is also well aligned with the Sustainable Development Goals (SDGs) in general.

Project Objective & Outcomes

To undertake future work towards implementing convention provisions; It will do so by implementing 4 components as specified in the GEF guidelines (GEF/C.45/Inf.05 paragraph 19), as well as a fifth component on mainstreaming.

1. **Undertake an assessment of legislation and policies in regard to the implementation of Convention provisions of**
   - Article 3;
   - Article 5;
   - Article 7 (including legislation and policy to cover formalization, worker health and safety);
   - Article 8 (specifically in regard to relevant national air pollution/emission standards and regulations);

- Article 9 (specifically in regard to the ability to identify and categorize sources of releases).

The policy and legislative assessment will be undertaken through a review of existing legislation on chemicals management and identification of the gaps prevalent in association to issues of Mercury. In addition, the legislation review will assess the necessary steps for the establishment of a National Mercury Coordination/Consultation Mechanism.

2. Undertake an initial assessment of Mercury in the following categories:

- Stocks of Mercury and/or Mercury compounds and import and export procedures including an assessment of the storage conditions;
- Supply of Mercury, including sources, recycling activities and quantities;
- Sectors that use Mercury and the amount per year, including manufacturing processes, ASGM and Mercury added products;
- Trade in Mercury and Mercury containing compounds

3. Identify:

- Emission sources of Mercury;
- Release sources of Mercury to land and water.

4. Assess institutional and capacity needs to implement the Convention.

Institutional capacity of governmental institutions and agencies will be assessed to determine the capacity needs and gaps that exist for the implementation of the Convention and propose intervention to strengthen these institutions and capacity. The assessment will also review the systems needed to report to the Convention under article 21.

The institutional capacity gaps identified, and the findings of the legislation and policy review will be used to formulate a number of priority actions, which will be included in the Mercury Initial Assessment Report. Proposed actions will be discussed and agreed upon among the key stakeholders mentioned above through several rounds of discussions.

5. Mainstream national Mercury priorities in national policies and plans to raise the importance of Hg priority interventions:

- Identify national Mercury priorities;
- Assess opportunities for mainstreaming Hg priorities;

6. Mainstream Hg priority interventions in relevant policies/plans.

Project approach and Stakeholder engagement;

Jordan's Ministry of Environment (MoEnv), in collaboration with its MIA consultants, conducted this inventory from January 2017 to July 2017. Data for the years 2012 to 2015 and 2016 have been used in the inventory, when available. For some data types, data from this year have not been available. The year for all data given is noted with the data in question in the relevant sections of this report.

This Mercury release inventory was made with the use of the "Toolkit for Identification and Quantification of Mercury Releases" made available by the Chemicals Branch of the United Nations Environment Programme (UNEP Chemicals). The Toolkit is available at UNEP Chemicals' website: http://www.unep.org/hazardoussubstances/Mercury/MercuryPublications/GuidanceTrainingMaterialToolkits/MercuryToolkit/tabid/4566/language/en-US/Default.aspx

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.

The project was carried out by engaging a number of government staff in the Ministry of Environment and other line ministries and other semi-governmental and private sector who are considered as main source of information for Mercury inventory. This was done by establishing national taskforce consist of representatives from Ministries, semi-governmental institutions and private sector. This approach helped in strengthening the national and institutional capacities to gather and analyze available data on Mercury; in addition to maximize knowledge and awareness to Mercury health impacts and Minamata convention requirements and its provisions and will ensure better understanding of Mercury sources, emission and releases.

Chapter I

National Background Information

1.1 Country profile: The Hashemite kingdom of Jordan

Jordan has an area of 92,300 sq km. It is bounded on the north by **Syria**, on the north east by **Iraq**, on the east and south by **Saudi Arabia**, on the south west by the Gulf of Aqaba, and on the west by Palestine, with a total land boundary length of 1,635 km and a coastline of 26 km (Figure 5). Jordan's capital city, Amman, is in the northwestern part of the country.

1.1.1 Geography and natural resources

The Jordan Valley, which extends down the entire western part of Jordan, is the country's most distinctive natural feature. The Jordan Valley forms part of the Great Rift Valley of Africa, which extends down from southern Turkey through Lebanon and Syria to the salty depression of the Dead Sea, where it continues south through Aqaba and the Red Sea to eastern Africa. This fissure was created 20 million years ago by shifting tectonic plates

The northern segment of the Jordan Valley, known in Arabic as the Ghor, is the nation's most fertile region. It contains the Jordan River and extends from the northern border down to the Dead Sea. The Jordan River rises from several sources, mainly the Anti-Lebanon Mountains in Syria, and flows down into Lake Tiberias, 212 meters below sea level. It then drains into the Dead Sea which, at 407 meters below sea level, is the lowest point on earth. The river is between 20 and 30 meters wide near its endpoint. Its flow has been much reduced, and its salinity increased because significant amounts have been diverted for irrigational uses. Several degrees warmer than the rest of the country, its year-round agricultural climate, fertile soils, higher winter rainfall and extensive summer irrigation have made the Ghor the food bowl of Jordan

Figure 4. Topographical and hydrological map of Jordan.

1.1.2 Population

Jordan has a population of 9.9 million people (in 2017, including refugees of the Syrian Civil War). Capital and largest city is Amman, about 4 million people live in Greater Amman Municipality, almost half of the country's population. Spoken language is Arabic (official). Jordan is a country with a predominantly Muslim population, about 92% of Jordanians are follower of Sunni Islam, the dominant religion in the country. Cities in the south of Jordan, have the highest percentage of Muslim population.

1.1.3 Political and institutional profile

Over the past 10 years, Jordan has pursued structural reforms in education, health, as well as privatization and liberalization. The Government of Jordan has introduced social protection systems and reformed subsidies, creating the conditions for public-private partnerships in infrastructure and making tax reforms. More work needs however to be accomplished so the focus on identifying steps towards enhancing the investment climate and ease of doing business can lead to concrete outcomes.

Adverse regional developments, in particular the Syria and Iraq crises, remain the largest recent shock affecting Jordan. This is reflected in an unprecedented refugee influx, in disrupted trade routes, and in lower investments and tourism inflows. The large number of Syrian refugees entering the country is having a strong impact on the country's economy and social fabric. Other major challenges facing Jordan include high unemployment, a dependency on grants and remittances from Gulf economies as well as continued pressure on natural resources.

Jordan's economy remains sluggish as growth slowed down in 2016 for the second year in a row — to an estimated 2 percent from 2.4 percent in 2015 — as geopolitical repercussions take a toll and as reflected in worsening labor market indicators. Economic growth is expected to marginally improve to an estimated 2.6 percent average over 2017-2019 anticipating improvements in tourism, exports, and the impact of investment climate reforms. Inflationary pressures appear after two years of deflation. Fiscal consolidation and monetary policy tightening are expected to continue

1.1.4 Economic Profile

General description of the economic sectors

Agriculture represents 4.2% of the GDP and employs 1.8% of the workforce. The lack of water creates an obstacle to agricultural development. The principal crops are wheat, barley, lentil, tomato, eggplant, citrus fruits, olives and grapes. Phosphates and potassium are the only natural resources of the country. It should be noted that six uranium deposits have been found, which represent 3% of the world's reserves, but so far remain unexploited.

Industry (mostly pharmaceutical) and mining together contribute 29.6% of the GDP and concentrate 18.5% of the workforce; a proportion that has increased over the last years. The manufacturing sector is rather limited and dominated by textiles, a sector presently in a state of crisis due to international competition.

The services sector, which employs 79.6% of the workforce, contributes 66.2% of the GDP. Communication technologies and financial services are particularly active in the country. The sectors of distribution and tourism infrastructure also contribute substantially to GDP, although they experienced a slowdown in recent years. The construction and transport sectors are in full bloom. The Government also supports new information technologies and the tourism industry.

1.1.5 Economic activities/source categories making Mercury input-outputs to society in Jordan

MINING

Jordan's mining sector is considered the cornerstone to the Jordanian economy. It plays a vital role in growth of many other important sectors in the economy and contributes to Jordan's standard of living. The mining industry in Jordan is dominated by the production of phosphate, potash, building and decoration stones, glass sand and other nonmetallic resources. Recently, Jordan has been ranked as the sixth largest producer and the second largest exporter of phosphate, the fourth largest producer and the second largest exporter of potash and has the 5th largest oil shale reserves in the world. Also, Jordan has sustainable amounts of uranium around 3% of the world resources.

In Jordan, there are more than 60 major mining facilities which employ more than 10,000 employees in the extractive industries and around 191,000 workers in manufacturing branches. The mining sector contribution to Jordan's Gross Domestic Product (GDP) in the period between 2004 and 2014 ranges from 10.5% to 15%, respectively. The contribution of the mining sector to GDP ratio in 2013 compared with other sectors amounted to 19.4%.

ENERGY AND POWER

Jordan has two main challenges regarding its energy situation: the growing energy demand on the one hand and the very limited domestic resources to fulfill this demand on the other hand. In 2012, the local production of energy – including crude oil, natural gas and renewable energy – was 272 ktoe (thousand tonnes of oil equivalent), which was enough to cover only about 5% of the energy consumption. Including imports, the primary energy supply was 7,624 ktoe in 2012.

Jordan, with miniscule deposits of petroleum, and natural gas, must rely upon imports to meet its petroleum and natural gas needs.

Almost all of Jordan's electrical power generating capacity is based on the use of fossil fuels. In that year, generating capacity totaled 1.661 million kW, with conventional thermal capacity accounting for 1.650 million kW. Hydropower accounted for 0.010 million kW of capacity, and geothermal/other capacity accounted for 0.001 million kW. Electric power production in 2002 totaled 7.642 billion kWh, with conventional thermal sources producing 7.587 billion kWh. Hydropower sources produced 0.052 billion kWh and geothermal/other produced 0.003 billion kWh.

Main Exports: Clothing, Fertilizers, Potash, Phosphates, Vegetables, Pharmaceuticals

Main Imports: Crude Oil, Machinery, Transport Equipment, Iron, Cereals

1.2 Health and welfare

The country's infant mortality rate is lower than those of several other countries in the region. Most infectious diseases have been brought under control, and the number of physicians per capita has grown rapidly. Comprehensive health facilities are operated by the government, but hospitals are found only in major urban centers. A national health insurance program covers medical, dental, and eye care at a modest cost; service is provided free to the poor. Welfare services were private until the mid-1950s, when the government assumed responsibility. Besides supervising and coordinating social and charitable organizations, the ministry administers welfare programs.

1.3 Environmental management system

Jordan's principal environmental problems are insufficient water resources, soil erosion caused by overgrazing of goats and sheep, and deforestation. Water pollution is an important issue in Jordan. Jordan has 1 cu km of renewable water resources with 75% used for farming activity and 3% used for industrial purposes. About 91% of the total population have access to pure water. It is expected that the rate of population growth will place more demands on an already inadequate water supply. Current sources of pollution are sewage, herbicides, and pesticides.

In terms of environmental management; Jordan has aggressively pursued implementation of sound environmental management including investment in modern basic infrastructure in areas such as solid waste and wastewater treatment. However, gaps remain that urgently need to be addressed and this is currently compounded by the substantial increase in unofficial pop-

ulation resulting from political/economic instability and conflict in neighboring countries. waste management generally is considered a major priority and, within that, the management of waste streams and resulting contamination that present specific hazards to both environmental resources, food supply and human health is a major concern.

The country's environmental policy emphasizes the need for coordination in effort on regional and global basis in close cooperation with concerned international bodies and agencies addressing all global environmental issues, including chemicals management. As a consequence, it has been a proactive participant in international chemicals conventions and multilateral initiatives. More specifically, it ratified or acceded to the Basel Convention in 1992, the Stockholm Convention in 2004, and the Rotterdam Convention in 2002 and has now ratified Minamata Convention in 2015. With respect to chemicals management generally Jordan is an active participant in the International Conference on Chemicals Management (ICCM) and through the SAICM program has developed a National Chemicals Profile and is pursuing a national sound chemicals management policy.

Institutionally, the national focal point for chemicals and waste management in the country is the Ministry of Environment (MoEnv) and within it, the Directorate of Hazardous Substances and Waste Management. Within the overarching Environmental Protection Law No. 52/ 2006, waste management is covered by regulations covering hazardous waste (Hazardous Materials Management Regulation No. 24/ 2005, Instruction for Hazardous Waste Management and Handling - 2003), solid waste (Solid Waste Management Regulation No. 27/2005, Instructions for the Management of Solid Waste - 2006), and healthcare waste (Medical Waste Management Regulation No. 1 for 2001).

Chapter II

Mercury Inventory and identification of emissions and resources.

2.1 Data gaps (Inventory methodology and limitations)

The greatest challenges were encountered in identifying and obtaining the data and information necessary to complete Step 6 of the inventory relating to Hg products and substances. The Custom department of Jordan, as well as other relevant institutions, were very helpful in providing insight in the number of Hg containing products that were on the market.

The Harmonized System Codes (HS) for various light sources alone were not sufficient to provide a final estimate on the number of Mercury containing light sources. In hindsight, emissions from these sources seemed to be elevated. One improvement within the Level 1 inventory could be an assessment among distributors and importers on the number of Mercury lamps imported each year, their origin and an indication of the range of Mercury content. Another approach could also be the use of a Level 2 inventory.

Lastly, the estimated Hg input for (1) open waste burning and (2) informal dumping of general waste can be greatly improved with more thorough field surveys.

Main priorities for further assessment

The estimated values for Use and Disposal of Other Products are the highest source category of Mercury in Jordan (not including waste). It is therefore of the utmost importance that the data presented in Step 6, Mercury Products and Substances, of the Level 1 inventory accurately reflects the current situation. Inventory efforts should have a particular focus on Mercury containing thermometers and sphygmomanometers, Mercury containing batteries, and light sources with Mercury. Import data are often unclear for certain Mercury containing products (e.g. sphygmomanometers), groups products and items by HS code. For example, these HS codes do not distinguish between compact fluorescent lamps (CFL) and fluorescent tubes (which have a different Mercury content). In addition, the Mercury content in energy efficient lamps can also dramatically vary by brands. Therefore,

import data needs to be compared and cross checked with information and data obtained through other sources (e.g. importers/distributors; conducting assessments/survey among users, etc.), for a clear and accurate picture of the current situation. Such efforts to collect additional data could be carried out as part of a Level 2 inventory.

Other areas of further research could be related to electrical switches. Detailed information in this area (actuals vs estimates) could potentially be provided by the entire industry sector, mechanics or automobile electricians.

The public dental institutions still use dental Hg amalgam. No specific waste management practices for Mercury containing waste streams are being promoted or have been put in place. It would be important to determine the amount of dental amalgam being imported on an annual basis and to obtain a sense of the use of alternative fillings as compared to amalgam fillings. Furthermore, early action could be promoted towards the phase-out of the use of dental amalgams, while improving waste management practices of amalgam-containing waste to minimize releases to the environment.

2.2 Summary of Mercury releases, stockpiles, and supply and trade

An aggregated presentation of the results for main groups of Mercury release sources is presented in Table 2 below.

Table 2. 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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
Other fossil fuel and biomass combustion	61.8	61.8	0.0	0.0	0.0	0.0	0.0	62	1%
Oil and gas production	21.8	4.3	2.4	0.0	3.5	0.0	5.6	16	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	1,518.5	1,138.9	0.0	0.0	379.6	0.0	0.0	1,519	14%
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	3,073.8	61.5	1,352.5	245.9	184.4	614.8	614.8	3,074	29%
Use and disposal of other products	4,534.8	372.4	784.0	137.6	0.0	3,073.6	167.1	4,535	43%
Production of recycled metals	130.4	43.0	0.0	44.3	0.0	43.0	0.0	130	1%
Waste incineration and open waste burning*2	282.0	282.0	0.0	0.0	0.0	0.0	0.0	282	3%
Waste deposition*2	8,925.0	89.3	0.9	0.0	-	-	-	90	1%

Informal dumping of general waste *2*3	3,825.0	382.5	382.5	3,060.0	-	-	-	765	7%
Waste water system/ treatment *4	772.0	0.0	694.8	0.0	0.0	77.2	0.0	77	1%
Crematoria and cemeteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0%
TOTALS (rounded) *1*2*3*4*5	**10,640**	**2,440**	**2,520**	**430**	**570**	**3,810**	**790**	**10,550**	**100%**

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 following source categories contribute with major Mercury inputs exceeding 1,000 kg of Hg/year: (1) Other materials production (i.e., cement),

(2) Disposal of dental amalgams, (3) Use of other products, (4) Waste deposition and (5) Informal dumping of general waste.

The individual Mercury releases sub-categories contributing with the highest Mercury inputs were (1) Other materials production (i.e., cement), (2) Disposal of dental amalgams, and (3) Use of other products.

The individual Mercury releases sub-categories contributing with the highest Mercury releases to the atmosphere were "Other Materials Productions" or cement (1,139 kg of Hg/year).

The origin of Mercury in waste and waste water produced in the country is Mercury in products and materials. Waste fractions and waste water do therefore not represent original Mercury inputs to society. Waste and waste water may however represent substantial flows of Mercury through society. The following were found to be the major flows of Mercury with waste and waste water: (1) Waste deposition (8,925 kg of Hg/year), (2) Informal dumping of general waste (3,825 kg of Hg/year), and (3) wastewater treatment (772 kg of Hg/year).

In this inventory, default input factors were used for the estimation of Mercury releases from general waste treatment and wastewater treatment. The default factors were based on literature data of Mercury contents in waste and wastewater, and these data were only available from developed countries. The 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 spreadsheets used in the development of this inventory are posted along with this report or can be submitted upon request.

2.2.1. Mercury release source types present

Table 3 Shows which Mercury release sources were identified as present or absent in the country. Only source types positively identified as present are included in the quantitative assessment.

Table 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
Other coal uses	Y
Combustion/use of petroleum coke and heavy oil	Y
Combustion/use of diesel, gasoil, petroleum, kerosene	Y
Biomass fired power and heat production	Y
Charcoal combustion	Y
Fuel production	
Oil extraction	N
Oil refining	Y
Extraction and processing of natural gas	Y
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 (iron, steel production)	N
Gold extraction with Mercury amalgamation - without use of retort	N
Gold extraction with Mercury amalgamation - with use of retorts	N
Another materials production	
Cement production	Y
Pulp and paper production	N
Production of chemicals and polymers	
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	N
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	Y
Light sources with Mercury	Y
Batteries with Mercury	Y
Polyurethane (PU, PUR) produced with Mercury catalyst	N
Paints with Mercury preservatives	N
Skin lightening creams and soaps with Mercury chemicals	N
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	N
Incineration 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	N
Cemeteries	N

It should be noted however, that the presumably minor Mercury release source types shown in Table 4 were not included in the detailed source

identification and quantification work.

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

2.2.2. 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 activity in the country (Table 5). This includes Mercury intentionally used in products such as thermometers, blood pressure gauges, fluorescent light bulbs, etc. It also includes Mercury mobilized via extraction and use of raw materials which contain Mercury in trace concentrations.

Table 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	314	Coal used, t/y	0
Combustion/use of petroleum coke and heavy oil	Y	606,260	Oil product combusted, t/y	33
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	4,069,000	Oil product combusted, t/y	22
Use of raw or pre-cleaned natural gas	N	0	Gas used, Nm^3/y	-
Use of pipeline gas (consumer quality)	Y	3,638,218	Gas used, Nm^3/y	-
Biomass fired power and heat production	Y	11,630	Biomass combusted, t/y	-
Fuel production				
Oil extraction	N	0	Crude oil produced, t/y	-
Oil refining	Y	2,996,407	Crude oil refined, t/y	10
Extraction and processing of natural gas	Y	116,099,071	Gas produced, Nm^3/y	12
Primary metal production				
Mercury (primary) extraction and initial processing	N	0	Mercury produced, t/y	-

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
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	Bauxit 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	11,100,000	Cement produced, t/y	1,519
Pulp and paper production	N	0	Biomass used for production, t/y	-
Production of chemicals				
Chlor-alkali production with Mercury-cells	N	0	Cl2 produced, t/y	-
VCM production with Mercury catalyst	N	0	VCM produced, t/y	-
Acetaldehyde production with Mercury catalyst	N	0	Acetaldehyde produced, t/y	-
Production of products with Mercury content				
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	-

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
Manometers and gauges with Mercury	N	0	Mercury used for production, kg/y	-
Biocides and pesticides with Mercury	N	0	Mercury used for production, kg/y	-
Paints with Mercury	N	0	Mercury used for production, kg/y	-
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	9,840,967	Number of inhabitants	3,074
Thermometers	Y	609,161	Items sold/y	1,544
Electrical switches and relays with Mercury	Y	9,840,967	Number of inhabitants	1,376
Light sources with Mercury	Y	27,230,650	Items sold/y	550
Batteries with Mercury	Y	6	t batteries sold/y	44
Polyurethane (PU, PUR) produced with Mercury catalyst	N	9,840,967	Number of inhabitants	-
Paints with Mercury preservatives	N	0	Paint sold, t/y	-
Skin lightening creams and soaps with Mercury chemicals	N	0	Cream or soap sold, t/y	-
Medical blood pressure gauges (Mercury sphygmomanometers)	Y	6,000	Items sold/y	480
Other manometers and gauges with Mercury	Y	9,840,967	Number of inhabitants	49
Laboratory chemicals	Y	9,840,967	Number of inhabitants	98
Other laboratory and medical equipment with Mercury	Y	9,840,967	Number of inhabitants	393
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	118,512	Number of vehicles recycled/y	130
Waste incineration				

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
Incineration of municipal/ general waste	N	0	Waste incinerated, t/y	-
Incineration of hazardous waste	N	0	Waste incinerated, t/y	-
Incineration / burning of medical waste	Y	1,126	Waste incinerated, t/y	27
Sewage sludge incineration	N	0	Waste incinerated, t/y	-
Open fire waste burning (on landfills and informally)	Y	51,000	Waste burned, t/y	255
Waste deposition/landfilling and waste water treatment				
Controlled landfills/deposits	Y	1,785,000	Waste landfilled, t/y	8,925
Informal dumping of general waste *1	Y	765,000	Waste dumped, t/y	3,825
Waste water system/treatment	Y	147,052,551	Waste water, m3/y	772
Crematoria and cemeteries				
Crematoria	N	0	Corpses cremated/y	-
Cemeteries	N	0	Corpses buried/y	-
TOTAL of quantified inputs*1*2*3*4				10,560

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

Note that the following six source categories made the largest contributions to Mercury inputs to society in Jordan:

1. Waste water system/treatment: 772 kg Hg/year
2. Other materials production – Cement: 1,519 kg Hg/year
3. Dental amalgam fillings ("silver" fillings): 3,074 kg Hg/year
4. Informal dumping of general waste: 3,825 kg Hg/year
5. Use and disposal of other products: 4,535 kg Hg/year
6. Waste Deposition: 8,925 kg Hg/year

2.2.3. Summary of Mercury releases

In Table 6 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 6 below for a more detailed description and definition of the output pathways.

Table 6. Summary of Mercury releases

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Energy consumption						
Coal combustion in large power plants	-	-	-	-	-	-
Other coal uses	-	-	-	-	-	-
Combustion/use of petroleum coke and heavy oil	0.0	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene	33.3	0.0	0.0	0.0	0.0	0.0
Biomass fired power and heat production	22.4	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	5.8	-	-	-	-	-

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Fuel production	-	-	-	-	-	-
Oil extraction	0.3	0.0	0.0	0.0	0.0	0.0
Oil refining	5.8	0.0	0.0	0.0	0.0	0.0
Extraction and processing of natural gas						
Primary metal production	-	-	-	-	-	-
Mercury (primary) extraction and initial processing	2.5	0.1	0.0	0.0	0.0	1.5
Production of zinc from concentrates	1.7	2.3	0.0	3.5	0.0	4.1
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 (iron, steel production)	-	-	-	-	-	-
Gold extraction with Mercury amalgamation - without use of retort	-	-	-	-	-	-
Gold extraction with Mercury amalgamation - with use of retorts	-	-	-	-	-	-
Other materials production						

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Cement production	1,138.9	0.0	0.0	379.6	0.0	0.0
Pulp and paper production	-	-	-	-	-	-
Production of chemicals						
Chlor-alkali production with Mercury-cells	-	-	-	-	-	-
VCM production with Mercury catalyst	-	-	-	-	-	-
Acetaldehyde production with Mercury catalyst	-	-	-	-	-	-
Production of products with Mercury content						
Hg thermometers (medical, air, lab, industrial etc.)	-	-	-	-	-	-
Electrical switches and relays with Mercury	-	-	-	-	-	-
Light sources with Mercury (fluorescent, compact, others)	-	-	-	-	-	-
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)	61.5	1,352.5	245.9	184.4	614.8	614.8
Thermometers	154.4	463.1	0.0	0.0	926.1	0.0
Electrical switches and relays with Mercury	137.6	0.0	137.6	0.0	1,101.1	0.0
Light sources with Mercury	27.5	0.0	0.0	0.0	522.4	0.0
Batteries with Mercury	0.0	0.0	0.0	0.0	44.3	0.0
Polyurethane (PU, PUR) produced with Mercury catalyst	-	-	-	-	-	-
Paints with Mercury preservatives	-	-	-	-	-	-
Skin lightening creams and soaps with Mercury chemicals	-	-	-	-	-	-

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Medical blood pressure gauges (Mercury sphygmomanometers)	48.0	144.0	0.0	0.0	288.0	0.0
Other manometers and gauges with Mercury	4.9	14.7	0.0	0.0	29.5	0.0
Laboratory chemicals	0.0	32.4	0.0	0.0	32.4	33.4
Other laboratory and medical equipment with Mercury	0.0	129.8	0.0	0.0	129.8	133.7
Production of recycled of metals						
Production of recycled Mercury ("secondary production")	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	43.0	0.0	44.3	0.0	43.0	0.0
Waste incineration						
Incineration of municipal/ general waste	-	-	-	-	-	-
Incineration of hazardous waste	-	-	-	-	-	-
Incineration of medical waste	27.0	0.0	0.0	0.0	0.0	0.0
Sewage sludge incineration	-	-	-	-	-	-
Open fire waste burning (on landfills and informally)	255.0	0.0	0.0	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment						
Controlled landfills/deposits	89.3	0.9	0.0	-	-	-
Informal dumping of general waste *1	382.5	382.5	3,060.0	-	-	-
Waste water system/treatment *2	0.0	694.8	0.0	0.0	77.2	0.0
Crematoria and cemeteries						
Crematoria	-	-	-	-	-	-
Cemeteries	-	-	-	-	-	-
TOTAL of quantified releases *1*2	2,380.0	2,520.0	430.0	550.0	3,810.0	790.0

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.

Note that the following source sub-categories made the largest contributions to Mercury releases to the atmosphere, water and land.

The following source sub-categories made the largest contributions to Mercury releases to the atmosphere:

- Other materials production - Cement (1,139 kg Hg/y)
- Informal dumping of general waste (383 kg Hg/y)
- Open fire waste burning (255 kg Hg/y)
- Thermometers (154 kg Hg/y)
- Electrical switches and relays with Mercury (138 kg Hg/y)

The following source sub-categories made the largest contributions to Mercury releases to the water:

- Informal dumping of general waste (383 kg Hg/y)
- Waste water system/treatment (695 kg Hg/y)
- Dental amalgam fillings (1,353 kg Hg/y)
- Thermometers (463 kg Hg/y)
- Medical blood pressure gauges (144 kg Hg/y)
- Other laboratory and medical equipment with Mercury (130 kg Hg/y)

The following source sub-categories made the largest contributions to Mercury releases to the land:

- Informal dumping of general waste (3,060 kg Hg/y)
- Dental amalgam fillings (246 kg Hg/y)
- Electrical switches and relays with Mercury (136 kg Hg/y)

Table 7 below provides general descriptions and definitions of the output pathways.

Table 7. 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 coal used annually in the country for combustion in large power plants.
Air	Mercury emissions to the atmosphere from point sources and diffuse sources from which Mercury may be spread locally or over long distances with air masses; for example, may generally be from: Point sources such as 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 marine environments (oceans), and freshwaters (rivers, lakes, etc.). for example, releases from: Wet flue gas cleaning systems on coal fired power plants; Industry, households, etc. to aquatic environments; Surface run-off and leachate from Mercury contaminated soil and waste dumps
Land	Mercury releases to the terrestrial environment: General soil and ground water. For example, releases from: Uncollected waste products dumped or buried informally Local un-confined releases from industry such as on site hazardous waste storage/ burial Spreading of sewage sludge with Mercury content on agricultural land (sludge used as fertilizer)
By-products and impurities	By-products that contain Mercury, which are sent back into the market and cannot be directly allocated to environmental releases, for example: Gypsum wallboard produced from solid residues from flue gas cleaning on coal fired power plants. Sulphuric acid produced from desulphurization of flue gas (flue gas cleaning) in non-Ferrous metal plants with Mercury trace concentrations. Chlorine and Sodium Hydroxide produced with Mercury-based chlor-alkali technology; with Mercury trace concentrations. Metal Mercury or calomel as by-product from non-Ferrous metal mining (high Mercury concentrations)

Calculation result type	Description
General waste	General waste: Also called municipal waste in some countries. Typically, household and institution waste where the waste undergoes a general treatment, such as incineration, landfilling or informal dumping. The Mercury sources to waste are consumer products with intentional Mercury content (batteries, thermometers, fluorescent tubes, etc.) as well as high volume waste like printed paper, plastic, etc., with small trace concentrations of Mercury.
Sector specific waste treatment / disposal	Waste from industry and consumers which is collected and treated in separate systems, and in some cases recycled; for example: Confined deposition of solid residues from flue gas cleaning on coal fired power plants on dedicated sites. Hazardous industrial waste with high Mercury content which is deposited in dedicated, safe sites Hazardous consumer waste with Mercury content, mainly separately collected and safely treated batteries, thermometers, Mercury switches, lost teeth with amalgam fillings, etc. Confined deposition of tailings and high volume rock/waste from extraction of non-ferrous metals

2.3 Data and inventory on energy consumption and fuel production

2.3.1 Other coal uses

In Jordan, only a very small fraction of coal consumed on a yearly basis (314 tons) Less than 1 kg of Hg/year is released.

2.3.2 Combustion/Use of Petroleum Coke and Heavy Oil

The total amount of estimated Hg input based on the Toolkit was 33 kg Hg/year. Activity rate data for this subcategory was from the Ministry of Energy and mineral resources. Table 8 shows detailed results for combustion/use of petroleum coke and heavy oil.

Table 8. Detailed results for combustion/use of petroleum coke and heavy oil.

Combustion/use of petroleum coke and heavy oil	Use + Disposal	Unit
Activity rate	606,260	t/y
Input factor	20	mg Hg/t
Calculated input	33.3	Kg Hg/y
Calculated outputs/releases to:		

Combustion/use of petroleum coke and heavy oil	Use + Disposal	Unit
- Air	33.3	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.3.3 Combustion/Use of Diesel, Gasoil, Petroleum and Kerosene

Petroleum products are intended mostly for the sectors of transport, industry, manufacturing and, to a minor level, household (LPG and kerosene), commercial and agriculture. The assumption was made that LPG is part of this category. Liquefied Petroleum Gas (LPG) is used mainly as energy source in the industry and fuel for vehicles.

The total amount of estimated Hg input based on the Toolkit was 33 kg Hg/year. Activity rate data for this subcategory was from the Ministry of Energy and mineral resource. Table 9 shows detailed results for combustion/use of diesel, gasoil, petroleum and kerosene

Table 9. Detailed results for combustion/use of diesel, gasoil, petroleum and kerosene.

Combustion/use of diesel, gasoil, petroleum and kerosene	Use + Disposal	Unit
Activity rate	4,069,000	t/y
Input factor	2.0	mg Hg/t
Calculated input	22.4	Kg Hg/y
Calculated outputs/releases to: - Air	22.4	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y

Combustion/use of diesel, gasoil, petroleum and kerosene	Use + Disposal	Unit
- Sector specific waste treatment	0.0	Kg Hg/y

2.3.4 Use of Pipeline Gas (Consumer Quality)

The total amount of estimated Hg input based on the Toolkit was <1 kg Hg/year. Activity rate data for this subcategory was from the Ministry of Energy and mineral resources. Table 10 shows detailed results for use of pipeline gas.

Table 10. Detailed results for use of pipeline gas.

Use of Pipeline Gas	Use + Disposal	Unit
Activity rate	3,638,218	Nm^3/y
Input factor	0.22	ug Hg/Nm^3
Calculated input	0	Kg Hg/y
Calculated outputs/releases to: - Air	0.0	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.3.5 Biomass Fired Power and Heat Production

The total amount of estimated Hg input based on the Toolkit was <1 kg Hg/year. Data for charcoal combustion is from FAO Forest Products for 2014. The total amount of biomass combusted per year was 11,630 t/y, and that amount was used as an input for the toolkit. Table 11 shows detailed results for biomass fired power and heat production.

Table 11. Results for biomass fired power and heat production.

Biomass Fired Power and Heat Production	Use + Disposal	Unit
Activity rate	11,630	t/y
Input factor	0.03	g Hg/t
Calculated input	0	Kg Hg/y
Calculated outputs/releases to:		

Biomass Fired Power and Heat Production	Use + Disposal	Unit
- Air	16.6	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.3.6 Charcoal Combustion

Data for charcoal combustion is from FAO Forest Products for 2014. The total amount of charcoal combusted per year was 48,000 t/y, and this value is used as an input for the toolkit. Table 12 shows detailed results for charcoal combustion.

Table 12. Detailed results for charcoal combustion.

Charcoal combustion	Use + Disposal	Unit
Activity rate	48,000	t/y
Input factor	0.12	g Hg/t
Calculated input	5.8	Kg Hg/y
Calculated outputs/releases to: - Air	5.8	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.3.7 Fuel Production (Oil Extraction, Oil Refining, Extraction and Processing of Natural Gas)

Data are from the Jordan Petroleum Refinery Company. The total amount of oil refining per year was 2,996,407 t/y, and this value is used as an input for the toolkit. Table 13 shows detailed results for oil refining.

Table 13. Fuel Production (Oil Extraction, Oil Refining, Extraction and Processing of Natural Gas).

Oil Refining	Use + Disposal	Unit
Activity rate	2,996,407	t/y
Input factor	3.4	mg Hg/t
Calculated input	10	Kg Hg/y
Calculated outputs/releases to: - Air	2.5	Kg Hg/y
- Water	0.1	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	1.5	Kg Hg/y

2.3.8 Extraction and processing of natural gas

Data are from the Ministry of Energy and mineral resources. The total amount of extraction and processing of natural gas per year was 116,099,071 Nm3, and this value is used as an input for the toolkit. Table 14 shows detailed results for the extraction and processing of natural gas.

Table 14. Extraction and processing of natural gas.

Extraction and processing of natural gas	Use + Disposal	Unit
Activity rate	116,099,071	Nm^3/y
Input factor	100	ug Hg/Nm^3
Calculated input	12	Kg Hg/y
Calculated outputs/releases to: - Air	1.7	Kg Hg/y
- Water	2.3	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	3.5	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	4.1	Kg Hg/y

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

In summary, there is no domestic production of metals and raw materials in Jordan. No primary metal production or other materials production takes

place, which might directly or indirectly lead to releases of Mercury. No pulp and paper production are conducted. Cement is the primary source type of Mercury in this category.

2.4.1 Cement production

Data are from the Ministry of Industry, trade and supply. The total amount of cement production per year was 11,100,000 t/yr, and this value is used as an input for the toolkit. Table 15 shows detailed results for cement production with no co-incineration of waste.

Oil is used as subsidiary fuel in cement production

Table 15. Cement production.

Cement	Use + Disposal	Unit
Activity rate	11,100,000	t/y
Input factor	0.11	g Hg/yr
Calculated input	1,519	Kg Hg/y
Calculated outputs/releases to: - Air	1,139	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	380	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.5 Data and inventory on domestic production and processing with international Mercury use

2.5.1 Production of Chemicals

Jordan does not have any production of chemicals using technology contain Mercury so there is no need for Mercury catalysts or Mercury cells. There are no registered companies for this purpose All chemicals containing Mercury are imported and primarily used for laboratory or scientific research.

There is production of polyurethane, but they don't use Mercury Catalyst.

2.5.2 Production of Products with Mercury Content

Jordan does not produce any products with Mercury content, such as thermometers, light sources, manometers/gauges, batteries, paints, or skin lightening creams and soaps. Some of these products, which may be avail-

able on the market, are imported illegally (such as pesticides, etc.)

2.6 Data and inventory on waste handling and recycling

2.6.1 Production of Recycled Mercury ("Secondary Production")

There is no production of recycled Mercury in Jordan.

2.6.2 Production of Recycled Ferrous Metals (Iron and Steel)

Jordan has production of recycled ferrous metals. The number of vehicles recycled in 2015 (this is an annual average) was 118,512. Table 16 shows detailed results for the production of recycled ferrous metals (Iron and steel).

Table 16. Detailed results for the production of recycled ferrous metals (iron and steel)

Production of recycled ferrous metals (iron and steel)	Use + Disposal	Unit
Activity rate	118,512	Number of vehicles recycled/y
Input factor	1.1	g Hg/vehicle
Calculated input	130	kg Hg/y
Calculated outputs/releases to: - Air	43.0	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	44.3	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	43.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.6.3 Incineration of Municipal/General Waste

There is no incinerator for municipal or general waste in Jordan. The collected waste is deposited in landfills.

2.6.4 Incineration of Hazardous Waste

Jordan does not incinerate hazardous waste except medical waste

Hazardous waste including some of EEEW is collected and stored at Swaqa disposal site where some of collected waste is landfilled, other streams, such as used oil and lead acid batteries are collected and recycled, a few companies are exporting their hazardous waste outside the country for final disposal.

2.6.5 Incineration and Open Burning of Medical Waste

Jordan does incinerate medical waste. A total of 1,126 tons/year of medical waste are incinerated annually. Table 17 shows detailed results for the incineration and open burning of medical waste. Data related to medical waste incineration is from the Ministry of health.

Table 17. Detailed results for incineration and open burning of medical waste.

Incineration and open burning of medical waste	Use + Disposal	Unit
Activity rate	1,126	t/y
Input factor	24	g Hg/t
Calculated input	27	kg Hg/y
Calculated outputs/releases to: - Air	27.0	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.6.6 Sewage Sludge Incineration

There is no incineration of sewage sludge in Jordan.

2.6.7 Open Fire Waste Burning (on landfills and informally)

In official sanitary landfills in Jordan, open fire waste burning is not conducted. The estimates for open fire waste burning were not possible to estimate and values were not recorded for this category. Table 18 shows detailed results for the informal or accidental open fire waste burning (on landfills and informally).

Table 18. Detailed results for open fire waste burning (on landfills and informally).

Open fire waste burning (on landfills and informally)	Use + Disposal	Unit
Activity rate	51,000	t/y
Input factor	5	g Hg/t
Calculated input	255	kg Hg/y
Calculated outputs/releases to: - Air	255.0	Kg Hg/y

Open fire waste burning (on landfills and informally)	Use + Disposal	Unit
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	0.0	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.6.8 Controlled Landfills/Deposits

In 2015, the total amount of municipal/general waste collected was 1,785,000 tonnes and was the value used in the Toolkit. Mercury from a landfill can be released through three main pathways to the environment. It is released:

- To the air through landfill gas and the working face at the landfill,
- To water through leachates,
- To the land through the accumulation of all the Mercury wastes.

The estimated Mercury inputs from this source in 2015 are 8,925 kg/year. (Table 19), although only 10% is attributed to the final totals to avoid double counting.

Table 19: Detailed results for disposal by controlled landfills.

Controlled Landfill	Disposal	Unit
Activity rate	1,785,000	t/y
Input factor	5	g Hg/t
Calculated input	8,925*	kg Hg/y
Calculated outputs/releases to:		
- Air	89.3	kg Hg/y
- Water	0.9	kg Hg/y
- Land	0.0	kg Hg/y
- Products	0.0	kg Hg/y
- General waste treatment	0.0	kg Hg/y
- Sector specific waste treatment	0.0	kg Hg/y

* 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 Tool-

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

2.6.9 Informal Dumping of General Waste

In 2015, the total amount of informal dumping of general waste was 765,000 tonnes. This is calculated to be 30% of the total solid waste generated. This value is used as an input for the Toolkit. Detailed results for informal dumping of general waste are presented in Table 20.

The estimated Mercury inputs from this source in 2015 are 3,825 kg/year. (Table 20), although only 10% is attributed to the final totals to avoid double counting. Output distribution factors by phase are 10% (air), 10% (water) and 80% (land).

Table 20. Detailed results for informal dumping of general waste.

Informal dumping of general waste	Disposal	Unit
Activity rate	765,000	t/y
Input factor	5	g Hg/t
Calculated input	3,825*	kg Hg/y
Calculated outputs/releases to: - Air	382.5	kg Hg/y
- Water	382.5	kg Hg/y
- Land	3,060.0	kg Hg/y
- Products	0.0	kg Hg/y
- General waste treatment	0.0	kg Hg/y
- Sector specific waste treatment	0.0	kg Hg/y

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

2.6.10 Waste Water System/Treatment

Wastewater from households and businesses that are connected to sewers are treated at various facilities. Table21 shows the amount of wastewater (147,052,551 m3/year) that is treated in the wastewater facilities in Jordan. Output distribution factors by phase are 50% (water), 20% (land), and 15% (general waste treatment) for the 772 kgy Hg/year released in Jordan.

Table 21. Detailed results for waste water systems/treatment.

Waste water systems/treatment	Disposal	Unit
Activity rate	147,052,551	m^3/y
Input factor	5.25	mg Hg/^{m3}
Calculated input	772*	kg Hg/y
Calculated outputs/releases to: - Air	382.5	kg Hg/y
- Water	382.5	kg Hg/y
- Land	3,060.0	kg Hg/y
- Products	0.0	kg Hg/y
- General waste treatment	0.0	kg Hg/y
- Sector specific waste treatment	0.0	kg Hg/y

* 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.

2.7 Data and inventory on general consumption of Mercury in products, as metal Mercury and as Mercury containing substances.

Background calculations for the product groups listed below were based on the data on population, electrification rate and dental personnel density shown in Table 22.

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

Table 22. Background data for default calculations for dental amalgam and certain other product types.

Background data for default calculations and range test			
Country	Population in 2015	Dental personnel per 1000 inhabitants	Electrification rate, % of population with access to electricity
Jordan	9,840,967	1.295	100

The data in Table 22 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.

2.7.1 Dental amalgam fillings ("silver" fillings)

Dental amalgam is a dental filling material used to fill cavities caused by tooth decay. It has been used for more than 150 years in hundreds of millions of patients around the world. Dental amalgam is a mixture of metals, consisting of liquid (elemental) Mercury and a powdered alloy composed of silver, tin, and copper. Approximately 50% of dental amalgam is elemental Mercury by weight. The chemical properties of elemental Mercury allow it to react with and bind together the silver/copper/tin alloy particles to form an amalgam. Dental amalgam fillings are also known as "silver fillings" because of their silver-like appearance. Despite the name, "silver fillings" do contain elemental Mercury.

There is no production of Mercury amalgams in Jordan, however as defined by the Toolkit, "production" in this context means in situ preparation at the dentist clinic.

The Level 1 assessment was based on a ratio of dental personnel of 1.295 per 1000 inhabitants. Table 23 illustrates that 3,074 kg of Hg is contributed by this source category and the greatest contribution is being released to water (1,353 kg Hg/year), although elevated levels are released to land, by-products and impurities, general waste and waste treatment facilities.

Table 23. Detailed results for dental amalgam fillings

Dental Amalgam	Unit	Production	Use	Disposal	Sum of releases to pathway from assessed part of life-cycle
Activity rate	Inhabi-tants	9,840,967	9,840,967	9,840,967	-
Input factor for phase	g Hg/ inhabi-tants/y	0.2	0.2	0.2	-
Calculated input to phase	kg Hg/y	3,074	3,074	3,074	-
Output distribution factors for phase: - Air		0.02	-	-	-
- Water		0.14	0.02	0.3	-
- Land		-	-	0.08	-
- Products		-	-	0.06	-
- General waste treatment		0.12	-	0.08	-
- Sector specific waste treatment		0.12	-	0.08	-
Calculated out-puts/releases to: - Air	kg/y	61.5	0.00	0.00	61.5
- Water	kg/y	430.3	61.5	860.7	1,352.5
- Land	kg/y	0.00	0.00	245.9	245.9
- Products	kg/y	0.00	0.00	184.4	184.4
- General waste treatment	kg/y	368.9	0.00	245.9	614.8
- Sector specific waste treatment	kg/y	368.9	0.00	245.9	614.8

2.7.2 Thermometers & Other Glass Hg Thermometers (air, laboratory, dairy, etc.)

One of the most common industrial uses of Mercury is in thermometers. Mercury is used because it is the only liquid metal at room temperature and since all metals expand with heat, when placed in a calibrated glass container, it can accurately measure the temperature. There is no production of Hg thermometers in Jordan. All thermometers are imported.

Table 24. Thermometers, not with other instruments, liquid-filled for direct reading.

HS Custom Code	Description of HS Code	Total Quantity	Included in Inventory
Thermometers			
9025 1120	Medical Hg thermometers	600,000 items	Yes
9025 1180	Engine-controlled Hg thermometers and other large industrial/specialty Hg thermometers	9,161 items	Yes

The Harmonized System Code for Mercury-containing clinical thermometers as suggested by the Guidelines for Inventory Level 1, HS code 90251100 was used to identify "Thermometers, not with other instruments, liquid-filled for direct reading" (Table 24). Table 25 shows detailed results for the input (1,544 kg Hg/year) and release of Mercury-based thermometers in Jordan.

Table 25. Detailed results for Hg thermometers.

Hg thermometers	Use + Disposal	Unit
Activity rate	609,161	Items/y
Input factor for phase	1	g Hg/item
Calculated input to phase	1,544	kg Hg/y
Output distribution factors for phase: - Air	0.1	
- Water	0.3	
- Land	0.0	
- Products		
- General waste treatment	0.6	
- Sector specific waste treatment	0.0	
Calculated outputs/releases to: - Air	154.4	Kg Hg/y
- Water	463.1	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	926.1	Kg Hg/y
- Sector specific waste treatment	0.0	Kg Hg/y

2.7.3 Electrical Switches and relays

Switches are devices that open or close an electrical circuit, or a liquid or gas valve. Mercury-added switches include: float switches, actuated by a change in liquid levels; tilt switches, actuated by a change in the switch

position; pressure switches, actuated by a change in pressure; and temperature switches and flame sensors, actuated by a change in temperature. Mercury switches are used in a variety of consumer, commercial, and industrial products, including: appliances, space heaters, ovens, air handling units, security systems, levelling devices, and pumps.

Relays are products or devices that open or close electrical contacts to control the operation of other devices in the same or another electrical circuit. Relays are often used to turn on and off large current loads by supplying relatively small currents to a control circuit. Mercury-added relays include: Mercury displacement relays, Mercury wetted reed relays, and Mercury contact relays. Relays have been used in telecommunication circuit boards, commercial/industrial electric ranges, and other cooking equipment.

Due to uncertainty in the distribution of Mercury switches and relays in Jordan, the inventory used the default method specified in the Toolkit, which assumed 0.14 g Mercury per inhabitant for this source category. Using this method provided the highest input of Mercury at 88.6 kg per year, perhaps indicating a degree of over estimation. The majority of this Mercury would be released to general waste treatment (Table 26).

Table 26. Detailed results for electrical switches and relays.

Electrical switches and relays	Use + disposal	Unit
Activity rate	9,840,967	Inhabitants
Input factor for phase	0.14	g Hg/inhabitant
Calculated input to phase	1,376	kg Hg/y
Output distribution factors for phase: - Air	0.1	-
- Water		-
- Land	0.1	-
- Products		-
- General waste treatment	0.8	-
- Sector specific waste treatment		-
Calculated outputs/releases to: - Air	137.6	kg/y
- Water	0.00	kg/y
- Land	137.6	kg/y

Electrical switches and relays	Use + disposal	Unit
- Products	0.00	kg/y
- General waste treatment	1,101.1	kg/y
- Sector specific waste treatment	0.00	kg/y

2.7.4 Light Sources with Mercury

The most typical light source using Mercury is known as the Mercury vapor lamp, which is still common in street lighting in some parts of the world. This uses electricity to vaporize Mercury and conduct electricity in gas (electric arc) to produce light. Other commonly used lighting includes fluorescent lamps. These lamps use electricity to excite Mercury atoms, causing the release of UV light, which strikes a phosphor coating inside the glass, causing it to "fluoresce" and produce white light. Mercury is present in both the phosphor powder and in the vapor. The same technology can be found in compact fluorescent light (CFL) and other energy efficient bulbs (not LED).

There is no production facility in Jordan for light sources. All lights are imported. As suggested by the Guidelines for Inventory Level 1, the HS codes included in Table 27 below, represent product categories, which may include products that contain Mercury. As described in the argumentation for each of these HS codes, not all of the items captured by such a HS code contain Mercury. Furthermore, the Mercury content for each of these products varies based on its size, the brand, etc.

Table 27. Light Sources with Hg.

HS Custom Code	Description of HS Code	Total Quantity	Included in Inventory
Light Sources with Mercury			
8539 3110	Fluorescent tubes (double end)	16,743,900 items	Yes
8539 3190	Compact fluorescent lamp (CFL single end)	8,371,960 items	Yes
8539 3220 8539 3290	Other Hg containing light sources (see guideline)	2,114,790 items	Yes

If we combine all potentially Mercury containing lamps (27,230,650), 61% represent fluorescent tubes (16,743,900), 31% CFLs (8,371,960) and 8% (2,114,790) account for other Mercury containing lamps (7,260). The total estimated Mercury input for lamps is 550 kg Hg/year. Table 28 shows de-

tailed results for fluorescent tubes and CFLs.

Table 28. Detailed results for fluorescent tubes and CFLs.

Light sources with Mercury	Use + disposal	Unit
Activity rate Fluorescent tubes	16,743,900	Items/y
Input factor for phase	25	mg Hg/item
Calculated input to phase	419	kg Hg/y
Activity rate CFL	8,371,960	Items/y
Input factor for phase	10	mg Hg/item
Calculated input to phase	84	kg Hg/y
Activity rate Other Hg-containing light sources Input factor for phase	2,114,960 30	Items/y mg Hg/item
Calculated input to phase	48	kg Hg/y
Output distribution factors for phase: - Air	 0.05	 -
- Water		-
- Land		-
- Products		-
- General waste treatment	0.95	-
- Sector specific waste treatment		-
Calculated outputs/releases to: - Air	 27.5	 Kg Hg/y
- Water	0.00	Kg Hg/y
- Land	0.00	Kg Hg/y
- Products	0.00	Kg Hg/y
- General waste treatment	522.4	Kg Hg/y
- Sector specific waste treatment	0.00	Kg Hg/y

Data gaps and priorities for potential follow up:

It was challenging to estimate how many of the lamps actually contain Mercury, and what the level of Mercury is that they contain. For example, fluorescent tubes contain more Mercury than CFLs. To more accurately estimate the distribution between the different types of lamps, especially in the category of “Other Hg containing light sources”, information need to be collected through additional means outside of the Import Customs Data (e.g. through distributors).

2.7.5 Batteries with Mercury

There are a variety of button-cell batteries that contain Mercury, including zinc air, silver oxide, and alkaline manganese oxide batteries (Table 29). Button-cell batteries are small, thin, energy cells that are not rechargeable. They are most commonly used in watches, toys, hearing aids, and other small and portable electronic devices. The creation of small electronic devices is possible due to the size of the button-cell batteries. Below is a brief description of the types of relevant batteries found on the market as described by literature by UNEP.

Zinc Air miniature batteries are mostly used in hearing aids because of their high-energy concentration and their ability to continuously discharge energy. This type of battery uses oxygen from the air to produce electrochemical energy. A hole in the cell allows the surrounding air to enter the battery and react with the cathode. They are also used for small devices, such as wristwatch pagers and ear speech processors.

Silver Oxide button-cell batteries are used in various devices, such as hearing aids, watches, cameras, and clocks. In these batteries, the silver oxide makes up the cathode, and powdered zinc provides the anode. Usually sodium hydroxide or potassium hydroxide is added as an alkaline electrolyte. Silver oxide batteries can come in a large size as well as the button-cell size; however, the manufacture of the larger batteries is limited due to the high price of silver.

Alkaline Manganese Oxide button-cell batteries are used in toys, calculators, remote controls, and cameras. In these batteries, the cathode consists of manganese dioxide, which is produced through an electrolytic process, and the anode is made up of powdered zinc metal. The electrolyte typically used in this type of button-cell battery is potassium hydroxide. Gas can form in all of these types of button batteries due to the corrosion of zinc. Zinc in the battery gets corroded into the electrolyte as the battery is used. This corrosion can cause electrolysis and can cause the generation of hydrogen gas in the canister. Build-up of hydrogen gas can cause the battery to leak, limiting the ability of the battery to function. Mercury suppresses this zinc corrosion, which is why it is added to button-cell batteries. These batteries may contain Mercury in the insulating paper surrounding the battery, or Mercury may be mixed in the anode itself.

Mercuric Oxide batteries contain Mercury as the electrode and are useful in applications that require a high energy density and a flat voltage curve. In the past, mercuric oxide button-cell batteries were used in hearing aids, watches, calculators, electronic cameras, and other personal electronic items requiring a small battery.

Other batteries, such as AAA, AA, C, and D alkaline, general purpose, and carbon-zinc; lead-acid; lithium-ion; and nickel metal halide and nickel-cadmium, do not contain Mercury.

All of the different button-cell batteries can contain up to 0.005 grams (5 milligrams) of Mercury in a single unit. Stacked button-cell batteries (i.e., units that contain multiple button-cells stacked on top of one another) may contain a larger amount of Mercury.

There is no production of batteries in Jordan. All battery products are imported. Data obtained from Customs department for 2015 indicates that no use of Mercury oxide (button cells and other sizes), also called Mercury-zinc cells, or batteries with plain cylindrical alkaline, permanganate, etc). Conversely, Jordan used six tonnes of other button cells (zinc-air, alkaline button cells, silver-oxide).

Table 29. Detailed results for batteries.

Light sources with Mercury	Use + disposal	Unit
Activity rate Batteries (zinc-air, alkaline button cells, silver oxide)	6	t/y
Input factor for phase	8	mg Hg/item
Calculated input to phase	44	kg Hg/y
Calculated outputs/releases to: - Air	0.0	Kg Hg/y
- Water	0.0	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	44.3	Kg Hg/y
- Sector specific waste treatment	0.00	Kg Hg/y

Data gaps and priorities for potential follow up:

It was challenging to estimate the kinds of batteries and what the level of

Mercury is that they contain. For example, “zinc-air” batteries contain 12 kg Hg/t, while alkaline batteries contain 5 kg Hg/t. Therefore, more information is needed to through additional means outside of the Import Customs Data to determine higher resolution information.

2.7.6 Polyurethane with Mercury catalysts

Polyurethane (PUR) is a polymer obtained from the reaction between a multi-hydroxyl alcohol (polyol) and an isocyanate (R-NCO). The resulting bonds are carbamate (urethane) bonds and the polymerization product is “polyurethane”. It is used in many applications, including automotive, to make suspension-bushing, seat padding etc. The production process uses organic Mercury compounds as a catalyst.

The production of polyurethane products in Jordan does not include the use Mercury as catalyst.

2.7.7 Paints with Mercury

It is known that phenyl mercuric acetate (PMA) and similar Mercury compounds were used as water-based paint additives. These additives work to extend shelf life by controlling bacterial fermentation in the can (biocides), as well as to retard fungus attacks on painted surfaces under damp conditions (fungicides). Inorganic Mercury compounds possessing very low solubility have also been used as additives in marine coatings and paints to impede bacteria formation and to hinder the development of marine organisms.

There is no production and import of paints with Mercury in Jordan.

2.7.8 Cosmetics with Mercury

Mercury is a common ingredient found in skin lightening soaps and creams. It is also found in other cosmetics, such as eye makeup, cleansing products, and mascara. Skin lightening soaps and creams are commonly used in certain African and Asian nations. They are also used among dark-skinned populations in Europe and North America. Mercury salts inhibit the formation of melanin, resulting in a lighter skin tone. Mercury in cosmetics exists in two forms: inorganic and organic. Inorganic Mercury (e.g. ammoniated Mercury) is used in skin lightening soaps and creams. Organic Mercury compounds (thiomersal [ethyl Mercury] and phenyl mercuric salts) are used as cosmetic preservatives in eye makeup, cleansing products, and mascara.

There is no production of cosmetics in Jordan and the use of products with Mercury remains unknown.

2.7.9 Manometers and gauges with Mercury

Mercury has a density of 13,600 kg/m3 compared to water (1000 kg/m3). Therefore, a column of Mercury only 760 mm high can balance atmospheric pressure; the equivalent of 10 m column of water. This has resulted in Mercury being used in manometers and gauges that measure pressure. The most widespread use in Jordan is in blood pressure monitors, also known as sphygmomanometers.

There is no production of manometers and gauges in Jordan. All of these products are imported.

The import data for 2015 was used (under HS 90262000), called "Instruments and Apparatus for Measuring or Checking Pressure", which used the following three categories: "blood pressure monitor", "blood pressure meter" and "digital pressure meter" (which are no longer being used). It was found that an estimated 6,000 items were imported in 2015. Table 30 highlights that this source category generates 480 kg of Hg/year. Further additional activity rates calculated through the number of inhabitants in Jordan estimated another 49 kg Hg/year. Therefore, the total estimated input for this category is 529 kg Hg/year, with the greatest calculated release to general waste treatment (318.5 kg Hg/year) .

Table 30. Detailed results for manometers and gauges containing Mercury.

Manometers and gauges	Use + disposal	Unit
Activity rate	6,000	Items
Input factor for phase	80	g/item
Calculated input to phase	529	kg Hg/y
Output distribution factors for phase: - Air	0.1	
- Water	0.3	
- Land		
- Products		
- General waste treatment	0.6	
- Sector specific waste treatment		
Calculated outputs/releases to: - Air	52.9	Kg Hg/y
- Water	168.7	Kg Hg/y

Manometers and gauges	Use + disposal	Unit
- Land	0.00	Kg Hg/y
- Products	0.00	Kg Hg/y
- General waste treatment	318.5	Kg Hg/y
- Sector specific waste treatment	0.00	Kg Hg/y

2.7.10 Laboratory chemicals

Mercury is used in demonstration or educational laboratories where investigations relating to density are conducted. Mercury has also been used as a preservative in reagents, buffers, stains and saline solutions. It is also common in analytical equipment, such as Atomic absorption spectrometry (AAS) and Mercury electrode (calomel) as a reference electrode in electrochemistry applications.

Laboratories in Jordan include research, industrial and testing. Research labs regularly contain small amounts of Mercury for research and other purposes. Industrial labs conduct tests for quality standards of manufactured products and still use Mercury.

The Toolkit I default results for the categories of laboratory chemicals and "other laboratory and medical equipment with Mercury" total 491 kg Hg/year, with the primary outputs to water, general waste, and sector specific waste treatment (Table 31).

The toolkit presented an additional calculation for "other laboratory equipment" which consisted of a list of Mercury containing chemicals but based on available data that equipment does not exist in Jordan.

Table 31. Detailed results for laboratory chemicals

Laboratory chemicals	Use + disposal	Unit
Activity rate	9,840,967	Inhabitants
Input factor for phase	0.01	g/inhabitant/y
Calculated input to phase	491	kg Hg/y
Output distribution factors for phase: - Air	 -	
- Water	0.33	
- Land		

Laboratory chemicals	Use + disposal	Unit
- Products		
- General waste treatment	0.33	
- Sector specific waste treatment	0.34	
Calculated outputs/releases to: - Air	0.0	Kg Hg/y
- Water	162.2	Kg Hg/y
- Land	0.0	Kg Hg/y
- Products	0.0	Kg Hg/y
- General waste treatment	162.2	Kg Hg/y
- Sector specific waste treatment	167.1S	Kg Hg/y

2.8 Data and inventory on crematoria and cemeteries

No data were gathered for this source category for religious reasons.

2.9 Data and inventory on stocks of Mercury and/or Mercury compounds, and storage conditions, supply and trade of Mercury and Mercury containing compounds

Currently, the only facility for the management of hazardous waste is the storage site in Swaqa hazardous waste landfill. Swaqa receives Mercury containing waste to be stored in relatively good conditions.

Chapter III

Policy, Regulatory and Institutional Framework Assessment

3.1 Policy and regulatory assessment

Ratification of Minamata Convention on Mercury binds Jordan legally to the Convention's obligations. As soon as Jordan ratified the convention and the convention enters into forces, Jordan entered into the implementation phase during which it has completed its Mercury Initial Assessment report (MIA) comprised of the completion of its national situation analysis of both the policy, regulatory and institutional framework assessment, Mercury inventory, population at risk and launched a national awareness campaign addressing schools, universities, Jordan chamber of industries and Commerce, civil society organizations, women and youth organizations. Moreover, Jordan identified the legal and administrative actions that need to be considered in the next phase of implementation.

Table 32 below presents a summary assessment of existing national policies and regulatory measures in place in Jordan, 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 in the future to ensure compliance with the Convention.

Given the situation of Jordan, in terms of reduced sources of Mercury emissions, some of the provisions of the Minamata Convention are not particularly applicable.

The main environmental legislation in Jordan is the **amended Environment Protection Law No. 6 for the 2017**. Out of this legal instrument a couple of directives are issued among of which is the "management, transportation and handling of harmful and hazardous regulation" number (24) for the year 2005" in which Mercury is implicitly classified as a "pollutant" and "hazardous substance" by virtue of its hazardous properties. Also, Mercury wastes are classified as hazardous wastes. The Ministry of Environment reg-

ulates in collaboration with national technical ministries and institutions the discharge (releases/emissions) of all hazardous substances (including Mercury) to the environment, the manner in which they are handled and their disposal. As such, the Ministry of Environment meets some of the requirements of the Minamata Convention, relating to storage and disposal of Mercury. There are other notable relevant legislations:

1. Public Health Law No.47 for the year 2008.
2. Ministry of Agriculture Law 13/2016.
3. Ministry of Industry, Trade and Supply.
4. ASEZA zone specific laws and regulations.
5. Ministry of Energy and Natural Resources laws.
6. Standards issued by the Standards and Metrological Corporation.
7. Jordan Food and Drug Administration, law of drugs and pharmacology no 12 for the year 2013.

Summary of Environment Protection Law 6/2017 provisions

Article 2 of the law defines “hazardous materials” as the solid, liquid and gaseous material that have hazardous properties which can cause pollution directly or indirectly through the reaction with other materials. The same article defines “hazardous wastes” as the remaining’s of different activities and processes or its ashes that poses the characteristics of the hazardous material and which has no primary use or alternative unless it is treated according to scientific and technical specification. Article 3 identifies the ministry as the entity in charge of environment protection at the country level. Article 3/a requires all official authorities to protect environmental information and furnish the ministry with. Article 3/b requires official authorities, private and civil society organizations to enforce policies, plans, instructions and decisions issued in accordance to this law.

Article 4/k entitles the Ministry of Environment in collaboration with the concerned authorities to establish labelling process by which hazardous chemicals impact degree on environment is identified including the collection, storage, transport, dispose of, tackling and handling by any mean in accordance to a directive to be issued for this purpose.

Article 6/a, hazardous materials that are prohibited or restricted to import or enter or store, handle, use in any way in the country, for environmental reasons is managed by the bylaw 24/2005. Article 6/B if a hazardous pro-

hibited or restricted chemical material or imported or stored or handled in accordance to article 6/a, then the ministry in collaboration with other official authorities will send the shipment back to its source on the importer cost and will penalize the importer as per this law provisions.

Article 7 prohibits the enter of any hazardous waste to Jordan or import, store, handle, dispose of or throw in any mean. Articles 12/A/3 prohibits any activity or act that impact environment within the reserve network negatively such as mining.

It can be concluded, therefore, that the Ministry of Environment Law is the main instrument to operationalize the Minamata Convention on Mercury, as far as definition and management of hazardous substances and waste. However, it currently falls short of several Convention requirements, in particular to provisions relating to Mercury containing products, supply and trade, and a ban on the mining of Mercury.

In order to properly assess the policies and regulatory measures in place and remaining gaps, a comparative analysis was carried out in tabular form and presented in subsequent pages for each article of the Convention. A succinct summary of each article of the Convention is presented, based on the Natural Resource Defense Council (NRDC) checklist and the list of national policy, and or regulatory measure that seeks to address the concern of the Convention article is displayed. Where there are none existing, (legislative gaps), proposals were made in order to be compliant to the Convention article.

Table 32. Policy and Regulatory Measures in Place and Remaining Gaps

Article 3 - Mercury supply sources and trade	
Description of Article:	
Succinct summary of provisions relevant (source NRDC checklist)	• Not allow new primary Mercury mining • Prevent the import and use of Mercury from primary Mercury mining for artisanal and small-scale gold mining (ASGM) • 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)

Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:
The Annex of Bylaw 24/ 2005	"Mercury and its compounds" is already added to the list of hazardous substances in the Annex.
Annex 1 on Hazardous Waste instructions for the year 2003	"Mercury and its compounds" is also added to the annex 1 of the hazardous waste instructions as banned hazardous waste that must not be imported.
Ministry of Health decision published on September 16, 2012 the Gazette No. 5178	Banning the use of Mercury and its compounds in schools and university's' laboratories.
Minister of Health decision published on 14 November 2012 in the Gazette No. 5187	Restrict the use of Mercury and its compounds within the prohibited and conditioned list of chemicals in different industries such as protecting woods, industrial textiles, treating industrial wastewater, in the manufacturing of packing material and in the production of paints.
Environmental law 6/2017	Not allow the import of Mercury without government consent
EE-Waste draft instructions	Management and handling of electrical and electron wastes.
Minister of Health decision published on 9 May 2013 No. 2390	Cease the purchase of hypertensive Mercury-containing meters in all the medical procurement and gradually replace with pressurized or digital meters.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions):*	
Develop a new legislation or amend the current one (directive 24 / 2005) so that the following points are considered and incorporated: **1. Amend and update its legislation to respond to the convention requirement and legislative gaps.** **2. When amending or updating the national legislations special consideration should be paid to:** • Include Mercury and its compounds definition in compliance with the Minamata convention's Articles. • Add a text prohibiting any mining of Mercury and the ban of Mercury for future ASGM. • Mention that the convention excludes some uses of Mercury that may contain small quantities or traces of Mercury. • Add annex or text that forces facilities or industries which has stocks of Mercury or Mercury compounds exceeding 50 metric tons, as well as sources of Mercury supply generating stocks exceeding 10 metric tons per year to take measures to dispose of Mercury in environmentally sound manner that do not lead to recovery or recycling or extraction or direct or alternative uses of Mercury. • Allow the export of Mercury as per the conditions identified under this article of the convention. • Not allow the import of Mercury from a non-Party to whom it will provide its written consent unless the non-Party has provided certification that the Mercury is not from sources identified as not allowed under paragraph 3 or paragraph 5 (b).	

Article 4 on Mercury-added products	
Description of Article:	
Succinct summary of provisions relevant	• 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:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Instructions of fertilizers registration procedures No. A/3 for the 2016 article 8/A issued in accordance to the agriculture law 13/2015 issued as per article 20	Fertilizers registration procedures.
Instructions Z/18 for the year 2016 issued in accordance with the Agriculture Law 13/2016 as per article 21.	On the registration, manufacture, processing, import, handling and trade of pesticides which prohibits the registration of any pesticide which is banned in the country of origin for health or environmental reasons or containing chemicals that cause cancerous tumors or congenital malformations or genetic mutations on humans and animal.
Principles of licensing pharmaceutical products that may contain vitamins or minerals for the year 2017 issued under provision of article (5) from the law of drugs and pharmacology no 12 for the year 2013 and paragraph 11 from Article (7) of the Food and Drug Association Law No. (41) For the year 2008,	Certificate indicating that the product is free of heavy metals (Mercury).
The licensing system for clinics and dental centers no. (52) Of 2016 issued under Article 7 and paragraph A of Article 72 of the Public Health Law No. 47 of 2008	The Minister issues the necessary instructions based on committee recommendation the technical requirements of the dental unit.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions):*	

1. Jordan needs to amend and upgrade its national legislations to comply with the convention provisions. Special consideration should be paid to:
   - Include in the national legislation text that banns the manufacture, import or export of Mercury-added products listed in part I of Annex (a) of the Convention, after the specified date in the Annex. (For Mercury-added products specified in Part I of Annex A, the phase out date is 2020).
   - Identify proper measures to phase down the use of dental amalgam in compliance with part II of Annex A of the convention and similar handling as per article 4/5 and 4/6.
   - Finalize and adapt the Restrictions of Hazardous Substances (RoHS) and Waste of Electrical and Electronic Equipment (WEEE).

Article 5 on manufacturing processes in which Mercury or Mercury compounds are used	
Description of Article:	
Succinct summary of provisions	• Not allow the use of Mercury or Mercury compounds in the manufacturing processes listed in Part I of Annex B. • Restrict (as specified in the Annex) the use of Mercury in the processes listed in Part II of Annex B. • Not allow new facilities from using Mercury in the processes listed in Annex B, except facilities using Mercury catalysts to produce polyurethane • For facilities with processes listed in Annex B, identify and obtain information on Mercury or Mercury compound use; and control Mercury emissions to air, and releases to land and water. • Discourage new uses of Mercury in industrial processes.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/ number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Non existing	Jordan does not have any manufacturing processes that use Mercury or Mercury compounds.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*:	
In the intended legislation anticipated to be amended or upgraded ban on manufacturing processes that use Mercury or Mercury compounds.	

Article 6 on exemptions available to a Party upon request	
Description of Article:	
Succinct summary of provisions relevant	Any State or regional economic integration organization may register for one or more exemptions from the phase-out dates listed in Annex A and Annex B, hereafter referred to as an " exemptions" by notifying the Secretariat in writing.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**

Non existing	Jordan has not filed any exemptions, but reserves the right to apply this clause for future amendments to Annex A or B.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:**	
Include in the national legislations to amend or upgrade in compliance with the convention provisions, consideration to the provisions of article 6.	

Article 7 on artisanal and small-scale gold mining	
Description of Article:	
Succinct summary of provisions relevant	No artisanal mining present in the country Not allow new primary Mercury mining
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Non existing	There is no artisanal and small-scale gold mining in Jordan.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:**	
Mention in the planned modification and amendment of the legislation, a provision to comply with this article of the convention.	

Article 8 on emissions	
Description of Article:	
Succinct summary of provisions relevant	• 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 (coal-fired power plants, coal-fired industrial boilers, non-ferrous metal smelting and roasting processes, waste incineration, and cement production) • 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. • Require monitoring/reporting and otherwise establish a Mercury emissions inventory for sources listed in Annex D.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**

Environmental Protection Law 6/2017	The Minister may prescribe standards and safeguards for emissions of air pollutants from mobile or stationary sources. Such standards can include emissions of Mercury from waste incinerators and cement factories.
Bylaw No. 75/2013 of the Ministry of Environment	On the generation of electric power using direct burning of oil shale which defines the Mercury in air pollutants and the maximum emission limits of the project activity of (0.1) mg /m3.
Medical Waste Management Instructions No. 1/2001	Monitoring the emissions of Mercury and its compounds resulting from the incineration of medical waste.
JS11989/2006	Jordanian Standard of air pollutants emitted from stationary sources (under modification to include Mercury and its compounds)
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*: Jordan will modify and amend the following legislations to comply with the convention provisions: 1. By law 24/2005 on Harmful and Hazardous materials management, transportation and handling. 2. Instructions of hazardous waste 2003 paying special consideration to the provisions on emissions to include best available technologies for controlling Mercury emissions. 3. Develop a new standard on the medical waste incinerators and cement factories stacks emissions limit values.	

Article 9 on releases	
Description of Article:	
Succinct summary of provisions relevant	• Require reporting or otherwise obtain information as needed to identify significant sources of Mercury/Mercury compound releases to land or water and to maintain an inventory of releases from the sources identified • Take one or more measures specified in Article 9.5 to control/reduce Mercury and Mercury compound releases to land and water from significant sources it Identifies.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Guidelines	On medical waste management unit produced by the dental clinics among of which are the amalgam and its empty capsules.
Guidelines	On how to handle Mercury in case of being released into the environment.
Mercury Initial Assessment (MIA)	The Mercury initial assessment (MIA) established an inventory of sources of Mercury releases to land and water. The MIA also incorporates the National Implementation Plan for Mercury, which fully addressed in article 9 and contains actions specified in article 9.5
Reduction and Elimination of U-POP and other chemical releases	Jordan is in the process of having in place facilities that treat medical wastes and electronic wastes to reduce emissions

JS 1145/2006 on uses of treated sludge and disposal	On uses of treated sludge and disposal
Instructions for the year 2017	On discharge of non-domestic wastewater into the sewer system
JS 202 /2007	On industrial reclaimed wastewater
Instruction for the 2001	On discharge of industrial and commercial wastewater.
JS 286/2008	On drinking water.
Framework Waste Management Law	Final procedures to adopt which handles all types of wastes.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:** The intended legislations to modify and amend need to include: • Define the meaning of such terms in accordance with the convention, the legislation to include measures to control releases of Mercury and its' compounds and the Government should prepare national plans setting out the measures to be taken to control Mercury releases. • Mention the periodic assessment for new sources and update to the inventory releases. • Modify the instructions of the discharge of non-domestic wastewater into the sewer system for the year 2017 and the instructions on the discharge of industrial and commercial wastewater to include Mercury and its compounds.	

Article 10 on environmentally sound interim storage of Mercury, other than waste Mercury	
Description of Article:	
Succinct summary of provisions relevant	Take measures to ensure interim Mercury storage is conducted in environmentally sound manner, taking into account guidelines to be developed by the Conference of the Parties.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Center of Hazardous Treatment (SWAQA) Hazardous	Jordan already has in place a center to store hazardous waste storage in SWAQA. Jordan also is signatory of Basel Convention whereby the Basel Convention classification is considered in this site. This also covers Mercury wastes.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:** Inventory and assessment study conducted by which stocks of Mercury and sources are identified. The anticipated amended and modified law to include specific storage facility for Mercury and Mercury waste, how to implement environmentally sound conditions and practices in the storage, in addition to carrying out frequent monitoring and evaluation.	

Article 11 on Mercury waste	
Description of Article:	
Succinct summary of provisions relevant	• Use a definition of Mercury waste consistent with Article 11.2 • Take measures to manage Mercury wastes in an environmentally sound manner, taking into account guidelines developed under the Basel Convention and in accordance with COP requirements to be developed. • Take measures to restrict Mercury derived from the treatment or re-use of Mercury waste to allowed uses under the Convention or environmentally sound disposal. • Require transport across international boundaries in accordance with the Basel Convention, or if the Basel Convention does not apply, consistent with international rules, standards, and guidelines.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Center of Hazardous Treatment (SWAQA)	Jordan already has in place hazardous waste storage in SWAQA.
Basel Convention	Jordan is already party in Basel Convention, Basel convention articles is already applied to Mercury waste
Bylaw 24/2005	Mercury wastes are considered as hazardous wastes.
Hazardous waste management instructions 2003	On hazardous wastes among of which Mercury wastes.
SWAQA	There is no facility for treatment
Guidelines of medical waste management resulting from Dental clinic such as amalgam waste and empty capsules	On management for the waste generated from the dental clinic.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:** Include in the anticipated legislation to amend and modify a definition consistent with Article 11.2 and for trans-boundary movement of hazardous waste including Mercury and Mercury containing waste.	

Article 12 on contaminated sites	
Description of Article:	
Succinct summary of provisions relevant	Develop strategies for identifying and assessing Mercury/ Mercury compound contaminated sites. If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	

Title and reference/number of relevant Policy and Regulatory Measure, as well as date	Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:
Non existing	
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*: • Include in the upcoming planned to amend and modify legislation a text on contaminated sites in compliance of this provision of the convention. • There is an old site possibly contaminated with Mercury (former acetaldehyde factory). Therefore, an assessment of the site and its surroundings need to be carried out including a risk assessment.	

Article 13 on financial resources	
Description of Article:	
Succinct summary of provisions relevant	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.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Public Private Partnership (PPP) law 31/2014 by the Ministry of Finance	On encouraging the creation of a partnership between the government authorities and the private sector in national priority projects.
Bylaw 98/2015 as per article 18.a and article 22 of the PPP law 31/2014	On the creation of a partnership between the public and private sector.
MIA 2018	Jordan is currently carrying out an MIA funded by GEF 2018 where its NIP will also be developed.
Ministry of Environment National Plan 2017-2019	Foster relationship between public and private sector
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*: • Jordan would need international financial support to proceed and continue in the implementation process and future frequent reporting. • Jordan would need to explore the domestic financial resources such as through the PPP partnership. PPP should be mentioned in the legislations planned to amend and modify.	

Article 14 on capacity building, technical assistance and technology transfer	
Description of Article:	
Succinct summary of provisions relevant	Cooperation for capacity building and technical assistance in particular between developed countries and least developed countries and Small Island Development States. Developed countries parties to provide information on alternative technologies through the COP as they become available.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
MIA 2018	MIA project has contributed to the enabling capacity of involved multi-sectoral taskforces members in addition to provide technical assistance in the form of training on the toolkit to conduct Mercury inventory, identify national priorities and developing Mercury NIP by an international consultant.
• **Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions** *(only in relation to binding provisions)*: • Jordan would continue to need enabling and capacity building to smoothly progress in the implementation post the compliance to the agreement and on frequent reporting and Mercury management. • Furnish Jordan with high technological analytical apparatus (field and lab) at country entry points (borders). • Transfer of up to date the new alternative technology including the identification of difficulties Jordan is facing.	

Article 16 on health aspects	
Description of Article:	
Succinct summary of provisions relevant	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:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
JS1032/2013 and JS 1141/2014 and JS 1584/2011	On lipsticks, nail paint and Dead Sea salts

Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*:

- Capacity building and technical assistance in developing strategies to identify population at risk and then work in the areas of prevention, diagnosis, treatment and monitoring related to exposure to Mercury.
- Conduct enabling program for public education targeting Awareness, Outreach and Communication and Hazardous Substance and Waste Management Departments and the Directorate of Environmental Health in the ministry of Health and other related sectors.
- The need to technical assistance to develop guidelines in the areas of fish (canned, fresh, frozen..etc), cosmetics, chemical in products (Mercury).
- Expand the Establish (human resources capacity building, technical assistance and technology transfer) of a specialized health unit just to provide care services for the affected intoxicated persons.

Articles 17 on information exchange	
Description of Article:	
Succinct summary of provisions relevant	• 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:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Jordanian Access to Information Law 47/2007	Entitles and give the right to public to access government information.
MIA report 2018	Jordan information in the area of Mercury comes from the international community and the heavy involvement in the Mercury negotiation processes, CoP1 and post the ratification where Jordan was able to have MIA project in place.

Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*:

- National implementation plan is required to include all future plans related to these provisions of this convention.
- Legislative provisions that encourage the government and industry to disseminate information on the on quantities of Mercury and Mercury compounds emitted, released, or disposed of, and sharing of information to let the public take health safety measures in compliance of this convention provision.

Article 18 on public information, awareness and education	
Description of Article:	
Succinct summary of provisions relevant	• Promote and facilitate: (a) provision to the public of available information on: • The health and environmental effects of Mercury and Mercury products. • Alternatives to Mercury and Mercury compounds. • The topics identified in paragraph 1 of article 17. • The results of its research, development and monitoring activities under article 19; and • Activities to meet its obligations under this convention. (b) Education, training and public awareness related to the effects of exposure to Mercury and Mercury compounds on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:
Environment Law 6/2017	• Within the Ministry of Environment, a department in charge of education and awareness raising is in place dedicated to educate the public at large on environmental issues among of which is Mercury and Mercury wastes. • Outreach campaigns are carried out during the negotiations, early ratifications, CoP1 and following the early ratification process and then ratification whereby Mercury and the conventions tackled through activities. • MIA campaign on Mercury and Mercury products impacts on health and environment.
Public Health Law 47/ 2008	Outreach campaigns by the Primary Health Care Directorate, health establishments and facilities.
National CSOs	Education and awareness raising campaigns on Mercury and its compounds.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)*: • Having the amended or modified legislation in place, the issue need to be included followed by the development of a National implementation plan to keep public informed and comply with this article of this agreement. • Outsource for expertise and information to the private sector, academic institutions and CSOs	

Article 19 on research, development and monitoring	
Description of Article:	
Succinct summary of provisions relevant	• Parties shall endeavor to cooperate to develop and improve, taking into account their respective circumstances and capabilities: (a) Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of Mercury and Mercury compounds; (b) Modelling 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, as well as collaboration in the collection and exchange of relevant and appropriate samples; (c) 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; (d) Harmonized methodologies for the activities undertaken under subparagraphs (a), (b) and (c); (e) 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, taking appropriate account of the distinction between anthropogenic and natural emissions and releases of Mercury and of remobilization of Mercury from historic deposition (f) Information on commerce and trade in Mercury and Mercury compounds and Mercury-added products; and (g) 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
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
Ministry of Environment	Within MIA sampling conducted looking for Mercury revealed the non-existence of Mercury in the samples included in the MIA report. Moreover, a national action plan and priority actions are identified.
CSOs	Took samples looking for methyl Mercury in hair, fish, lipstick and cosmetics in general .
• **Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions** *(only in relation to binding provisions)***:** • Requires the development of JS for the emissions and releases. • Build the capacity of Jordanian academic institutions in research. • Assistance in developing country high risk Mercury map. • Financial support to carry out a national comprehensive study on health and the environment pertinent to pollution caused by Mercury	

Article 20 on implementation plans	
Description of Article:	
Succinct summary of provisions relevant	• Following MIA, develop a national implementation plan, taking into account Jordan circumstance for meeting the obligation under this convention and furnish the secretariat with such a plan. • Review and update Mercury NIP taking into accounts Jordan circumstances and referring to guidance from the COP and other relevant guidance. • Consult national stakeholders to facilitate the development, implementation, review and updating. • Coordinate at the regional level to disseminate the implementation plan.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
MIA 2018	Jordan has already completed the MIA report incorporating the implementation plan. Moreover, the MIA and the implementation plan were prepared through the consultation with national multi-sectoral stakeholders.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:** Jordan will make available the outcomes, gathered experience and expertise in the service of the region coming out of the MIA process.	

Article 21 on reporting	
Description of Article:	
Succinct summary of provisions relevant	• Each Party shall report to the Conference of the Parties, through the Secretariat, on the measures it has taken to implement the provisions of this Convention and on the effectiveness of such measures and the possible challenges in meeting the objectives of the Convention • Each Party shall include in its reporting the information as called for in Articles 3, 5, 7, 8 and 9 of this Convention.
Policy and regulatory measures in place that enable the country to comply with the above listed provisions:	
Title and reference/number of relevant Policy and Regulatory Measure, as well as date	**Explanation on what aspects of the above provisions are being addressed by policy/regulatory measure:**
COP1	Reporting template was discussed and adopted.
MIA report	Jordan has completed the outcomes of the MIA report that could be considered the future base for reporting.
Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions *(only in relation to binding provisions)***:** Consideration for this article should be included in the upcoming national legislation that will be amended and modified in compliance to the provisions of Mercury conventions.	

3.2 Institutional assessment

National institutions and other stakeholders will implement the Minamata Convention on Mercury in Jordan. For this to be successful, institutions have identified capacities, in terms of human resources, technical expertise, and financial resources to be able to undertake these activities. As a pre-requisite to assessing capacity, a stakeholder assessment was carried out during the MIA work and in specific within the multi-sectoral taskforces formed during the assessment process and the report validation workshop as per the table 33 below. The Ministry of Environment is the competent authority and the focal institution for the Convention, as well as being responsible for various implementation of activities.

In order to ensure effective implementation of the Minamata Convention through coordinated actions from institutions and stakeholders, Jordan identified 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 as follows:

Stakeholder	Role and relevant area
Ministry of Environment	Competent Authority for implementing the Minamata Convention and carry out monitoring, controlling, inspection the Interim storage and disposal of hazardous wastes
Ministry of Health	Health Aspects, Research, inspection, controlling and monitoring.
Ministry of Agriculture	Register and monitor pesticides and fertilizers Mercury free in the country
Ministry of Industry, Trade and Supply	Import and monitoring in collaboration with the competent authority and other line authorities.
Drug and Pharmacology Administration	Approving the import of drugs and pharma such as the use dental amalgams.
Ministry of Finance / Custom Department	Port of entry for Mercury and Mercury-containing devices and materials and thus monitor these ports in collaboration with the Ministry of Environment and other line ministries.
Standards and Metrological Corporation	Monitoring through formulating standards
Aqaba Economic Special Zone	Import, Inspect and monitor within the Aqaba zone
Jordan Chamber of Industry	Research and education addressing its member industries

Energy and Minerals Monitoring Commission	Approve energy sources alternatives
Ministry of Water and Irrigation	Monitor wastewater treatments
Ministry of Municipalities	Monitor solid waste sites
Jordan Refinery (private sector)	Monitor stacks emissions
CSOs such as LHAP and JREDS	Community outreach, awareness raising and education about Mercury issues, the convention, Mercury and its compounds health and environment risks.
Academic and research institutions (universities and accredited research centers)	To undertake monitoring and research on Mercury.
Royal Administration for Environment Protection (Environment Police)	Inspection and monitoring
Dental Association	Education and promotion of alternatives to dental amalgam Mercury containing materials.

This report also assessed the institutional capacity gaps within these key stakeholders. In keeping with the standard developed for legislative measures, the assessment of institutional capacity is presented in tabular form, where the key stakeholder for each article is identified and an assessment is made to the existing capacity for implementation of the corresponding Article, as well as opportunity for capacity enhancement required.

Table 33. Existing National Institutional Capacity and Remaining Gaps

Article 3 - Mercury supply sources and trade	
Description of Article:	
Succinct summary of provisions relevant to the country in question (source NRDC checklist)	• Not allow new primary Mercury mining • Prevent the import and use of Mercury from primary Mercury mining for artisanal and small-scale gold mining (ASGM) • 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)
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	• Role with respect to the above listed provisions: • Legislative measures relating to ban on Mercury mining. • Regulating the import and export of Mercury. • List some Mercury compounds under lists of prohibited and limited substances under the regulation of management, transport, and handling of Harmful and Hazardous Substances No.24 of 2005. • Obtain informed pre-consent upon importing Mercury and its compounds and limit their use to certain fields such as research and laboratories. • Conduct environmental inspection at different facilities to define and report stocks of Mercury and its compounds.
	• **Relevant institutional capacity in place to comply with the above listed provisions:** • Monitoring and Assessment Directorate • Environmental Inspection Directorate • Hazardous Substances and Waste Management
2. Name of institution/ stakeholder: Ministry of Health	• Role with respect to the above listed provisions: • List Mercury and its compounds under the lists of prohibited and conditional chemicals issued in the official Gazette No. 5187 dated November 14, 2012. • Obtain pre-informed consent upon importing Mercury and its compounds and limit their use to certain fields such as research and laboratories. • Record imported quantities and monitor their uses. • Conduct inspection on health facilities to define and report stocks of Mercury and its compounds to Ministry of Environment. • Limit the use of Mercury and its compounds to some industries and prohibit using them in other industries such as wood preservation, artificial textiles impregnation, treatment of industrial wastewater, packaging and painting.

	Relevant institutional capacity in place to comply with the above listed provisions: • Chemical Safety Section/ Environmental Health Directorate. • Environment Inspection Section/ Environmental Health Directorate.
3. Name of Institution / Stakeholder: Ministry of Industry, Trade and Supply	**Role with respect to the above listed provisions:** • Import Instructions No. 1 for 2012 under which the lists issued by Ministry of Environment are considered when to approve the import of chemicals among of which is Mercury and its compounds.
	Relevant institutional capacity in place to comply with the above listed provisions: • Import Section / Trade Directorate
4. Name of Institution / Stakeholder: Jordan Chamber of Industry, other Industry Chambers	**Role with respect to the above listed provisions:** • look after the affairs of its members
	Relevant institutional capacity in place to comply with the above listed provisions: • Unit of Energy and Environment Sustainability.
5. Name of Institution / Stakeholder: Custom Department	**Role with respect to the above listed provisions:** • Monitor the entrance of material containing Mercury based on guidance from technical institutions such as the Ministry of Environment, Ministry of Health and Ministry of Agriculture etc.
	Relevant institutional capacity in place to comply with the above listed provisions: • Agreements and Tariff Directorate.
6. Name of Institution / Stakeholder: ASEZA	**Role with respect to the above listed provisions:** • Conduct environmental inspection on facilities to define Mercury and its compounds stocks and then report them. • Approve the import of Mercury and its compounds to Aqaba Special Economic Zone after getting all approvals from the competent ministry and relevant ministries based on the list of prohibited substances. • Record imported quantities and monitor their uses.
	Relevant institutional capacity in place to comply with the above listed provisions: • Environment Directorate/ Environment Commission
7. Name of Institution / Stakeholder: Royal Department for Environment Protection	**Role with respect to the above listed provisions:** • Notify the Ministry of Environment on Mercury stocks in different facilities. • Accompany the Ministry of Environment staff during inspection missions to enforce the law and legislations.
	Relevant institutional capacity in place to comply with the above listed provisions: • Focal Point based in the Ministry of Environment, he coordinates with the following sections: • Environmental Investigation. • Coordination • Environmental Protection • Operations • Training

Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:
• Include in the current HS Codes specific code on the Mercury and Mercury compounds containing products in addition carrying out training. • Recording of imported quantities and monitoring their uses. • Obtaining informed pre-consent of imports of Mercury and its compounds for very limited purposes and quantities as provided in Annex A of the convention. • Encourage industries using Mercury and its compounds, to use Mercury alternatives. • Lack of effective and enforced legislation on reporting Mercury stocks at the different facilities.

Article 4 - Mercury-added products	
Description of Article:	
Succinct summary of provisions relevant	• 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.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Health	**Role with respect to the above listed provisions:** • Stop procuring thermal and blood pressure meters Mercury-contained and replace them with digital meters in the public health sector. • Inspect on health facilities and ensure they reduce using thermal and blood pressure meters Mercury-contained and promote digital Mercury free meters to use as alternatives. • Raise awareness of health facilities staff on risks related to using Mercury-containing meters on health and surrounding environment, as well as ways of disposing of them in coordination with the Ministry of Environment regulation so that it is environmentally and healthy sound method. • The Ministry of Health has a trend to minimize using amalgam through advising the dental health clinics and facilities to reduce using dental amalgam. • Using Mercury free dental amalgam is not yet on the trend by the Ministry of Health and the Dental Association. • Import fluorescent, horizontal fluorescent and high steam lighting for public and comprehensive lighting, Mercury used in cold cathode and fluorescent lamps in sign without any consideration to whether they contain Mercury or not.
	Relevant institutional capacity in place to comply with the above listed provisions: • Chemical Safety Section/ Environmental Health Directorate. • Environment Inspection Section/ Environmental Health Directorate.

Dental Association	**Role with respect to the above listed provisions:** • Raising awareness, • Encourage the use of Mercury free dental amalgam, • Building the capacity of their members.
	Relevant institutional capacity in place to comply with the above listed provisions: • Dental Association
2. Name of Institution / Stakeholder: Jordan Drug and Pharmacology Administration	**Role with respect to the above listed provisions:** • Approve imports of amalgam fillings, cosmetics, and medical supplies. • Approve the import of Mercury containing meters (thermometers). • Approve imports of Mercury free tooth fillings. • Registration of medical supplies and cosmetics.
	Relevant institutional capacity in place to comply with the above listed provisions: • Drug Directorate. • Food Directorate
3. Name of Institution / Stakeholder: Ministry of Agriculture	**Role with respect to the above listed provisions:** • Monitor the import of pesticides and make sure that all are Mercury free.
	• Pesticides Registration Section / Plant Protection and Phytosanitary
4. Name of Institution / Stakeholder: Jordan Institution for Standards and Metrology	**Role with respect to the above listed provisions:** • Inspect imported batteries according to the approved standards. • Determine the allowed limit of Mercury and other hazardous substances. • Monitor Mercury in lipsticks standard 1032/2013 • Monitor Mercury in nail colors standard 1141/2014 • Monitor Mercury in Dead Sea products Carnalite standard 1584/2011
	Relevant institutional capacity in place to comply with the above listed provisions: • Standardization Department
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Shortage of staff and thus recruitment and training is needed. • Investigate feasible alternatives. • Take to measures to gradually replace of Mercury containing products. • Define best practices for environmentally sound disposal of Mercury waste to prevent release to land and water. • Finalize and adapt the Restrictions of Hazardous Substances (RoHS) and Waste of Electrical and Electronic Equipment (WEEE). • Support in issuing a national legislation and standards on e-waste, batteries and come up with an HS code to assist the custom department monitor products containing Mercury.	

Article 5 on manufacturing processes in which Mercury or Mercury compounds are used	
Description of Article:	
Succinct summary of provisions relevant	• Not allow the use of Mercury or Mercury compounds in the manufacturing processes listed in Part I of Annex B. • Restrict (as specified in the Annex) the use of Mercury in the processes listed in Part II of Annex B. • Not allow new facilities from using Mercury in the processes listed in Annex B, except facilities using Mercury catalysts to produce polyurethane • For facilities with processes listed in Annex B, identify and obtain information on Mercury or Mercury compound use; and control Mercury emissions to air, and releases to land and water. • Discourage new uses of Mercury in industrial processes.
Relevant national stakeholder:	
Name of institution/ stakeholder: Ministry of Trade Industry and Supply	**Role with respect to the above listed provisions:** • Monitor and make sure that no Mercury compounds are used in the production of chlorine and alkaline and no Mercury-contained stimulators are used in the production of polyurethane.
	Relevant institutional capacity in place to comply with the above listed provisions: • Safety Section / Import Directorate.

Article 6 on exemptions available to a party upon request	
Description of Article:	
Succinct summary of provisions relevant to the country	Any State or regional economic integration organization may register for one or more exemptions from the phase-out dates listed in Annex A and Annex B, hereafter referred to as an " exemptions" by notifying the Secretariat in writing.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment (Convention focal point)	**Role with respect to the above listed provisions:** Grant permissions for exemptions available to Jordan upon request
	Relevant institutional capacity in place to comply with the above listed provisions: Hazardous Substances and Waste Directorate.
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
No current capacity gaps but may exist depending on type of Mercury added product that are added to the Convention.	

Article 8 - on emissions	
Description of Article:	
Succinct summary of provisions relevant to the country	• 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 (coal-fired power plants, coal-fired industrial boilers, non-ferrous metal smelting and roasting processes, waste incineration, and cement production) • 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. • Require monitoring/reporting and otherwise establish a Mercury emissions inventory for sources listed in Annex D.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Prepare national plans. • Monitoring on facilities. • Control medical waste incinerators.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Management • Inspection and Monitoring Department.
2. Name of Institution / Stakeholder: Energy and Minerals Regulatory Commission	**Relevant institutional capacity in place to comply with the above listed provisions:** Grant permission for the import of coal and fuel alternatives.
	Relevant institutional capacity in place to comply with the above listed provisions: • Fuel and Oil Shale Directorate
3. Name of Institution / Stakeholder: ASEZA	**Role with respect to the above listed provisions:** • Control import and handling operation at Aqaba Port. • Sampling and analyzing of water and air during handling.
	Relevant institutional capacity in place to comply with the above listed provisions: • Environment Directorate/ Environment Commission
Name of Institution / Stakeholder: Jordan Institution for Standard and Metrology	**Role with respect to the above listed provisions:** • Amend the standard number 1189 / 2006 related to stack emissions to include Mercury
	Relevant Institutional capacity in place to comply with the above listed provisions: • Standardization Department
Name of Institution / Stakeholder: Ministry of Trade, Industry and Supply	**Role with respect to the above listed provisions:** • Execute actions issued by other relative authorities.
	Relevant institutional capacity in place to comply with the above listed provisions: • Import Section / Trade Directory
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Adapt measures to replace coal with environment friendly alternatives. • Finalize JS 1189/2006 to have limit values on Mercury emissions.	

Article 9 on releases	
Description of Article:	
Succinct summary of provisions relevant to the country	• Require reporting or otherwise obtain information as needed to identify significant sources of Mercury/Mercury compound releases to land or water and to maintain an inventory of releases from the sources identified • Take one or more measures specified in Article 9.5 to control/reduce Mercury and Mercury compound releases to land and water from significant sources it Identifies.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Prepare national plans. • Monitoring on facilities. • Control medical waste incinerators.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Management Directorate • Inspection Department • Monitoring Department
2. Name of Institution / Stakeholder: Ministry of Agriculture	• Monitoring of facilities • Sampling and testing
	Relevant institutional capacity in place to comply with the above listed provisions: • Land and Irrigation Department • National Center for Agricultural Research and Extension
3. Name of Institution / Stakeholder: Ministry of Water and Irrigation	**Role with respect to the above listed provisions:** • Monitoring and sampling for drinking water quality. • Monitoring and sampling for the domestic and industrial wastewater treatment plans into Wadis. • Protection of highly exposed bodies of water from contamination. • Run research and studies on water quality.
	Relevant institutional capacity in place to comply with the above listed provisions: • Laboratories and Quality Department
4. Name of Institution / Stakeholder: Academic and Research institutes	**Role with respect to the above listed provisions:** • Monitor, sample and test. • Conduct research and studies
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Set up limit values for Mercury and its compounds in the domestic, industrial and commercial wastewater. • Though hazardous waste among of which is Mercury and its compounds are prohibited to dispose within the domestic waste, an emphasis through the enforcement of law is needed to prevent its final release into land and water. • Adopt measure to replace coal with environment friendly alternatives. • Take measures to reduce releases by incentives and enforcing law.	

Article 10 on environmentally sound interim storage of Mercury, other than waste Mercury	
Description of Article:	
Succinct summary of provisions relevant to the country	• Take measures to ensure interim Mercury storage is conducted in environmentally sound manner, taking into account guidelines to be developed by the Conference of the Parties.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Carryout interim store of Mercury in SWAQA. • Inspection on facilities looking for Mercury.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate. • Monitoring and Inspection Directorate.
2. Name of Institution / Stakeholder: Ministry of Health	• Monitoring and inspection of medical facilities, academic institutions and schools using Mercury for calibration studies, and research.
	• **Relevant institutional capacity in place to comply with the above listed provisions:** • Environmental Health Directorate.
3. Name of Institution / Stakeholder: Royal Administration for Environmental Protection (Rangers)	**Role with respect to the above listed provisions:** • Accompany the Ministry of Environment to enforce its mandate.
	Relevant institutional capacity in place to comply with the above listed provisions: • Ministry of Environment focal point
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Tailor and adopt the CoP guidelines on interim storage.	

Article 11 on Mercury wastes	
Description of Article:	
Succinct summary of provisions relevant to the country	• Use a definition of Mercury waste consistent with Article 11.2 • Take measures to manage Mercury wastes in an environmentally sound manner, taking into account guidelines developed under the Basel Convention and in accordance with COP requirements to be developed. • Take measures to restrict Mercury derived from the treatment or re-use of Mercury waste to allowed uses under the Convention or environmentally sound disposal. • Require transport across international boundaries in accordance with the Basel Convention, or if the Basel Convention does not apply, consistent with international rules, standards, and guidelines.
Relevant national stakeholder:	

1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Monitor and inspect facilities generate waste containing Mercury and its compounds and ensure its transportation according the national legislations to SWAQA for storage. • Take measures to manage Mercury containing waste and its compounds in an environmentally sound manner and store in SWAQA until a final solution is available. • Restrict Mercury derived from the treatment of re-use of Mercury waste to allow uses. • Apply Basel Convention provisions in the transport across international boundaries.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate • Monitoring and Inspection Directorate.
2. Name of Institution / Stakeholder: Ministry of Health	• Monitoring and inspection of medical facilities, academic institutions and schools using Mercury for calibration studies, and research when it becomes waste.
	Relevant institutional capacity in place to comply with the above listed provisions: • Environmental Health Section (copy from previous paragraph)
3. Name of Institution / Stakeholder: Royal Administration for Environmental Protection	**Role with respect to the above listed provisions:** • Accompany the Ministry of Environment in monitoring and inspection of medical facilities, academic institutions and schools using Mercury for calibration studies, and research when it becomes waste.
	Relevant institutional capacity in place to comply with the above listed provisions: • Ministry of Environment focal point
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
Needs are incorporated in other provisional items of the convention that cover this article.	

Article 12 on contaminated sites	
Description of Article:	
Succinct summary of provisions relevant to the country	• Develop strategies for identifying and assessing Mercury/ Mercury compound contaminated sites. • If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Develop strategies for identifying and assessing Mercury and Mercury compounds contaminated; in collaboration with other concerned authorities.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate. • Legal Unit • Monitoring and Inspection Directorate.

Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:
Gaps pertinent to this article are incorporated in other provisions of this convention.

Article 13 on financial resources and mechanisms	
Description of Article:	
Succinct summary of provisions relevant to the country	• 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.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Encourage and involve private sector in hazardous substance and waste management. • Formulate project proposal on priority chemical issues and apply to donors.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate.
2. Name of Institution / Stakeholder: International organizations	**Role with respect to the above listed provisions:** • Provide technical and financial support to develop project proposals to access funds allocated by the convention.
	Relevant institutional capacity in place to comply with the above listed provisions: • UNDP • UNIDO • UNEP • Regional Basel office in Cairo. • GIZ… etc
3. Name of Institution / Stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Write proposals to obtain funds. • Identify priorities that could be funded by the PPP pipeline. • Approach international organizations and donors to have partnership and support in the priority issues implementation.
	• Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Department
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Financial and technical support to completely replace thermometers and blood pressure meters as the cost is very high (4) • Technical and financial support to manage Mercury waste (11) • Technical and financial support to separate waste containing Mercury and its compounds at source to prevent disposal into domestic waste and landfills (11)	

Article 14 on capacity building, technical assistance and technology transfer	
Description of Article:	
Succinct summary of provisions relevant to the country	• Cooperation for capacity building and technical assistance in particular between developed countries and least developed countries and Small Island Development States. • Developed countries parties to provide information on alternative technologies through the COP as they become available.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	• Role with respect to the above listed provisions: • Identify national capacities and technical assistance needed in collaboration with all stakeholders. • Request the international community to provide the country with up to date technology to manage Mercury and Mercury compounds in consultation with all stakeholders. • Approach regional centers to seek technical and financial assistance in building capacity and technology transfer.
	• Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Wastes Department
2. Name of Institution / Stakeholder: International organizations	• Role with respect to the above listed provisions: • Provide capacity building, technical assistance and technology transfer.
	Relevant institutional capacity in place to comply with the above listed provisions: • UNDP • UNIDO • UNEP • GIZ… etc
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Assist regional centers in providing capacity building, technical assistance and technology transfer to national countries. • Weakness in private sector role and thus encourage and get them involved. • The need of academic and research institutions technical capacity building and technology transfer and alternatives. • Training of concerned personnel of the different authorities on issues on Mercury supplies and trade (3) • Building capacities on Mercury and its compounds alternatives as per article 3 on Mercury supplies and trade (3) • Capacities on outreach and awareness raising on Mercury and its compounds risks and impacts on health in specific related to Mercury and its compounds storage on workers and the surroundings (3) • Capacities in the field of hazardous chemicals and inspection procedures (3). • Capacities on the different stakeholders' role in chemicals management (3) • Capacities on stocks reporting and reporting in general about the country compliance to the convention (3). • Digital metering inaccuracy (4) • Capacities to test Mercury in cosmetics' in addition to capacities to determine proper procedures for test/ analysis of cosmetics (4). • Training on BAT/ BEP for sources listed in Annex D and, more specifically towards solid waste and medical waste incinerators (8). • Training on BAP/BEP (9). • Capacity building on environmentally sound interim storage for Mercury (10). • Jordan needs a treatment facility or any other environmentally sound managed solution to treat waste (11). • Training on calibrating electronic thermometers (hardware calibration) (4). • Training in the area of awareness raising in dealing with the temperature and hypertensive meters and on the disposing of such meters and how to handle when accidental leaks occur and leak fate (4). • Training on environmentally sound management of Mercury waste (11). • Capacity on **contaminated** sites rehabilitation and risk assessment (12). • Training on domestic allocation of fund and fund raising (13) • Training on writing proposals to raise fund to implement the convention (13).	

Article 16 on health aspects	
Description of Article:	
Succinct summary of provisions relevant to the country	• 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.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Develop a strategy and programs addressing population at risk in collaboration with the concerned authorities. • Develop a strategy and educational programs in collaboration with the Ministry of Labor on occupational health and exposure to Mercury and Mercury compounds.
	Relevant institutional capacity in place to comply with the above listed provisions: Hazardous Substances and Waste Directorate
2. Name of Institution / Stakeholder: Ministry of Health	• Promote appropriate health care services for the prevention, treatment and care for population affected by the exposure of Mercury and Mercury compounds. • Cooperate with international organization such as WHO.
	Relevant institutional capacity in place to comply with the above listed provisions: • Environment Section • Occupational Health Section
3. Name of Institution / Stakeholder: Ministry of Labor	**Role with respect to the above listed provisions:** • Establish and strengthen as appropriate the institutional and health professional's capacities for the prevention, diagnosis, treatment, and monitoring of health risks related to the exposure to Mercury and Mercury compounds. • Cooperate and exchange of information wit he ILO.
	Relevant institutional capacity in place to comply with the above listed provisions: Labor Directorate
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
Develop strategies to identify population at risk.	

Article 17 on information exchange	
Description of Article:	
Succinct summary of provisions relevant to the country	• 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.

Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Collect and disseminate information on annual quantities of Mercury and Mercury compounds emitted, released, or disposed; and other information. • Share information on the health and safety of humans and the environment as non-confidential. • Report to the COP on progress in implementing Convention obligations as per the convention.
	Relevant institutional capacity in place to comply with the above listed provisions: Hazardous Substances and Waste Directorate.
2. Name of Institution / Stakeholder: Ministry of Health	**Role with respect to the above listed provisions:** Follow up and report on intoxication relevant to Mercury and Mercury compounds.
	Relevant institutional capacity in place to comply with the above listed provisions: Environment Section
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
Upgrade the Jordan National Drug and Poison Information Center and support with technology transfer and technical assistance.	

Article 18 on public information, awareness and education	
Description of Article:	
Succinct summary of provisions relevant to the country	• Promote and facilitate: • (a) provision to the public of available information on: • The health and environmental effects of Mercury and Mercury products. • Alternatives to Mercury and Mercury compounds. • The topics identified in paragraph 1 of article 17. • The results of its research, development and monitoring activities under article 19; and • Activities to meet its obligations under this convention. • (b) Education, training and public awareness related to the effects of exposure to Mercury and Mercury compounds on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Launch outreach campaigns addressing the public. • Gather data and inventories and pass them to public to inform.
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate. • Education and Awareness Raising Directorate.

2. Name of Institution / Stakeholder: Ministry of Health	**Role with respect to the above listed provisions:** • Launch outreach campaigns addressing the public and health sector. • Gather data and inventories and pass them to public and health sector staff to inform
	Relevant institutional capacity in place to comply with the above listed provisions: • Primary Health Care Directorate
3. Name of Institution / Stakeholder: Civil Society Organizations	**Role with respect to the above listed provisions:** • Educate and raise the public at large awareness • Conduct training on health issues.
	Relevant institutional capacity in place to comply with the above listed provisions: • Land and Human to Advocate Progress (LHAP). • Jordanian Royal Environment Diving Society (JREDS).
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
• Raise industries awareness using Mercury and its compounds of their risk (3). • Run national outreach and awareness activities addressing public at large (8). • Run national outreach and awareness activities addressing public at large (9). • Educate and raise academic and schools about Mercury and its compounds available in interim storage (10)	

Article 19 on research, development and monitoring	
Description of Article:	
Succinct summary of provisions relevant to the country	• Parties shall endeavor to cooperate to develop and improve, taking into account their respective circumstances and capabilities: (a) Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of Mercury and Mercury compounds; (b) Modelling 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, as well as collaboration in the collection and exchange of relevant and appropriate samples; (c) 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; (d) Harmonized methodologies for the activities undertaken under subparagraphs (a), (b) and (c); (e) 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, taking appropriate account of the distinction between anthropogenic and natural emissions and releases of Mercury and of remobilization of Mercury from historic deposition (f) Information on commerce and trade in Mercury and Mercury compounds and Mercury-added products; and (g) 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

Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Conduct research and studies. • Monitor firms and industries. • Cooperate with national authorities
	Relevant institutional capacity in place to comply with the above listed provisions: • Hazardous Substances and Waste Directorate. • Inspection and Monitoring Directorate.
2. Name of Institution / Stakeholder: Ministry of Health	**Role with respect to the above listed provisions:** • Conduct research and studies. • Monitor firms and industries. • Cooperate with national authorities
	Relevant institutional capacity in place to comply with the above listed provisions: • Primary Health Care Directorate.
3. Name of Institution / Stakeholder: Academic and Research Institutions	**Role with respect to the above listed provisions:** • Conducts research, studies and carryout monitoring.
	Relevant institutional capacity in place to comply with the above listed provisions: • RSS • UoJ • JUST …etc
4. Name of Institution / Stakeholder: CSOs	**Role with respect to the above listed provisions:** • Conducts research, studies and carryout monitoring.
	Relevant institutional capacity in place to comply with the above listed provisions: • LHAP. • JREDS.
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
Recording of imported quantities and monitoring their uses (3).	

Article 21 on reporting	
Description of Article:	
Succinct summary of provisions relevant to the country	• Each Party shall report to the Conference of the Parties, through the Secretariat, on the measures it has taken to implement the provisions of this Convention and on the effectiveness of such measures and the possible challenges in meeting the objectives of the Convention • Each Party shall include in its reporting the information as called for in Articles 3, 5, 7, 8 and 9 of this Convention.
Relevant national stakeholder:	
1. Name of institution/ stakeholder: Ministry of Environment	**Role with respect to the above listed provisions:** • Report annually on Jordan compliance with the the provisions of the agreement
	Relevant institutional capacity in place to comply with the above listed provisions: 1. Hazardous Substances and Waste Directorate in cooperation with other national authorities.
Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:	
Orient the staff of the Ministry of Environment about reporting template and requirements adopted in CoP1.	

Chapter IV

Identification of Populations at Risk and Gender Dimensions

4.1 Preliminary review of potential populations at risk and potential health risks

In general, there are groups of people susceptible to Mercury, namely those who are more sensitive to the effects of Mercury and those who are exposed to higher levels of Mercury. As a targeted group the fetus, newborns, and young children (<12 years of age) are especially susceptible to Mercury exposure because of the sensitivity of the developing nervous system. Individuals with preconditions, such as diseases of the liver, kidney, nervous system, and lung are at higher risk of suffering from the toxic effects of Mercury.

The other group are those individuals exposed to higher levels of Mercury, either through occupational, Mercury-added products, or environmental exposure. This group includes those who regularly consume a regular diet of fish and aquatic organisms, particularly larger predatory animals. Pregnant women, and women who might become pregnant are generally the populations considered to be high risk groups because of the potential exposure to the foetus. Young children are also more highly impacted by the effects of Mercury through dietary uptake of methylMercury. There are many studies on the impacts of methylMercury toxicity to the neurological, cardiovascular, and immune systems within humans. For example, neurological impacts are often measured and become evident through lowered IQ levels (Spadaro and Rabl 2008) and through various neuropsychological tests (Grandjean et al. 1998). Cardiovascular and immunological impacts are often related to chronic exposure to Mercury (Sweet and Zelikoff 2010; Downer et al. 2017). However, the relative impacts from methylMercury's toxic effects can vary across human populations, whereas some groups may be more sensitive than others to the impacts of Mercury exposure.

MethylMercury is known to affect neurological development in children and is also linked to cardiovascular disease in adults (Clarkson et al. 2003;

Valera et al. 2011; Grandjean et al. 2012). Seafood Mercury concentrations, best known in fish, are most studied in North America and Europe and least studied in Africa, Asia, and South America (Karimi et al. 2012). However, even in developed countries, monitoring of seafood Mercury concentrations needs improvement to ensure accurate exposure estimates over time (Sunderland 2007).

Globally, Mercury concentrations are lowest in smaller, short-lived fish. There are many regularly harvested fish from the region (e.g., Mediterranean Sea or Red Sea) that can be safely consumed on either a daily or weekly basis (i.e., they have average Mercury concentrations under 0.22 ppm, ww), such as anchovies, sardines, flounder, cod, salmon, and surmullet. These species, and many others, are often harvested commercially and shipped through European markets (Appendix III). Mercury concentrations are highest in large, long-lived species, many of which are pelagic. Bluefin tuna, albacore tuna, bream, bonito, common sole, hake, bluefish and Atlantic horse mackerel have average total Mercury concentrations over 0.22 ppm, ww and are riskier choices for human consumption, where only one meal per month is recommended (Table 34). Some swordfish and tuna individuals have average Mercury body burdens that approach the "no consumption" guidance level of 0.95 ppm, ww (Table 34).

Table 34. Interpreting Mercury concentrations and related risks of exposure.

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

Fish Mercury concentrations can be compared with consumption guidelines and linked with the number of seafood meals that could be eaten at various Mercury concentrations to stay within the U.S. EPA's health-based reference dose for methylMercury – with further interpretation by the Great Lakes Commission in the USA .For further reference, the World Health Organization (WHO) and the European Commission (EC) general guidance level for fish Mercury concentrations is 0.5 ppm with an "exemption" for larger, predatory fish species (e.g., swordfish, shark, some tuna species) of up to 1.0 ppm, which is similar to the U.S. EPA "no consumption" level. Seafood Mercury concentrations and associated meal frequency guidelines are

based on the U.S. EPA reference dose of 1x104 mg of Hg/kg of body weight/day, a body weight of 132 pounds (60 kg) for an adult female person, and a fish meal size of about 6 ounces (170 gm). These guidelines are for muscle tissues in fish because >95% of Hg is in the methyl form. However, shellfish Mercury concentrations greatly vary in percent methyl and therefore the consumption guidance provided here cannot be directly used with shellfish total Mercury data.

4.2 Assessment of potential gender dimensions related to the management of Mercury

This section presents the differing roles of gender with regards to the exposure and management of Mercury. The objective is to ensure that gender considerations are effectively mainstreamed into the National Implementation Plan for Mercury. While an extensive survey and assessment of gender issues related to Mercury exposure in Jordan is not yet defined, future plans could be designed to specifically identify at-risk populations. A descriptive summary could be developed to broadly apply across human populations relating to general exposure and gender risks within various sectors where Mercury contamination is likely to occur.

4.2.1 Occupational Exposure

According to the exposure of Mercury by known occupations within Jordan, men are normally at a greater risk of Mercury exposure than women. In the absence of a national Mercury-oriented industry, the main work groups and associated general patterns identified for occupational exposure may include:

- Waste collectors, medical waste incinerator workers and landfill workers: These groups are typically comprised of men who are at greater risk of exposure due to the handling of waste from Mercury containing devices.
- Dental professionals: Within dental practices, there is often a higher population of male dentists as compared to females, and many are supported by female assistants. Therefore, male dentists would be more prone to be in contact with dental amalgams, but assisting females may also be affected.
- Medical professionals: It is often the case that women may be more likely to be called upon for the clean-up of medical accidents involving Mercury containing equipment, such as sphygmomanometers or thermometers. Therefore, women would be more likely to be exposed

to Mercury through the handling of medical waste.

- Gas station attendants: Service attendants in this profession are almost exclusively men, which would predispose men to a greater risk for environmental exposure.
- Environmental/enforcement officers: This group is called upon to investigate environmental pollution cases and are generally gender balanced (but this is a minor exposure route)
- Firemen and first responders to chemical accidents: This group is often primarily male.

It can be concluded for the professions outlined, there is a tendency for men to be at greater risk than women in relation to occupational Mercury exposure (the one important exception may be within the medical professional community). A further study of the gender ratios for these professions in Jordan would be required to accurately confirm and quantify patterns of exposure and at-risk populations, according to gender and occupation type.

4.2.2 Mercury in fish

With respect to Mercury in fish, the issue is applicable across genders as both sexes generally eat similar quantities of fish. However, the adverse health impacts due to exposure of Mercury are more significant in cases of children, pregnant women and women in child-bearing years. This is because the developing organ systems (such as the foetal nervous system) are the most sensitive to the toxic effects of Mercury. Recent studies also demonstrate that there may be increased risk for cardiovascular disease in adults (Downer et al. 2017), which may be particularly important for individuals either sensitive to methyl Mercury or those with elevated levels. Men may be more prone to cardiovascular disease than women.

4.2.3 Mercury In households

Within households, women and children are more likely to be exposed to Mercury from broken thermometers, since women may primarily use them during routine childcare or oversight of households.

4.2.4 Mercury in cosmetics

Women are more susceptible to exposure by Mercury added cosmetics and personal products such as soaps, creams and shampoos. The use of skin lightening creams may also serve as an avenue for Mercury exposure but was not investigated through this study. Nonetheless, local women may use

skin lightening creams to remove blemishes due to excessive sun damage and it is likely that the general public have limited knowledge of the use of harmful chemicals in cosmetics.

In summary, it is clear from the above considerations that men should be principally targeted for occupational exposure, especially in the field of waste management and first responders, such as firemen and disaster risk managers. However, in the medical profession, both genders are equally susceptible to Mercury contamination. Women are a more important target group in regard to dietary update of methylMercury and Mercury in cosmetics. These trends are useful when considering training, education, and awareness-raising strategies regarding Mercury exposure as they allow for more gender-sensitive communication strategies that can target the sexes differently to achieve maximum benefit.

Hg

Chapter V

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

5.1 Awareness raising on Mercury and the Minamata Convention

Further awareness raising and planning for such activities are listed in the Communications Plan (Table 35).

5.2 Future training needs for successful implementation of the Convention

The Ministry of Environment will provide assistance with future training needs as generated from Table 35.

Table 35. Awareness and Communications Plan.

#	Activity	Objective	Target group	Venue	No. of participants	Activity requirements	Estimated cost (USD)
1	Hold a national workshop to raise awareness of stakeholders on the negative impact of Mercury and its compounds on human health and environment	Identify the health impacts resulting from exposure to Mercury and its compounds Indicate the environmental impacts resulting from Mercury emissions and releases. Identify necessary measures to deal safely with Mercury and its compounds Present the best international technologies and practices in manufacturing to reduce Mercury emissions to the surrounding environment Promote use of safe alternatives (availability, efficiency, cost, etc.)	- Concerned public institutions (MOH, MOIT, MEMR, and JISMO) - Chamber of industry, chamber of commerce, private sector (cement factories, steel factories, and other targeted industries)	Meeting room (hotel/ Amman)	25 persons 2 workshops max.	Local expert in health and environment	1500 USD
2	Hold an awareness workshop on necessary measures for gradual phase out of using amalgam and adoption of safe alternatives for human health and environment.	Promote using safe alternatives of Mercury-free tooth fillings Draw broad lines of national procedures and measures to reduce using amalgam Change health insurance programs to cover dental treatment using alternative tooth fillings Environmental sound disposal of Mercury wastes and compounds to prevent leakage to water and soil.	MOH, Dentist Syndicate, JFDA, chamber of commerce Health insurance companies	Meeting room (hotel/ Amman)	20participant Expert (1) working days (6) Expert (2) (10) working days	Expert in using Mercury-free tooth fillings	7500 USD

3	Hold sessions to raise awareness on safe use of Mercury-contained products and how to deal with the Mercury wastes in an environmentally sound manner.	- Raise awareness on safe use of Mercury and its compounds in schools and universities laboratories and how to deal with them. - Safe use of household Mercury-contained products (thermometers , blood pressure measurement devices, lamps, etc.) - Environmentally sound disposal of Mercury-contained wastes and compounds used at household level / sorting at source	MOH, Ministry of Education), schools, and universities	Schools Universities Amman Irbid Karak Ma'an	Depending on the number of participants from schools and universities	3 lecturers from MOH 3 lecturers from MOE Training material (a team from the stakeholders)	30,000 USD
4	Issue a manual on safe use of Mercury and its compounds in school and university labs	Issue a manual on safe use of Mercury, Mercury compounds and Mercury wastes Develop guiding signs at schools and universities	MOE, MOH, Ministry of Education, universities, and NGOs	Hold regular meetings with the stakeholders in the Ministry of Environment	5 experts to develop the guide (point 3) Print the guide (3000 copies) and print 3000 copies of the stickers)	Experts in management of Mercury and its compounds from the stakeholders (MOE, MOH, Ministry of Education, universities, and environmental NGOs) Training material	24,000 USD
5	Develop a brochure/leaflet on Mercury (sources, impact on health and environment, and environmentally sound management during the life cycle) and a profile on *Minamata Convention* on Mercury	Raise awareness of all society segments on environmentally sound management on Mercury compounds, products, and wastes Introduction to *Minamata Convention* on Mercury	All sectors	Hold regular meetings with the stakeholders in the Ministry of Environment	Design and print 4,000 copies	Experts in Mercury compound management from the stakeholders (MOH, MOE, MOIT, chamber of industry, and chamber of commerce) Develop the training material and its contents Design the brochure Print the brochure	22,000 USD

6	Develop media messages/ flashes (TV, radio, and social media) on safe use of Mercury-contained products, compounds, and wastes	Safe use of household Mercury-contained products Raise awareness on safe disposal of household Mercury-contained wastes (sorting from the source)	All society segments (particularly housewives)	TV Radio Social media		Scientific material (possibly from the material developed in the previous points) Artistic text developed in an appealing media way	10,000 USD for 3 ads and 4 media messages
7	Produce TV sketches on Mercury-contained products that are used in our daily life and indicate their negative impact on the human health and environment, as well as safe disposition of the wastes	Mercury-contained products and compounds used in our daily life Raise awareness on safe disposition of household Mercury-contained wastes. Promote sorting from the source and safe disposition of wastes in the designated containers	All society segments	TV Radio Social media		Scientific material Artistic text developed in an appealing media way	
8	Engage the local community in some activities to sort Mercury-contained wastes from the source and dispose them in an environmentally safe way	Raise awareness on safe disposition of household Mercury-contained wastes Promote sorting from the source Distribute containers to collect Mercury-contained wastes	All society segments	Social media TV Radio		Design and implement containers to collect Mercury-contained wastes and distribute them to certain locations Develop a press release on distributing the containers	
9	Produce a film on the project implementation phases and outcomes	Publish findings of the preliminary assessment report on Mercury and its compounds Document the project implementation phases	All stakeholders in the public and private sectors			Findings of the preliminary assessment report on Mercury and its compounds Film (direction)	5,000 USD
	Total						100,000 USD

Chapter VI

Priority areas for implementation of the Convention

The Minamata Convention is originally linked to other relevant UN conventions by regulating Mercury and its compounds belonging to harmful chemicals. Jordan joined all international environmental conventions closest to the Minamata Convention - the Stockholm, Basel Conventions and Rotterdam, in relation to the ratification of the Minamata Convention, it made an initial assessment and necessary consultation with governmental agencies and relevant stakeholders leaded to the ratification of the convention in November 2015. The initial assessment of the Minamata Convention was made In the course of initial assessment, a detailed analysis of national legislation and institutional framework that regulates chemicals management has been conducted, gaps and deficiencies have been identified, inventory of Mercury and Mercury containing substances has been prepared and concrete proposals have been made.

Under the Convention, the country may, following the initial assessment, develop an implementation plan (action plan) to fulfill the obligations arising from the Convention - although this is not a compulsory requirement. The decision on this matter was made after taking into consideration the national condition and experience. New priorities may arise in Jordan's accession to the Convention. However, the initial assessment has identified the followings as the key trends:

Objective 1 – Strengthening the Legal and Institutional Framework

The identification of the key targets, relevant measures and their implementation within the framework of the Action Plan should be developed based on the commitments described after joining the Convention. The agencies responsible for the implementation of the measures to be envisaged in the Action Plan (and their associated timelines) will be the state authorities, relevant NGOs, and other stakeholders. Considering the strengthening of the legal and institutional framework for the field the development and adoption of relevant legal acts for this purpose will be enhanced.

1.1 Strengthening the legal framework	Responsibility	Budget (USD)	Timeframe
1.1.1 Amendments of the regulations	All related Ministries	50,000	2019-2021
1.1.1.a Legislative ban on the import and export of products listed in Part I, Annex A of the Convention			
1.1.1.b Legislative ban on manufacturing processes using Hg			
1.1.2 Obligation to collect and disseminate information on Hg emitted, released or disposed		50,000	2019-2021
1.1.3 Adoption of instructions to regulate the issues related to the collection and processing of data on waste	MoEnv		
1.1.4 Adoption of regulation to establish Mercury Management unit	MoEnv		2019-2020
Budget		**100,000**	
1.2 Strengthening institutional capacity for the management of Mercury	**Responsibility**	**Budget**	**Timeframe**
1.2.1Building capacities for implementation of Minamata Convention	MoEnv + partners	50,000	2019-2022
1.2.2 Improve the work of the poison center and staffed it with professional people that can respond in emergency and collect, analyses and disseminate information in the correct way	MoH	50,000	2019-2022
1.2.3 Strengthening capacities of regulatory, implementing and enforcement institutions for implementation of chemicals management (Including Mercury) tasks, including monitoring, reporting, permitting etc.	MoEnv	50,000	2019-2022

1.2.4 Additional employment/ diversification of tasks	MoEnv	10,000	2019-2022
1.2.5 Training for Customs Officers and first responders on HS-codes for Mercury added products, Inspection on imported products.	Custom department, MoEnv	10,000	2019-2022
1.2.6 Sources of funding designated for capacity building activities of national state authorities to be defined and included in their annual budgets	All relevant stakeholders		annually
Budget		170,000	

Objective 2 – Environmentally Sound Management of Mercury-containing Waste

Minimizing the use of Mercury and Mercury compounds through the gradual replacement of various Mercury-containing equipment, tools and devices, especially from point sources, and mitigation of the impact on the environment and human health will serve as important activities. Improvement of temporary storage of Mercury, its combinations and wastes, improvement of existing landfills and capacity building, and strengthening of the management of Mercury waste and polluted areas (i.e., air, soil, water) will also be key objectives.

2. Storage and disposal	Responsibility	Budget	Timeframe
2.1 Enhancing storage facility for Mercury containing equipment/ recovery unit	MoEnv	100,000	2019-2021
2.2 Program for phasing out Mercury containing products from household level	MoEnv	100,000	2019 – 2020
		200,000	

Objective 3 – Education and Awareness Raising

Developing and implementing promotional, awareness-raising and preventive measures to help the people affected by Mercury and Mercury compounds will strengthen health care services. The exchange of scientific, technical, economic, environmental and legal information on chemicals, including information on toxicological and eco-toxicological and environ-

mental safety issues, Mercury and Mercury compounds, and its dissemination will further broaden awareness.

3. Education and awareness raising	Responsibility	Budget	Timeframe
3.1 Strengthen technical and internal communication, communication with representatives of government, institutions, agencies, professional associations with special emphasis on the associations of dentists, meetings with representatives of industry, political parties, local self-governments, and professional organizations in order to obtain their support.	MoEnv	10,000	2019-2022
3.1.1 Development and implementation of awareness program for decision makers on the importance of implementing the Minamata Convention	MoEnv		
3.1.2 Development and implementation of awareness program on the importance of implementing the Minamata Convention among state and public employees and officers on national levels	MoEnv		
3.2 Establish communications with vulnerable groups, NGOs, media, business sectors and all citizens	MoEnv	50,000	2018-2019
3.2.1 Arrange educational events and other methods of awareness raising to educate the general public on the dangers of exposure to Mercury and Mercury compounds	MoEnv		

3.2.2 Distribution of relevant brochures in all health institutions especially private dentists and gynecology ambulances, as well as gynecology ambulances in primary health institutions and hospitals.	MoH		
3.3 Establish the e-based presence to ensure the visibility, knowledge sharing, and regular updates of information	MoEnv, MoH	50,000	2019-2021
Budget		110,000	

Objective 4 – Incorporation of BAT/BEP

Enhancement of BAT/BEP through providing related material technical and financial support for activities undertaken for the Convention in line with national policies, priorities, state programs, strategic road maps and action plans targeted at the protection of the environment and human health is important using this BAT and BEP For capacity building and applying appropriate state-of-the-art technology and environmental practices, identification of appropriate financial sources will remain a high priority and may include: state budget, loan funds, aids from international organizations, voluntary payments, and other sources not prohibited by national legislation.

4. Incorporation of BAT/BEP	Responsibility	Budget	Timeframe
4.1. Training on BAT/ BEP for sources listed in Annex D and, more specifically towards solid waste and medical waste incinerators. Including providing related material	MoEnv	100,000	2020-2022
Budget		100,000	

Objective 5 – Research, Monitoring and Reporting

Inclusion of scientific investigations, monitoring and developing reports describing the important components of the work to be conducted upon joining the Minamata Convention are key. Developing monitoring and accountability mechanisms to conduct investigation within the Action Plan are envisioned as are preparing relevant reports by the National Authority for the country on the fulfillment of the obligations undertaken by Jordan in the manner and within the timeframe established by the Convention, and ultimately submission to the Convention Secretariat.

5. Improving research, monitoring and reporting	Responsibility	Budget	Timeframe
5.1 Establishment of regular channels of cooperation with state authorities of other Parties to achieve knowledge transfer	MoEnv		2019-2022
5.2 Take part in the work of regional working bodies with the task of improving Mercury pollution reduction and information exchange at the broader level	MoEnv	50,000	2022-2019
5.3 Regularly take part in the work of EU chemicals management bodies	MoEnv	20,000	2019-2022
5.4 Updating the national inventory on Mercury to be submitted to convention secretariat /COP	MoEnv	50,000	2022
5.5 Introduce the new section on Mercury in the current Report on Chemical profile	MoEnv	10,000	2020
Budget		130,000	

Chapter VII

Mainstreaming of Mercury Priorities

Implementation of the Minamata Convention will require a comprehensive approach to the management of hazardous chemicals with the public, private sector and civil society. Although not directly linked to the Minamata Convention, Mercury is included as a hazardous chemical priority in several existing laws and rules adopted in the country (Table 36).

Table 36. A number of political documents adopted in the country on the Mercury-hazardous chemicals that are not directly related to the Minamata Convention

Development Plan / State Strategy / State Program / Name of Political Document	Main content (results or conclusion)	Term	The envisaged priorities
Decision No. 117 on Approval of State Strategy for Hazardous Waste Management in Jordan	Establishing a system for the management of hazardous waste in accordance with international standards and the United Nations Framework Convention for the Prevention of Transboundary Movements and Elimination of Hazardous Wastes and the reduction of harmful effects of hazardous wastes on human health and the environment.	2006-2010	Within the framework of the Initial Mercury Assessment, the institutional capacity of the relevant agencies, including political, regulatory and institutional framework, was assessed and gaps were identified; Also, various sources of Mercury were identified and evaluated
"Strategic Roadmap covering National Economy Perspective of the Jordan	4.3 Interpretation of the Target Based on the protection of the ecological balance, an efficient management system of waste management, including harmful gases, wastewater and radioactive wastes will be established.	2016-2020	Establishment of waste management system

Development Plan / State Strategy / State Program / Name of Political Document	Main content (results or conclusion)	Term	The envisaged priorities
Jordan 2020: The Vision for Future	The required efforts will be made to eliminate wastes, their recycling, reuse, as well as the application of low-waste or non-waste technologies for the protection of the environment.	2013-2020	Using cutting-edge methods, and establishment of waste recycling facilities

In addition, the steps that are necessary to use the findings of this MIA report to help understand and meet the obligations of the Minamata Convention on Mercury are many. In response, a draft National Implementation Plan (NIP) was developed with the stakeholders at the Validation Workshop in Jordan on 17 December 2017 (Table 37). Within the draft NIP, each Article (and subparagraph, if relevant) of the Minamata Convention is described, whether it is a mandatory obligation (i.e., "shall") or voluntary interest (i.e., "should"), a resulting response for what does or does not need to be done in Jordan based on the MIA, a timeline for meeting the MIA needs, and then whether there is a Jordan law in place or if new regulations need to be developed.

Table 37. National Implementation Plan for Jordan.

Article and (paragraph) in MC	Impact of MC provision	Should or Shall*	Summary of assessment	Timeline Deadline
Article 3: Mercury supply sources and trade			Contains specific obligations to control Hg supply sources and trade of Hg	2017 ("immediate')
3(3)	Restriction on new primary Mercury mining	Shall	No Mercury mining in Jordan	
3(4)	Phase out of existing primary Mercury mining	Shall	No Mercury mining in Jordan	
3(5a)	Identification of Mercury stocks	Shall	No Mercury stocks in Jordan	
3(5b)	Disposal of excess Mercury from decommissioned chlor-alkali facilities	Shall	Mercury that is no longer used in the chlor-alkali industry (i.e., from decommissioned facilities) is considered waste and subject to waste disposal	

3(6)	Restriction on Mercury exports	Shall	No Mercury exports in Jordan	
3(8)	Restriction on Mercury imports	Shall	No Mercury imports in Jordan	
Article 4: Mercury-added products			Contains specific obligations to phase out (or phase down, as specified) certain Hg-added products	2020
4(1)	Prohibition of manufacture/ import/export of certain Mercury-added products (Annex A, Part I)	Shall	Restrictions on placing on the market / imports of the specific Mercury-added products are not yet fully in place.	
4(3)	Measures with respect to dental amalgam (Annex A, Part II)	Shall	Measures to phase down the use of dental amalgam shall include two or more of the measures from Annex A, Part II.	
4(5)	Preventing the incorporation of Mercury-added products in assembled products	Shall	No products with Mercury are assembled in Jordan	
4(6)	Obligation to "discourage" the manufacture and distribution of new Mercury-added products	Shall	No new products with Mercury are planned to be assembled, but if an assessment of the risks and benefits of a new product demonstrates environmental or human health benefits it can be approved.	
Article 5: Manufacturing processes in which Mercuryor Mercury compounds are used			Contains specific obligations to phase out (or phase down as specified) certain industrial processes that use Hg	N/A
5(2)	Prohibition of Mercury use in the processes listed in part I of Annex B	Shall	No processes using Mercury are in Jordan	
5(3)	Obligation to restrict the use of Mercury in the processes listed in part II of Annex B	Shall	No processes using Mercury are in Jordan	
5(5)	Obligation to take measures to "address" emissions and releases from all processes / to endeavor to identify facilities	Shall	No processes using Mercury are in Jordan	
5(6)	Prohibition of using Mercury in new facilities for the processes listed in Annex B	Shall	No processes using Mercury are in Jordan	

5(7)	Discourage "the development of new facilities using any other Mercury-based manufacturing process	Shall	No processes using Mercury are planned for Jordan	
Article 7: Artisanal and small-scale gold mining			Contains specific obligation to reduce and where feasible eliminate Hg use in ASGM	N/A
7(2)	Reduce/eliminate emissions from Artisanal and small-scale gold mining (ASGM)	Shall	No ASGM activities occur in Jordan	
7(3)	Determination of significance of ASGM / Developing and implementing a national action plan if applicable	Shall	No ASGM activities occur in Jordan	
Article 8: Emissions			Contains specific obligations to control and where feasible reduce specified sources of Hg air emissions	
8(3)	Controlling emissions: Develop a national plan (optional)	Should May	 A National Plan will be created by Jordan to address emissions from existing sources of Hg emissions (cement and incinerators)	2021
8(3) / 8(4)	Require BAT/BEP for new sources	Shall	BAT/BEP approaches will be used for any new sources of Hg emissions in Jordan.	2022
8(3) / 8(5)	Emission control measures for existing sources	Shall	Jordan shall implement, one or more of the 5 measures listed in Art 8, par 5, taking into account its national circumstances, and the economic and technical feasibility and affordability of the measures	2027
8(7)	Establish emissions inventory	Shall	Jordan will establish and maintain thereafter, an inventory of emissions from relevant sources.	2022
Article 9: Releases			Contains obligations to control and where feasible reduce major sources of Hg releases to land and water that are not covered in other Articles of the Convention, but allows countries significant flexibility in identifyingwhich sources they choose to control, as well as the specific control measures they wish to employ	

9(3)	Identify relevant sources for releases (to water and land)	Shall	The anthropogenic point sources of Mercury releases for Jordan have been identified	2019
9(4)	Releases control	Should	A National Plan will be created by Jordan to address releases of Hg from existing sources of to land and water	2021
9(6)	Establish release inventory	Shall	Jordan will establish and maintain thereafter, an inventory of releases from relevant sources.	2022
Article 10: Environmentally sound interim storage of Mercury, other than waste Mercury			Contains obligations for Hg storage, but guidance on control measures will be determined by the Conference of Parties at a later time	TBD
10(2)	Storage of non-waste Mercury	Shall	Fit of MC needs to be assessed against the future requirements of the MC (which partly refer to guidelines under Basel Convention).	
Article 11: Mercury wastes			Contains obligations for Hg waste management, but guidance on control measures will be determined by the Conference of Parties at a later time	TBD
11(3)	Mercury waste	Shall	Fit of MC needs to be assessed against the future requirements of the MC (which partly refer to guidelines under Basel Convention).	
Article 12: Contaminated sites			Contains obligations for developing strategies to identify and assess sites but does not include obligations for remediation	TBD
12(1)	Contaminated Sites	Should	Jordan shall endeavor to develop appropriate strategies for identifying and assessing sites contaminated by Mercury	
12(3)	Guidance on managing contaminated sites		Jordan will use guidance provided by the COP for managing contaminated sites	

Article 13: Financial resources and mechanism				2018
13(3)	Financial resources and mechanism	Should	Multilateral, regional and bilateral sources of financial and technical assistance, as well as capacity- building and technology transfer, will be investigated with proposals planned to be submitted for GEF7	
Article 14: Capacity-building, technical assistance and technology transfer				2017
14(4)	Capacity-building, technical assistance and technology transfer	Shall	Jordan will cooperate to provide, within their respective capabilities, timely and appropriate capacity-building and technical assistance to meet obligations under this Convention	
Article 16: Health Aspects				2017
16(1a)	Health Aspects	Should	Jordan will promote the development and implementation of strategies and programs to identify and protect populations at risk, particularly vulnerable populations, and which may include adopting science-based health guidelines relating to the exposure to Mercury	
16(1b)		Should	Jordan will promote the development and implementation of science-based educational and preventive programs on occupational exposure to Mercury and Mercury compounds;	
Article 17: Information Exchange				2017
17(1)	Information Exchange	Shall	Jordan will facilitate scientific, technical, economic and legal information concerning Mercury, including toxicological, ecotoxicological and safety information	

Article 18: Public information, awareness and education				2017
18(1a)	Public information, awareness and education	Shall	Jordan will promote and facilitate to the public available information on: (i) The health and environmental effects of Mercury and Mercury compounds; (ii) Alternatives to Mercury and Mercury compounds; (iii) The results of its research, development and monitoring activities; and (iv) Activities to meet its obligations under this Convention	
18(1b)	Public information, awareness and education	Shall	Jordan will provide education, training and public awareness related to the effects of exposure to Mercury on human health and the environment in collaboration with relevant intergovernmental and non-governmental organizations and vulnerable populations, as appropriate	
Article 19: Research, development and monitoring				

	Research, development and monitoring	Shall	Jordan will endeavor to cooperate to develop and improve, taking into account their respective circumstances and capabilities: (i) Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of Mercury and Mercury compounds; (ii) Modelling and geographically representative monitoring of levels of Mercury in vulnerable populations and in environmental media, including biotic media such as fish, marine mammals, sea turtles and birds, as well as collaboration in the collection and exchange of relevant and appropriate samples; (iii) 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; and (iv) build on existing monitoring networks and research programs in undertaking the activities identified in paragraph	

ANNEX I:

Stakeholder Engagement Process

During the inception phase of the MIA project, Stakeholders and their roles and responsibilities that relevant to the project have been identified, as follows;

Primary Stakeholders (among others) and their roles and responsibilities relevant to the proposed project:

- Ministry of Environment (MoEnv): Host the focal point for the Minamata Convention; Planning and policy development for implementation of the Minamata Convention; Ensure overall coordination at national level in support of the Minamata Convention, including i) Setting of national targets; ii) Support the Mercury inventory; iii) Monitor levels of contamination in environmental media and quantity of Mercury in products; iv) Coordinate with national partners such as the Ministry of Health and the Ministry of Agriculture to address national priorities related to Mercury phase-out; v) Oversee the environmentally sound disposal of Mercury containing products and materials resulting from phase-out efforts.
- Ministry of Health (MoH): Implement newly developed and adopted regulations in the health sector; Coordinate project components that pertain to the use of Mercury in the health sector; Advocate and increase awareness for the phase-out of Mercury containing devices where cost-effective alternatives exist; and, Provide advice and guidance on best practices for Mercury management in the health sector.
- Ministry of Energy and Mineral resources: Provide required data on Mining processes, coal combustion in power plants, combustion and use of petroleum, coke and heavy oil, use of pre-cleaned natural gas, use of pipeline gas, and charcoal combustion.
- Ministry of Industry and Trade: Control and support the reduction of Mercury air emissions from a number of industrial sources; Reduce or eliminate the use of Mercury in certain products and industrial processes; and, Support the reduction of Mercury use in other priority sectors.
- Minstry of Municipal affairs: Control and prevent incineration of municipal waste, prevent open burning in landfills that result in producing Mercury emissions. Provide information on production of recycled Mercury.

- Ministry of Water and irrigation: control wastewater treatment plants, provide information on sewage sludge incineration.
- Jordan Standards and Metrology Organization (JSMO): Adopting EU regulations with respect to Mercury and its management; Carrying out conformity tests and market surveillance; and, Establishing specifications for the testing of laboratory equipment and their commissioning.
- Ministry of Agriculture: Identify and take stock of Mercury-containing agricultural chemicals that might still be present on farms in the form of old stockpiles; Collaborate with local entities on the prioritization of necessary interventions to prevent harmful releases to the environment and exposure to people.
- Chamber of trade: Responsible on the registration of trade companies and establishments. Distributors and retailers of Mercury containing and Mercury-free consumer products; Will assist in providing data on trading of Mercury products.
- Chamber of Industry: responsible for private companies/industries responsible for the release of Mercury and production of Mercury containing products and/or wastes; will provide information on types of industries that may use Mercury in it's processes, contacts and information on annual production.
- Royal Scientific Society (RSS): Verification of and preparation of guidance on sampling methods; Provision of sampling materials; Provide laboratory facilities and undertake tests/analysis in accordance with EU standards.
- Jordan food and drug administration: is an independent public sector institution that is the sole national competent authority for ensuring drug safety and efficacy in addition to food safety and quality
- Drugstore Owners Association: will provide information on drugs containing Mercury
- Aqaba Special Economic zone:
- Civil Society Organizations and Non-Governmental Organizations (CSOs/NGOs): Collection of data and information on the environmental and health aspects and concerns related to Mercury releases and accumulation in the environment. Dissimation of project results and raising awareness on Mercury issues (health and environment) among local communities and population groups at risk, the general public and decision makers.

Establishing the taskforce

Task force was established to participate in developing MIA report especial-

ly the inventory phase of Mercury that require collection of data from different sources; therefore, TOR was drafted and discussed with MoEnv focal point. Then PMU started the nomination process.

The Nomination of representatives from each governmental, semi-governmental and private institutions, who will be engaged in developing MIA report, took more than two months until PMU ensure that all members were officially selected.

The first meeting of "taskforce" took place on July 27,2016 at MoEnv premises to introduce the project concept to the taskforce members, and to agree on the TOR, In addition to identify the mechanisms of collaboration to ensure effective implementation of the project work plan.

During the first meeting the PMU noticed lack of awareness and lack of technical capacities required for the MIA project implementation, so it was decided to conduct one-day workshop to assess national capacities needs of governmental, semi-governmental and private institutions to meet the requirements of conducting Mercury inventory, implementing project activities and to meet requirements of the Convention, and formulate number of priority actions.

The second meeting of taskforce was convened on October 25,2016. The meeting aimed to assess capacity needs of governmental institutions to conduct Mercury inventory, to meet the requirements of the Convention and to formulate number of priority actions on the national level. During this meeting taskforce confirmed the need for a training to cover all issues related to the project including but not limited to Hg sources, emissions and releases, negative impacts on human health and the environment, data sources and how to conduct the inventory, and identifying industries, products and activities that may contain Mercury and should be counted.

This meeting allowed the members to discuss their technical, legal and institutional needs and requirements to conduct Mercury inventory, which were identified as follows:

- To understand more about Mercury and health impacts
- To understand Minamata convention provisions.
- To understand Mercury uses, sources of emissions and releases.
- Training on Mercury inventory tools and how to be conducted.
- To understand the importance and aim of stakeholder's engagement

and their role in inventory process.

For the implementation of the Minamata convention; participants recommended the following:

- Build national capacities toward implementing convention provisions
- Conduct number of awareness workshops on Mercury health impacts, uses, sources of contamination and on most important articles in the convention.
- Identify alternatives and conduct feasibility studies for the available alternatives.
- Develop and update current legislations to meet convention requirements and Strengthening the enforcement of such legislations.
- Identification of the needs lead the PMU to better organize and arrange for technical training to meet their needs.

Taskforces included the following institutions:

-Ministry of Environment

- Ministry of Health

- Ministry of Energy and mineral resources

- Ministry of Agriculture

- Ministry of Trade, Industry and supply

- Ministry of water and irrigation

- Ministry of Municipal affairs

- Jordan standards and metrology organization

-Jordan food and drug administration

- Chamber of Industry

-Chamber of commerce

- Custom department

- Jopetrol

- Aqaba Special economic zone authority.

ANNEX II:

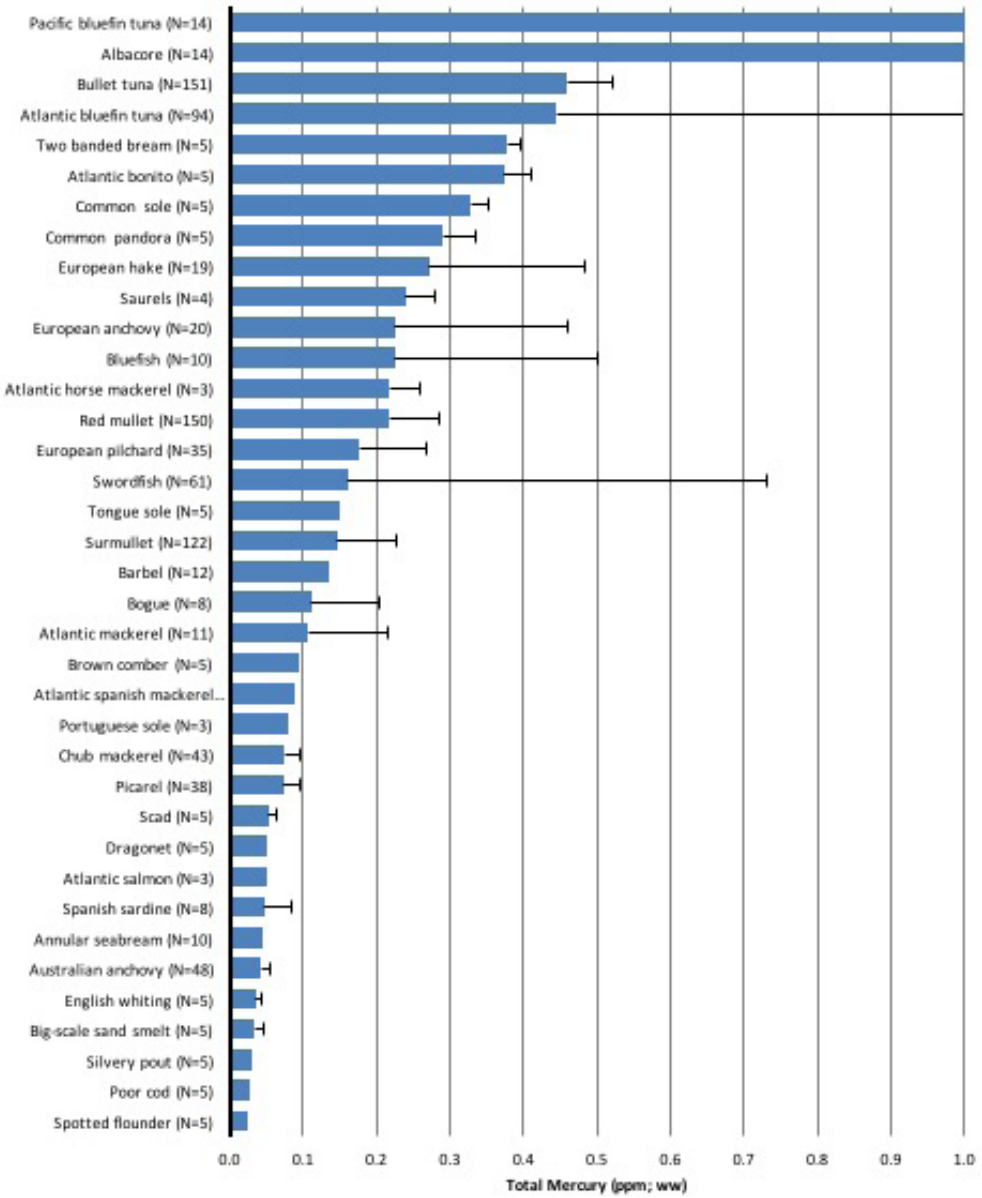
UNEP Toolkit Calculation Spreadsheet

Source category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						
		Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal	Total releases *3*4*5
Coal combustion and other coal use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Other fossil fuel and biomass combustion	61.8	61.8	0.0	0.0	0.0	0.0	0.0	62
Oil and gas production	21.8	4.3	2.4	0.0	3.5	0.0	5.6	16
Primary metal production (excl. gold production by amalgamation)	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
Other materials production*6	1,518.5	1,138.9	0.0	0.0	379.6	0.0	0.0	1,519
Chlor-alkali production with Mercury-cells	-	-	-	-	-	-	-	0
Other production of chemicals and polymers	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
Application, use and disposal of dental amalgam fillings	3,073.8	61.5	1,352.5	245.9	184.4	614.8	614.8	3,074

Use and disposal of other products	4,534.8	372.4	784.0	137.6	0.0	3,073.6	167.1	4,535
Production of recycled metals	130.4	43.0	0.0	44.3	0.0	43.0	0.0	130
Waste incineration and open waste burning*2	282.0	282.0	0.0	0.0	0.0	0.0	0.0	282
Waste deposition*2	8,925.0	89.3	0.9	0.0	-	-	-	90
Informal dumping of general waste *2*3	3,825.0	382.5	382.5	3,060.0	-	-	-	765
Waste water system/treatment *4	772.0	0.0	694.8	0.0	0.0	77.2	0.0	77
Crematoria and cemeteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
TOTALS (rounded) *1*2*3*4*5*6	10,640	2,440	2,520	430	570	3,810	790	10,550

ANNEX III.

Average (+/- SD) total Mercury concentrations (ppm, ww) in fish muscle tissue from the Mediterranean Sea by species from the Global Biotic Mercury Synthesis database (Evers et al. 2017).



Literature Cited:

Clarkson, TW, L Magos, and GJ Myers. 2003. *The toxicology of Mercury—current exposures and clinical manifestations*. The New England J. Medicine, 349:1731–1737.

Evers, DC, DG Buck, AK Dalton, SM Johnson, and M Burton. 2017. *Understanding spatial patterns for biomonitoring needs of the Minamata Convention on Mercury*. Biodiversity Research Institute. Portland, Maine. BRI Science Communications Series 2017-22. 24 pages.

Grandjean, P, C Pichery, M Bellanger, and E Budtz-Jorgensen. 2012. *Calculation of Mercury's Effects on Neurodevelopment*. Environ Health Perspect 120:a452–a452.

Karimi, R, TP Fitzgerald, and NS Fisher. 2012. *A quantitative synthesis of Mercury in commercial seafood and implications for exposure in the U.S. Environ*. Health Perspectives. 120: 1512.

Sunderland, EM. 2007. *Mercury exposure from domestic and imported estuarine and marine fish in the U.S. seafood market*. Environ. Health Perspectives 115:235-242

Valera, B, E Dewailly, and P Poirier. 2011. *Impact of Mercury exposure on blood pressure and cardiac autonomic activity among Cree adults* (James Bay, Quebec, Canada). Environ. Res. 111: 1265–70.