





Minamata Convention: Initial Assesment of Turkey Evaluation of Mercury Inventory in Turkey Ivan Holoubek ^{1, 2, 3}





Research centre for toxic compounds in the environment





¹ RECETOX, Masaryk University, Brno, CR

² CzechGlobe, Academy of Science, Brno, CR

³ TOCOEN, s.r.o., Brno, CR

holoubek@recetox.muni.cz; http://recetox.muni.cz

Mercury Inventory Workshop

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Contents

Mercury Sources: Related Sectors



Main sources of mercury releases and main control options





Emission source types and remobilisation processes affecting mercury distribution in the environment



Life-cycle of Hg product or processs





Mercury Inventory Toolkit

UNEP's Mercury Inventory Toolkit is intended to assist countries in developing national mercury release inventories.

The Toolkit provides a standardized methodology, enabling countries to produce consistent and well-document inventories.



Toolkit for Identification and Quantification of Mercury Releases

"Inventory Level 2" is the comprehensive version, including a detailed description of all mercury sources. It allows the development of a detailed mercury inventory by using specific input and output distribution factors.

"Inventory Level 1"

provides a simplified version of the Toolkit, as well as calculation spreadsheets that allows the development of an overview mercury inventory, by using the defaulf factors.



Mercury Toolkit

The newly revised Toolkit for identification and quantification of mercury releases - Inventory Level 1.

The Toolkit consists of 6 separate documents:

- *** This Guideline for Inventory Level 1;**
- An electronic spreadsheets for calculation of estimates of mercury inputs and releases on Inventory Level 1;
- **Solution Weights for data collection letters;**
- **An Inventory Reporting Template; and**
- **A Toolkit Reference Report.**



Mercury Toolkit

This guideline works closely together with the Toolkit electronic Inventory Level 1 spreadsheet for calculation of estimates of mercury inputs and releases.

The guideline and the calculation spreadsheet bring step by step through the development of national mercury inventory on Inventory Level 1.

The design of Inventory Level 1 makes it simple to organise and calculate the first national mercury inventory.



Mercury Toolkit

The Inventory Level 1 guideline and calculation spreadsheet is organised with the following steps:

Step 1: Getting started;

Step 2: Energy consumption and fuel production;

- Step 3: Domestic production of metals and raw materials;
- Step 4: Domestic production and processing with intentional mercury use;
- Step 5: Waste treatment and recycling;
- Step 6: General consumption of mercury in products, as metal

mercury and as mercury containing substances;

Step 7: Crematoria and cemeteries;

Step 8: Miscellaneous mercury sources not quantified on

Inventory Level 1;

Step 9: Reporting your inventory and

Step 10: Refining your inventory (optional).



Examples of anthropogenic mercury releases to the environmental media

- Destinations of releases to the environment and types of releases to each receiving environmental medium:
- Air the atmosphere: Point sources and diffuse sources from which release may be spread locally, regionally and hemispherically/globally with air masses.
- Emissions from major point sources such as coal fired power plants, metal extraction, waste incineration, chlor-alkali facilities, secondary scrap recycling/smelting, cement production, industrial inorganic chemicals production and diffuse sources such as housing (fossil fuel combustion);
- Emissions from artisanal gold mining;
- Semissions from cremation, primarily due to dental fillings containing mercury;
- Emissions from mercury-containing paints;
- Diffuse releases from uncollected waste products (fluorescent lamps, batteries, thermometers, mercury switches, lost teeth with amalgam fillings etc.);
- Sevaporation of previous discharges to soil and water;
- **Evaporation of mercury disposed of on landfills.**



Examples of anthropogenic mercury releases to the environmental media

- Water aquatic environment: Point sources and diffuse sources from which mercury will be spread to marine environments (oceans), and freshwaters (rivers, lakes etc.).
- Solution Direct discharges from industry and households to aquatic environments;
- **Emissions from artisanal gold mining;**
- **Indirect discharges via waste water treatment systems;**
- Surface run-off and leachate from mercury contaminated soil and landfills without leachate collecting membrane and leachate water cleaning system;
- **Wash-out of mercury previously applied or deposited on land.**



The mass balance principle, inputs and outputs

The mercury release calculations used in this Toolkit are based on the mass balance principle:

All the mercury fed into the system (e.g. an industrial sector) with materials and fuels will come out again, either as releases to the environment or in some kind of product stream.

In other words:

"Sum of inputs = sum of outputs".



The mass balance principle, inputs and outputs

- Inputs: Therefore we quantify the mercury inputs from the amount of mercury containing material fed into the system (called "activity rate") and general data on the mercury concentration in the feed material (called "input factor").
- Outputs: The mercury releases from the system are calculated by distributing this mercury amount on the relevant release pathways based on available data on how the releases (or "outputs") are generally distributed in this sector. For calculating this distribution, we use general "output distribution factors".



The mass balance principle, inputs and outputs

On Inventory Level 1, these calculations are automatic, and are based on default input factors and default output distribution factors, which are already entered in the electronic calculation spreadsheet.

So all you need to do is to enter the amount of material used or produced in each sector, as carefully described in the individual steps of this Guideline.



Basic quantification equation

Estimated mercury release to pathway Y

Activity rate * Input factor * Output distribution factor for pathway Y

The background for all default input factors and output distribution factors is also described in detail in the Toolkit Reference Report, in section 5.
Appendix 1 to this guideline provides background information on how the default factors were implemented in Inventory Level 1.



Remarks

These simplified results aim at providing a useful first insight into your country's situation on mercury inputs and releases. Generally, it may be useful to produce refined inventories at later stages, as the work with national management of mercury develops further.

Specifically, it is recommended to develop more detailed and refined inventories for targeted sectors or activities prior to launching any far reaching regulation or management procedures for these sectors or activities, preferably in cooperation with the relevant stakeholders.

For users who wish to reflect mercury management improvements in their inventory, which are not reflected on Inventory Level 1, the Toolkit Reference Report provides more detailed descriptions of the source categories, and release estimate calculations can be made in more detail in the Inventory Level 2 spreadsheet pages.



Remarks

It should be noted that for some mercury source categories, the data available for developing the default factors have been very scarce, and some default factors are therefore associated with substantial uncertainty.

In some cases where detailed mass balances have not been available, default output distribution factors were developed preliminarily based in expert assessment. In these cases the output distribution default factors are considered "signal values", which indicate a probable release distribution. As mentioned, the available data background for the default factors can be seen in the Toolkit Reference Report.

Each source-category section ("Step") in this guideline describes the limitations of Inventory Level 1 and lists the main factors which may influence the actual inputs and releases, including cases of more technically advanced source configurations, and cases with particularly uncertain default factors, including "signal values".



Step 1 – Getting started

Open spreadsheet page Step 1 and fill in the information requested, using the advice given in this guideline.

The coloured cells contain complex formulas without which the calculations will not work, and they are therefore protected and no changes can be made in them on Inventory Level 1. In Inventory Level 1, only the white cells are open for entering data in the spreadsheet.

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9	("secondary production")			Mercury produced, kg/y	Present?	Present?	Present?	Present?	Present?		125/	
	Production of recycled ferrous metals (iron										VINTS	
10	and steel)			Number of vehicles recycled/	Present?	Present?	Present?	Present?	Present?		X3 0/V	
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12	Waste incineration	Sec. Carro	Second of a									
13	Incineration of municipal/general waste			Waste incinerated, t/y	Present?	Present?	Present?	Present?	Present?			IIIA
14	Incineration of hazardous waste			Waste incinerated, t/y	Present?	Present?	Present?	Present?	Present?			
	Incineration and open burning of medical											
15	waste			Waste incinerated, t/y	Present?	Present?	Present?	Present?	Present?			
16	Sewage sludge incineration			Waste incinerated, t/y	Present?	Present?	Present?	Present?	Present?			
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17	informally)			Waste burned, t/y	Present?	Present?	Present?	Present?	Present?	Present?	Present?	5.8.5
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19	water treatment	Sec. 1										
20	Controlled landfills/deposits			Waste landfilled, t/y	Present?	Present?	Present?	Present?	Present?	Present?	Present?	5.9.1

When you have established an overview of your work in Step 1, simply proceed to Step 2 of the guideline and the spreadsheet to proceed with the inventory work.



Data collection

Data collection may take time, and once specific data are requested from data owners it may take time before responses are received.

As the inventory should aim at describing the mercury situation in (or around) a given year, try to get data for that same year from the different data sources. If some data types are not available for that year, data from other adjacent years can be used, or averages over several adjacent years, if this describes the situation better.

Data collection

Therefore, it is recommended to start data collection early for all inventory steps, and not wait for data for one step before proceeding to the next inventory step.

This also allows for coordination of data collection in cases where several data types are requested from the same sources of information (such as for example the national statistics bureau, or similar).



Data

units !!!

Using the spreadsheet





Understanding the calculated results

Try opening the Inventory Level 1 calculation spreadsheet and open the page entitled "Step 2 Energy" by clicking on the page label with this title at the bottom of the screen window. You will first see a page as shown in Figure 1.

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	Other coal uses			t coal used/y	Present ?	Present ?	Present ?	Present ?	Present ?	Present ?	Present ?	5.1.2		
	Combustion/use of petrole-			t oil product										
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Understanding the calculated results

Try opening the Inventory Level 1 calculation spreadsheet and open the page entitled "Step 2 Energy" by clicking on the page label with this title at the bottom of the screen window. You will first see a page as shown in Figure 1.

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entered in the white cells.

Examples of anthropogenic mercury releases to the environmental media

Land/soil – terrestrial environment: General soil surfaces and ground water.

- Diffuse releases from uncollected waste products (batteries, thermometers, mercury switches, lost teeth with amalgam fillings etc.);
- Local releases from industry: On site materials and waste storage, broken/unused pipes, and equipment and building material contaminated with mercury;
- Spreading of sewage sludge with mercury content on agricultural land (used as fertilizer);
- Application on land, seeds or seedlings of pesticides with mercury compounds;
- Use of solid residues from waste incineration and coal combustion for construction purposes (slag/bottom ash and fly ash);
- **Burial of persons with dental amalgam fillings.**



5.1 Extraction and use of fuels/energy sources











Coal combustion in large power plants

Other coal use Mineral oils extraction, refining and use Natural gas extraction, refining and use

Biomass fired power and heat production



	Source	category					S	ourc	e pres	sen	.t?
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Energy consumption	ı										
Coal combustion in 1	large pov	ver plants	5						Y		
Other coal uses									Y		
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Combustion/use of	diesel, g	asoil, pet	roleur	n, kei	ose	ne			Y		
Biomass fired power	and hea	t product	ion						Y		
Charcoal combustion	n								Y		
Fuel production											
Oil extraction									Y		
Oil refining									Y		
Extraction and proce	essing of	natural g	gas						Y		
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2	20 production	Y	1 876 000	Biomass combusted, t/y		56	56,3	0,0	0,0	0,0	0,0	0,0	5.1.6	
2	21 Charcoal combustion	Y	8 608 000	Charcoal combusted, t/y		1 033	1 033,0	0,0	0,0	0,0	0,0	0,0) 5.1.6	
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2	24 Oil extraction	Y	2 573 000	Crude oil produced, t/y		9	0,0	1,7	0,0	0,0	0,0	0,0	5.1.3	
2	25 Oil refining	Y	29 605 000	Crude oil refined, t/y		101	25,2	1,0	0,0	0,0	0,0	15,	1 5.1.3	
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5.7 Production of recycled metals ("secondary" metal production)



Production of recycled mercury ("secondary production")



Production of recycled ferrous metals (iron and steel)



Production of other recycled metals



Source category	Source present?
	Y/N/?
Primary metal production	
Mercury (primary) extraction and initial processing	Ν
Production of zinc from concentrates	Ν
Production of copper from concentrates	Y
Production of lead from concentrates	Ν
Gold extraction by methods other than mercury	
amalgamation	?
Alumina production from bauxite (aluminium production)	Y



Source category	Source present?
	Y/N/?
Primary ferrous metal production (iron, steel production)	Y
Gold extraction with mercury amalgamation - without use	
of retort	Y
Gold extraction with mercury amalgamation - with use of	
retorts	Ν
Other materials production	
Cement production	Y
Pulp and paper production	Y
Production of chemicals and polymers	
Chlor-alkali production with mercury-cells	Ν
VCM production with mercury catalyst	Ν
Acetaldehyde production with mercury catalyst	Ν



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	A19 🔻 🗍 f 🖉	Gold extrac	ction with me	cury amalgamation	- from whole ore								
	A	В	С	D	E	F	G	Н	I	J	К	L	
		Source				Estimated Hg							
3	Source category	present?	Activity rate			input, Kg Hg/y		E	stimated Hg release	s, standard estima ⊺	ates, Kg Hg/y	Sector openific	-
4		Y/N/?	consumption/p roduction	Unit	Include Hg controls in estimation? (y/n)	Standard estimate	Air	Water	Land	By-products and impurities	d General waste	waste treatm. /disposal	Ca no
5	Primary metal production												1
6	Mercury (primary) extraction and initial	N		Moreun produced the									5
7	Production of zinc from concentrates	N		Concentrate used t/v		-	-	-	-	-	-	-	5
8													
10	Production of copper from concentrates	Y	381 216	Concentrate used t/v	Y	11 436	1 143 6	228 7	0.0	4 803	3 00	5 260 8	5
11					Relevant pollution abatement options (guide: click white cells)		No filters used or coarse, dry PM retention	Wet gas cleaning	Wet gas cleaning and acid plant	Wet gas cleaning, acid plant and Hg specific filter			
					Enter per cent of total				100				
12	Production of load from concontrator	N		Concentrate used the	activity rate per type:		0		100				-
13	roduction of lead none concentrates	IN		Concentrate used, by		-	-	-	-	-	-	-	0.
15													
16	Gold extraction by methods other than mercury amalgamation	?	27 661 000	Gold ore used, t/y		?	?	?	?	?	?	?	5.
17	Alumina production from bauxite (aluminium production)	Y	494 092	Bauxit processed t/v		247	37.1	24 7	0.0	0	0 160.6	24.7	5
18	Primary ferrous metal production (pig iron production)	Y	10 304 272	Pig iron produced, t/y		515	489,5	0,0	0,0	0	0,0	25,8	5.
19 f	Gold extraction with mercury amalgamation - from whole ore	?		Gold produced, kg/y		?	?	?	?	?	?	?	5.
	Step1-Country data Step2	P-Energy	Step3-Metals	-RawMat Step4-I	industrial Ha use St	ep5-Waste treat	tment+recvc	lina / s	Step6-Ha products	-substances	Step7		
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Gold extraction by methods other			
than mercury amalgamation	?	27 661 000	Gold ore used, t/y
Alumina production from bauxite			
(aluminium production)	Y	494 092	Bauxit processed, t/y
Primary ferrous metal production			Pig iron produced,
(pig iron production)	Y	10 304 272	t/y
Gold extraction with mercury			Gold produced, kg/y
amalgamation - from whole ore	?		



5.3 Production of other minerals and materials with mercury impurities



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	A19 - f _x	Gold extra	iction with mer	cury amalgamation -	- from whole ore								v
	A	В	С	D	E	F	G	Н	1	J	K	L	M
21													
22	Gold extraction with mercury amalgamation - from concentrate	N		Gold produced, kg/y		-	-	-	-	-			5.2.
23													
24													
25 26	Cement production	Y	80 000 000	Cement produced, t/v	Y	10 160	7 112.2	0.0	0.0	3 04	8.1 0.0	0.0	5.3.
27					1) WITH WASTE USED as fuel (>3% of energy); relevant pollution abatement options		No filter	Simple particle control (ESP / PS / FF)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FF)	Efficient air pollut control (FF+DS / ESP+DS / ESP+WS / ESP+SNCR)	tion Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+SN CR)	, , , , , , , , , , , , , , , , , , ,	
20					Enter per cent of total			25					
20					2) NO/LOW WASTE use as fuel; relevant pollution abatement options		No filter	Simple particle control (ESP / PS / EE)	Optimized particle control (FF+SNCR / FF+WS / ESP+FGD / optimized FE)	Efficient air pollut control (FF+DS / ESP+DS / ESP+WS / ESP+SNCP)	tion Very efficient Hg pollution control (wetFGD+ACI / FF+scrubber+SN CR)		
30					Enter per cent of total activity rate per type:		0	75	opumizeurry				Nor
31	Pulp and paper production	Y		Biomass used for production, t/y		0	0,0	0,0	0,0		0,0 0,0	0,0	<u>5.3.</u> ≡
32													
33													
34 35 36	 ▲ ▶ ■ Step1-Country data / Step3 	2-Energy	Step3-Metals	-RawMat Step4-Ir	ndustrial Hg use 🖉 Ste	ep5-Waste trea	tment+recyc	ling / S	tep6-Hg products	-substances	Step7	m	•
Přip	praven										ⅢⅢ 80% ()	-+
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Pulp and paper productionY??? production, t/y



5.5 Consumer products with intentional use of mercury



5.6 Other intentional product/process uses





Source category	Source present?
	Y/N/?
Production of products with mercury content	
Hg thermometers (medical, air, lab, industrial etc.)	Ν
Electrical switches and relays with mercury	Ν
Light sources with mercury (fluorescent, compact, others:	
see guideline)	Ν
Batteries with mercury	Ν
Manometers and gauges with mercury	Ν
Biocides and pesticides with mercury	Ν
Paints with mercury	Ν
Skin lightening creams and soaps with mercury chemicals	Ν



Source category	Source present?
	Y/N/?
Medical blood pressure gauges (mercury	
sphygmomanometers)	Ν
Other manometers and gauges with mercury	Ν
Laboratory chemicals	Ν
Other laboratory and medical equipment with mercury	Ν
Production of recycled of metals	
Production of recycled mercury ("secondary production")	?
Production of recycled ferrous metals (iron and steel)	Y



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	A	В	С	D	E	F	G	Н		J
1	DOMESTIC PRODUCTION AND PROCESSING WIT	H INTENTI	ONAL MERCUR	YUSE						
2										
		Source	•		Estimated Hg					
3	Source category	present?	Activity rate		input, Kg Hg/y		Estimate	d Hg releases,	standard estima	ites, Kg F
4	Production of chemicals	Y/N/?	Annual consumption /production	Unit	Standard estimate	Air	Water	Land	By-products and impurities	Genera waste
5	Chlor-alkali production with mercury-cells	N		Cl ₂ produced, t/y	-	-	-	-	-	-
6	VCM production with mercury catalyst	Ν		VCM produced, t/y	-	-	-	-	-	_
7	Acetaldehyde production with mercury catalyst	N		Acetaldehyde produced, t/y	-	-	-	-	-	-
8										
9	Production of products with mercury content									
10	Hg thermometers (medical, air, lab, industrial etc.)	N		Mercury used for production, kg/y	-	-	-	-	-	-
11	Electrical switches and relays with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	
	Light sources with mercury (fluorescent, compact,									
12	others: see guideline)	N		Mercury used for production, kg/y	-	-	-	-	-	
13	Batteries with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	
14	Resides and posticides with mercury	N N		Mercury used for production, kg/y	-	-	-	-	-	
16	Paints with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	
10	Skin lightening creams and soaps with mercury			increary used for production, kg/y	-	-				
17	chemicals	Ν		Mercury used for production, kg/y	_	_	_	_	-	_
18					1	I				
19		_								
20]								
21	Step/-Industrial Hause Step5-Waste tr	- oatmont∔ro	cycling Stop	6-Ha producte-substances / Stop7-	Crematoria-cemota	ries / Stop	8-Miscellannous -			
Dělev		eaunent+re	cycling j step	ong products-substances / Step7-	crematona-cemeta	nes z step			100 %	
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5.8 Waste incineration









Incineration of municipal/ general waste

Incineration of hazardous waste

Incineration of medical waste Informal waste incineration



5.9 Waste deposition/landfilling and waste water treatment







Source category	Source present?
	Y/N/?
Waste incineration	
Incineration of municipal/general waste	Ν
Incineration of hazardous waste	Y
Incineration of medical waste	Y
Sewage sludge incineration	Y
Open fire waste burning (on landfills and informally)	Ν
Waste deposition/landfilling and waste water treatment	
Controlled landfills/deposits	Y
Informal dumping of general waste *1	Ν
Waste water system/treatment	X
Crematoria and cemeteries	
Crematoria	Ν
Cemeteries	Ν



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		А	В	С		D		E	
1 2	GENERAL WASTE	MANAGEMENT SET-UP IN		TRY					
З	waste treatment set	-up in your country:	Y/N					Y/N	
4	a) Is more than 2/3 (t general waste collect landfills or incinerated	two thirds = 67%) of the red and deposited on lined d in closed incinerators?	Y		b) Is more tha 33%) of the m products wast and treated se	n 1/3 (one third = ercury-added e safely collected eparately?		N	These t answer mercur calcula
5 6	WASTE HANDLING	AND RECYCLING							
7	Source category		Source present?	Activity rate					Estim input,
8	Production of recyc	led of metals	Y/N/?	Annual production /waste disposal		Unit	lr e	nclude Hg controls in estimation? (y/n)	Sta est
	Production of recycle	d mercury ("secondary							
9	production")	d formano matala (iran and	?		Mercury produ	uced, kg/y			?
10	steel)	d ferrous metals (iron and	Y	14 645	Number of veh	nicles recycled/y			
11									
12	Waste incineration			<u> </u>					
13	Incineration of munici	pal/general waste	N	▼	Waste incinera	ated, t/y			-
	Step1-Countr	ry data / Step2-Energy /	Step3-Metals	-RawMat / Step4-I	ndustrial Hg use	Step5-Wast	e trea	tment+recycling / Step6-H	lg product
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	A	В	С		D	E	
16	Incineration of hazardous waste	Y	286 872	Waste incinera	ited, t/y	Y	
17						Relevant pollution abatement options (guide: click white cells)	
18						Enter per cent of total activity rate per type:	
19	Incineration / burning of medical waste	Y	11 973	Waste incinera	ited, t/y		
20							
21							<u> </u>
22	Sewage sludge incineration	Y	30 453	Waste incinera	ited, t/y		
23	informally)	N		Waste burned	t/v		_
24	······································			indete painea,			
25	Waste deposition/landfilling and waste water treatment						
26	Controlled landfills/deposits	Y	5 463	Waste landfille	d, t/y		
27	Informal dumping of general waste *1	?		Waste dumped	d, t/y		?
28					3.		
29	Waste water system/treatment	Y	18 232 053	Waste water, r	m°/y		
l ∢ ↓ Vybe	Step1-Country data / Step2-Energy / Step2-Energ	tep3-Metals	-RawMat / Step4-Ir	ndustrial Hg use	Step5-Waste tre	eatment+recycling Step6-Ho] product
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Production of recycled		
mercury ("secondary		
production")	?	Mercury produced, kg/y
Informal dumping of		
general waste *1	?	Waste dumped, t/y



	Source
Source category	present?
	Y/N/?
Use and disposal of products with mercury content	
Dental amalgam fillings ("silver" fillings)	Y
Preparations of fillings at dentist clinics	
Use - from fillings already in the mouth	
Disposal (excavations, lost and extracted teeth)	
Thermometers	Y
Medical Hg thermometers	Y
Other glass Hg thermometers (air, laboratory, dairy, etc.)	?
Engine control Hg thermometers and other large industrial/	
speciality Hg thermometers	?
Electrical switches and relays with mercury	Y
Light sources with mercury	Y
Fluorescent tubes (double end)	Y
Compact fluorescent lamp (CFL single end)	?



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	A	В	С	D	E	F	G	Н	
1	GENERAL CONSUMPTION OF MERCURY IN P	RODUCTS, A	S METAL MERC	URY AND AS MERCURY CONTAIN	ING SUBSTANCES		1		
2		•					1		
2	Source esterony	Source	Activity rate			Estimated Hg		Ectimat	
4		Y/N/?	Activity fate Annual consumption /population	Unit	Include Hg controls in estimation? (v/n)	Standard estimate	Air	Water	
5							More than 2/3 (f	wo thirds: 67%)	of the
-	Use and disposal of products with mercury					regarding waste		<u>wo unicas, or ////</u>	
6	content					management:	Less than 1/3 (c	ne third = 33%)	of the
7	Dental amalgam fillings ("silver" fillings)	Y			Y	4 711	94,2	2 073,0	376,
8	Preparations of fillings at dentist clinics		81 000 000	Number of inhabitants			94,2	659,6	
9	Use - from fillings already in the mouth		81 000 000	Number of inhabitants			0,0	94,2	
10	Disposal (excavations, lost and extracted teeth)		81 000 000	Number of inhabitants	0 inhah		0,0	1 319,2	
			0,241	Number of dental personnel per 100	Relevant pollution abatement		Clinics where	Clinics where	
12					options (guide: click white cells)		only simple chair strainers/filters are used	high efficiency amalgam separators are used	
13					Enter per cent of total activity rate per type:		100		
14	T he mass to me	× ×	04.454					7.0	<u> </u>
15	Inermometers	Ŷ	24 151	ltoma cold/u		24	2,4	7,2	<u> </u>
10	Other glass Hg thermometers (air Jaboratory	T	24 151			24			—
N 4	▶ ▶ Step4-Industrial Hg use / Step5-Wast	te treatment+r	ecycling Step	6-Hg products-substances Step	7-Crematoria-cemetaries / Step8-	Miscellannous Hg so	urces /		
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15	Thermometers	Y	24 151			24	1 2,4	7,2	
16	Medical Hg thermometers	Y	24 151	Items sold/y		24	1		
17	Other glass Hg thermometers (air, laboratory, dairy, etc.)	?		Items sold/y		?			
18	Engine control Hg thermometers and other large industrial/speciality Hg thermometers	?		Items sold/y		?			
19									
20	Electrical switches and relays with mercury	Y	81 000 000	Number of inhabitants		11 329	1 132,9	0,0	
21			100	electricification rate, %					
22	Light pourses with measure	N N	4.040.000	lterrer e e lel 6 :		45			<u> </u>
23	Light sources with mercury	Ŷ	1 816 880	Items sold/y		45	2,3	0,0	+
24	Compact fluorescent lamp (CEL single and)	Y 2	1 816 880	Items sold/y		45			
25	Compact hubrescent lamp (CFL single end)	ŗ				f			
26	Other Hg containing light sources (see guideline)	2		Items sold/v		2			
27						•			
28	Batteries with mercury	Y	0	t batteries sold/y		78	3 0.0	0.0	
	Mercury oxide (button cells and other sizes); also			-				· · ·	
29	called mercury-zinc cells	Y	0	Batteries sold, t/y		78	3		
	Other button cells (zinc-air, alkaline button cells,								
30	silver-oxide)	?		Batteries sold, t/y		?			
~ 1	Other batteries with mercury (plain cylindrical			5 <i>u</i> · · · · <i>u</i>					
31	aikaline, permanganate, etc., see guideline)	(Batteries sold, t/y		?			<u> </u>
32	Polyurothano (PLL PLIP) produced with moreury								<u></u>
33	catalyst	2	81 000 000	Number of inhabitants		2	2	2	2
34		:	100	Electricification rate %					<u> </u>
25		h - h			7. Currente di a constanti da con	Missellennen Li			
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	Source
Source category	present?
	Y/N/?
Compact fluorescent lamp (CFL single end)	?
Other Hg containing light sources (see guideline)	?
Batteries with mercury	Y
Mercury oxide (button cells and other sizes); also called mercury-	
zinc cells	Y
Other button cells (zinc-air, alkaline button cells, silver-oxide)	?
Other batteries with mercury (plain cylindrical alkaline,	
permanganate, etc., see guideline)	?
Polyurethane (PU, PUR) produced with mercury catalyst	?
Paints with mercury preservatives	?
Skin lightening creams and soaps with mercury chemicals	?
Medical blood pressure gauges (mercury sphygmomanometers)	Y
Other manometers and gauges with mercury	Y
Laboratory chemicals	Y
Other laboratory and medical equipment with mercury	Y



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36 Paints with mercury preservatives	?		Paint sold, t/y		?	?	?	?
37								
Skin lightening creams and soaps with mercury chemicals	?		Cream or soap sold, t/y		?	?	?	?
39								
Medical blood pressure gauges (mercury 40 sphygmomanometers)	Y		Items sold/y		0	0,0	0,0)
41								
42 Other manometers and gauges with mercury	Y	81 000 000	Number of inhabitants		405	40,5	121,4	,
43		100	Electricification rate, %					<u> </u>
44								
45 Laboratory chemicals	Y	81 000 000	Number of inhabitants		809	0,0	267,0	1
46		100	Electricification rate, %					<u> </u>
Other laboratory and medical equipment with								<u>+</u>
48 mercury	Y	81 000 000	Number of inhabitants		3 237	0.0	1 068 1	
49		100	Electricification rate %		0 201	0,0	1 000,1	
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	Source
Source category	present?
	Y/N/?
Combustion of oil shale	Ν
Combustion of peat	Ν
Geothermal power production	Ν
Production of other recycled metals	Ν
Production of lime	Y
Production of light weight aggregates (burnt clay nuts for building	
purposes)	Ν
Chloride and potassium hydroxide produced from mercury-cell	
technology	Ν
Polyurethane production with mercury catalysts	Ν
Seed dressing with mercury chemicals	Ν
Infra red detection semiconductors	Ν



	Source
Source category	present?
	Y/N/?
Bougie tubes and Cantor tubes (medical)	Ν
Educational uses	Y
Gyroscopes with mercury	Ν
Vacuum pumps with mercury	Ν
Mercury used in religious rituals (amulets and other uses)	Ν
Mercury used in traditional medicines (ayurvedic and others) and	
homeopathic medicine	Ν
Use of mercury as a refrigerant in certain cooling systems	Ν
Light houses (levelling bearings in marine navigation lights)	Ν
Mercury in large bearings of rotating mechanic parts in for	
example older waste water treatment plants	Ν
Tanning	Ν



Source
present?
Y/N/?
Y
Ν
Ν
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?



Inventory Level 1 – Summary (draft)

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1	1 INVENTORY LEVEL 1 - EXECUTIVE SUMMARY												
2	Source category	Estimated		Estim	ated Hg rel	eases, standa	rd estimates	, Kg Hg/y		Percent of			
		Hg input,				By-products		Sector specific	Total	total			
		Kg Hg/y				and	General	waste treatment	releases	releases			
3			Air	Water	Land	impurities	waste	/disposal	*3*4*5	*3*4			
4	Coal combustion and other coal use	15 126,9	13 049,5	0,0	0,0	0,0	0,0	2 077,4	15 127	21%			
5	Other fossil fuel and biomass combustion	5 937,7	5 937,2	0,0	0,0	0,0	0,0	0,5	5 938	8%			
6	Oil and gas production	146,1	30,7	10,1	0,0	11,0	0,0	27,9	80	0%			
_	Primary metal production (excl. gold production by												
7	amalgamation)	12 198,7	1 670,2	253,4	0,0	4 803,3	160,6	5 311,2	12 199	17%			
8	Gold extraction with mercury amalgamation	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	0%			
9	Other materials production*6	10 160,3	7 112,2	0,0	0,0	3 048,1	0,0	0,0	10 160	14%			
10	Chlor-alkali production with mercury-cells	-	-	-	-	-	-	-	0	0%			
11	Other production of chemicals and polymers	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	0%			
12	Production of products with mercury content*1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	0%			
13	Application, use and disposal of dental amalgam fillings	4 /11,4	94,2	2 0/3,0	3/6,9	282,7	942,3	942,3	4 /11	/%			
14	Use and disposal of other products	15 927,2	1 1/8,0	1 463,8	1 132,9	0,0	10 / /6,9	1 375,6	15 927	22%			
15	Production of recycled metals	16,1	5,3	0,0	5,5	0,0	5,3	0,0	16	0%			
16	Waste incineration and open waste burning^2	7 233,2	6 538,6	0,0	0,0	0,0	0,0	694,6	7 233	10%			
17	vvaste deposition ²	27,3	0,3	0,0	0,0	-	-	-	0	0%			
18	Informal dumping of general waste "2"3	<u>(</u>	?	? 00 1	?	?	?	· · · · · · · · · · · · · · · · · · ·	0	0%			
19	Viaste water system/treatment 4	95,7	0,0	00,1	0,0	0,0	9,6	0,0	10	0%			
20	TOTAL S (rounded) \$4\$2\$2\$4\$5\$6	64 990	25 620	2 800	1 520	0,0	11 200	0,0	71 400	100%			
21	Notoo:	04 000	35 020	3 800	1 520	0 150	11 090	10 430	11400	100%			
22	*1 To avoid double counting of moreury in products produce	domostically	and sold on t	he domostia	market (ine	luding oil and	and vine (and	a part of moreury i	anute releas	ad from pro	duction		
23	are included in the input TOTAL	Gomestically		ne domestic	market (IIIC	idding on and g	jas), uniy the	e part of mercury i	ipuls i ciddo				
24	*2: To avoid double counting of mercury inputs from waste a	nd producte in	the input TO		% of the m	arcury input to	waste incine	aration waste dep	osition and				-
14 4	Step6-Hg products-substances Step7-Cremate	ria-cemetaries	Step8-N	liscellannous	Ha sources	Insert IL2	results		evel 1-Exec	Summarv			
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Toolkit for Idetification and Quantification of Mercury Releases Reference Report and Guideline for Inventory Level 2 Version 1.4 January 2017





Introduction to the Inventory Level 2 concept

The Toolkit's Inventory Level 2 consists of a four-step standardized procedure to develop consistent and comparable source inventories.
 The recommended four-step approach used to establish a national mercury release inventory using the Toolkit

ESTABLISHING A NATIONAL MERCURY RELEASE INVENTORY USING THIS TOOLKIT

- **STEP 1** Apply screening matrix to identify main source categories present in the country or region investigated and identify existing descriptions of mercury sources in the country;
- **STEP 2** Classify main source categories further into sub-categories and gather additional qualitative information to identify existing activities and sources of mercury releases in the country; and if feasible, the relative importance of each;
- **STEP 3** Gather detailed quantitative information on the identified sources, and quantify releases with source specific data or default mercury input and output distribution factors from this Toolkit;
- **STEP 4** Apply nation-wide to establish full inventory and report results using guidance given in the standard format.





Teşekkür Ederim



