

# Minamata Convention: Initial Assessment of Turkey

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# Lecture 8

**Intentional use of mercury in industrial processes**  
**Consumer products with intentional use of mercury**  
**Other intentional products/process use**

# Intentional use of mercury in industrial processes

This category covers the following **main sub-categories**:

- ↪ **Chlor-alkali production with mercury-technology;**
- ↪ **VCM (vinyl-chloride-monomer) production with mercury-dichloride ( $\text{HgCl}_2$ ) as catalyst;**
- ↪ **Acetaldehyde production with mercury-sulphate ( $\text{HgSO}_4$ ) as catalyst;**
- ↪ **Other production of chemicals and polymers with mercury compounds as catalysts.**

# Intentional use of mercury in industrial processes

Main category – Intentional use of mercury as an auxiliary material in industrial processes

Chapter	Sub-categories	Air	Water	Land	Product	Waste/ residue	Main inventory approach
5.4.1	Chlor-alkali production with mercury-technology	X	X	X	X	X	PS
5.4.2	VCM (vinyl-chloride-monomer) production with mercury-dichloride (HgCl <sub>2</sub> ) as catalyst	x	x			X	PS
5.4.3	Acetaldehyde production with mercury-sulphate (HgSO <sub>4</sub> ) as catalyst	?	?	?	?	?	PS
5.4.4	Other production of chemicals and polymers with mercury compounds as catalysts	?	?	?	?	?	PS

Notes: PS = Point source by point source approach; OW = National/overview approach;  
 X - Release pathway expected to be predominant for the sub-category;  
 x - Additional release pathways to be considered, depending on specific source and national situation.

# Consumer products with intentional use of mercury

This category covers the following **main sub-categories** given below.

The category includes **products that may be used by broader groups** (and may be subject to public waste handling procedures).

It also includes releases from production, use and disposal.

↳ **Thermometers containing mercury, including medical thermometers, other glass thermometers (used in laboratories, for educational purposes, etc.) and other mercury thermometers (industrial, marine diesel engines, etc.);**

# Consumer products with intentional use of mercury

↪ **Electrical and electronic switches, contacts and relays with mercury, including:**

- ❖ **Level switches** in sewer pumps, water pumps, car boot lids (lighting), car ABS sensors, car ride-control systems, freezers lids, fall alarms for the elderly, railway signals, lights in children's shoes, etc.,
- ❖ **Multiple pole level switches** in excavation machines,
- ❖ **Mercury-wetted contacts** (in electronics),
- ❖ **Data transmission relays** or "reed relays",
- ❖ **Thermo-switches, etc.;**

# Consumer products with intentional use of mercury

## ↪ Light sources with mercury, including:

- ❖ **Linear fluorescent lamps,**
- ❖ **Compact bulbs (small energy saving fluorescent lamps),**
- ❖ **Street advertisement with fluorescent tubes,**
- ❖ **Other mercury-containing lamps (Hg-lamps and Na-lamps for street lighting, UV lamps for skin tanning, light source in LCD flat screens for TV and computers, laboratory atomic absorption spectrometry lamps, head lamps in some car brands, etc.);**

# Consumer products with intentional use of mercury

## ↳ Batteries containing mercury, including:

- ❖ **Mercury oxide batteries** (cylindrical and button),
- ❖ **Alkaline cylindrical cells** (containing mercury). (Note: in recent years mercury content in cylindrical alkaline cells has been reduced/eliminated in many battery brands.),
- ❖ **Button shaped cells** of most types (containing mercury);

## ↳ **Biocides and pesticides**, including seed dressing, sugar cane seedling dip and other pesticides;



# Consumer products with intentional use of mercury

- ↪ **Paints**, including some latex paints and possibly other paints containing mercury compounds as biocides for shelf life preservation;
- ↪ **Pharmaceuticals for human and veterinary uses**, including vaccines, eye drops, some herbal medicines, disinfectants, etc.;
- ↪ **Cosmetics and related products**, including skin lightening creams and soaps, preservation in eye cosmetics, etc.

# Consumer products with intentional use of mercury

## Main category - Consumer products with intentional use of mercury

Chapter	Sub-category	Air	Water	Land	Product	Waste/ residue	Main inventory approach
5.5.1	Thermometers with mercury	X	X	X	X	X	OW
5.5.2	Electrical and electronic switches, contacts and relays with mercury	X	x	X	X	X	OW
5.5.3	Light sources with mercury	X	x	X	X	X	OW
5.5.4	Batteries containing mercury	X	x	X	X	X	OW
5.5.6	Biocides and pesticides	X	X	X	X	X	OW
5.5.7	Paints	X	x	x	X	x	OW
5.5.8	Pharmaceuticals for human and veterinary uses	X	x	x	x	X	OW
5.5.8	Cosmetics and related products		X		X	x	OW

Notes: PS = Point source by point source approach; OW = National/overview approach;  
 X - Release pathway expected to be predominant for the sub-category;  
 x - Additional release pathways to be considered, depending on specific source and national situation.

# Other intentional products/process use

This category covers the following **main sub-categories** given below.

It includes **releases from production, use and disposal.**

- ↪ **Dental amalgam fillings;**
- ↪ **Manometers and blood pressure gauges, including:**
  - ❖ **Blood pressure gauges,**
  - ❖ **Other manometers/pressure controls for industrial uses, for educational purposes, district heating pressure valves (such pressure controls may contain hundreds of kilos of mercury per control valve), etc.;**

# Other intentional products/process use

- ↪ **Laboratory chemicals and equipment, including:**
  - ❖ **Special laboratory apparatus (Coulter Counters etc.),**
  - ❖ **Chemical reactants for COD analysis, Kjeldahl analysis (nitrogen analysis),**
  - ❖ **Electrodes for physico-chemical measurements, such as calomel electrodes and others;**
  
- ↪ **Ethnic/cultural/ritualistic uses, including mercury metal use in religious/ethnic/cultural rituals and practices and folklore medicine;**

# Other intentional products/process use



## Other mercury metal uses, including:

- ❖ Educational uses,
- ❖ Gyroscopes with mercury;
- ❖ Vacuum pumps with mercury
- ❖ Marine navigation lights in light houses (in some types the lens/lamp unit floats on mercury),
- ❖ Mercury in large bearings of rotating mechanic part in for example older waste water treatment plants;

# Other intentional products/process use

## ↪ Miscellaneous products, including:

- ❖ Infra-red detection semiconductors,
- ❖ Tanning,
- ❖ Pigments,
- ❖ Browning and etching steel,
- ❖ Certain colour photograph paper types,
- ❖ Recoil softeners in rifles,
- ❖ Explosives (mercury-fulminate),
- ❖ Fireworks,
- ❖ Executive toys;

The last two sub-categories, other mercury metals and miscellaneous products, covers a large range of uses that have been reported and are 1) either known to be generally small uses (low consumption), or 2) uses with very little data available.

These uses can not, however, be ruled out as potentially important release sources locally or nationally

# Other intentional products/process use

Main category - Other intentional products/process uses							
Chapter	Sub-category	Air	Water	Land	Product	Waste/ residue	Main inventory approach
5.6.1	Dental mercury-amalgam fillings	x	X		X	X	OW
5.6.2	Manometers and gauges	x	X	x	X	X	OW
5.6.3	Laboratory chemicals and equipment	x	X		X	X	OW
5.6.4	Mercury metal use in religious rituals and folklore medicine	X	X	X	X	X	OW
5.6.5	Miscellaneous product uses, mercury metal uses and other sources	X	X	X	X	X	OW

Notes: PS = Point source by point source approach; OW = National/overview approach;  
 X - Release pathway expected to be predominant for the sub-category;  
 x - Additional release pathways to be considered, depending on specific source and national situation.

# Data collection

Source sub-category

Input data types  
and units

Possible data sources

## Production of chemicals and polymers

Chlor-alkali production  
with mercury-cells

Cl<sub>2</sub> produced,  
t/y

Production of chlorine (Cl<sub>2</sub>) may be found in national production statistics held at the ministry of industry or in the national statistics bureau; otherwise contact companies. The share of chlorine production capacity based on mercury cells compared to total production capacity in a country is often known by industry associations, companies and resource persons. Production capacity can provide a reasonable estimate of the share of production produced with mercury cells. If not available in overview, production companies must be contacted individually to obtain production numbers based on mercury cells, and if possible mercury input and release data.

Note that some companies producing rubber, PVC, vitamins and other chemicals may have their own internal chlor-alkali production plants for production of feedstock which is not sold externally. In such cases, the companies must be contacted to get data on their chlorine production and if possible their mercury input and release data.



# Data collection

Source sub-category	Input data types and units	Possible data sources
<p>VCM production with mercury catalyst</p>	<p>VCM produced, t/y</p>	<p>Production of VCM (vinyl chloride monomer) may be found in national production statistics held at the ministry of industry or in the national statistics bureau; otherwise contact companies. It may be needed to contact the companies to establish if mercury catalysts are used, or of the VCM is produced from other processes which do not use mercury.</p> <p>Note that some companies producing raw PVC plastic compound have their own internal VCM production plants for production of feedstock which is not sold externally. In such cases, the companies must be contacted to get data on their VCM production and if possible their mercury in- put and release data.</p>

# Data collection

Source sub-category	Input data types and units	Possible data sources
Acetaldehyde production with mercury catalyst	Acetaldehyde produced, t/y	See advice for VCM, the situation is similar for acetaldehyde.
Production of products with mercury content		
Hg thermometers (medical, air, lab, industrial etc.)	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.
Electrical switches and relays with mercury	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.
Light sources with mercury (fluorescent, compact, others)	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.

# Data collection

Source sub-category	Input data types and units	Possible data sources
Batteries with mercury	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.
Manometers and gauges with mercury	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.
Biocides and pesticides with mercury	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.
Paints with mercury	Mercury used for production, kg/y	Contact identified companies for production data and mercury input and release data.

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Skin lightening creams and soaps with mercury chemicals</b>	<b>Mercury used for production, kg/y</b>	See advice above; in case this sector is largely informal and perhaps not reported in statistics, etc., you may try to form a rough estimate of the likely annual consumption of such creams and soaps by visiting and interviewing a representative number of shops selling this type of products. Note that only some skin-lightening creams and soaps contain mercury compounds. The estimated national sales in metric tons may be multiplied with a medium mercury content of 30 kg Hg/t skin lightening cream or soap.

# Data collection

Source sub-category	Input data types and units	Possible data sources
Use and disposal of products with mercury content		
Dental amalgam fillings ("silver" fillings)	Number of inhabitants	No need to enter data in this step; calculations are based on population and density of dental personnel from step 1. Amalgam filling usage is in the decline in some countries, partly due to rising awareness of mercury adverse environmental effects, partly because white filling materials are considered cosmetically preferable in some countries and customer segments. Amalgam is however still generally less expensive than most alternatives, though prices of alternatives are falling, and some dentist prefer amalgam; especially for complex fillings.
Preparations of fillings at dentist clinics		
Use - from fillings already in the mouth		
Disposal (lost and extracted teeth)		

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Thermometers:</b>		
<b>Medical Hg thermometers</b>	Items sold/y	<p>Consumption (or data for production, import and export) of glass thermometers with mercury may be found in the national statistics bureau, or at the ministry of commerce. Make sure to use only numbers for medical glass thermometers, as also electronic fever thermometers exist. If there is no distinction in the statistics, consult producers, importers or resource persons and try to estimate a rough distribution. If these sources do not have data, identify and ask producers and importers of thermometers of their estimate for the total national consumption. Otherwise contact selected hospitals to get information on their annual purchase of medical glass thermometers and number of beds and extrapolate to national level via total number of beds in country. Add expert estimate of privately owned thermometers, for example as related to the supply to hospitals (importers of producers may have the knowledge to make an estimate). Data on import and export (but not production) may be available for your country in the UN Comtrade database available at <a href="http://comtrade.un.org/db/default.aspx">http://comtrade.un.org/db/default.aspx</a> (see Appendix 2).</p>

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Other glass Hg thermometers (air, laboratory, dairy, etc.)</b>	Items sold/y	See above; this group of thermometers normally contain several times more mercury per unit (2-40 g/piece) than medical thermometers, but may be less in number supplied annually.
<b>Engine control Hg thermometers and other large industrial/speciality Hg thermometers</b>	Items sold/y	These are specialty thermometers which are generally sold in lower numbers than glass thermometers, but can contain up to 200 g mercury/unit. They are used for ship engine control among others. For data, contact identified producers or users (for example shipyards).
<b>Electrical switches and relays with mercury</b>	Number of inhabitants	No need to enter data; is based on population and electrification data from step 1.

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Light sources with mercury:</b>		
<b>Fluorescent tubes (double end)</b>	Items sold/y	Consumption (or data for production, import and export) of these light sources with mercury may be found in the national statistics bureau, or at the ministry of commerce. Otherwise identify and contact producers or importers and for their estimate for the total national consumption. Data on import and export (but not production) may be available for your country in the UN Comtrade database available at <a href="http://comtrade.un.org/db/default.aspx">http://comtrade.un.org/db/default.aspx</a> (see Appendix 2).
<b>Compact fluorescent lamp (CFL single end)</b>	Items sold/y	
<b>Other Hg containing light sources (see guideline)</b>	Items sold/y	See above. This group contains the following other types of mercury containing light sources which generally contain higher amounts of mercury: High pressure mercury vapour lamps (road and outdoor lighting, etc.); high-pressure sodium lamps (road and outdoor lighting, etc.); UV light for sun-tanning; and metal halide lamps. You only need to insert the total consumption of all these types.



# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Batteries with mercury:</b>		
<b>Mercury oxide (button cells and other sizes); also called mercury-zinc cells</b>	Batteries sold/y	Mainly used for certain specialised purposes; very high mercury concentrations, but sold in lower numbers; for details see Toolkit Reference Report. Consumption (or data for production, import and export) of these light sources with mercury may be found in the national statistics bureau, or at the ministry of commerce. Otherwise contact identified producers or importers and for their estimate for the total national consumption.
<b>Other button cells (zinc-air, alkaline button cells, silver-oxide)</b>	Batteries sold/y	For consumption data see above. Covers all other button size cells than mercury oxide button cells. Button cells generally contain mercury to reduce risk of breakage. Data on import and export (but not production) may be available for your country in the UN Comtrade database available at <a href="http://comtrade.un.org/db/default.aspx">http://comtrade.un.org/db/default.aspx</a> (see Appendix 2).

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Other batteries with mercury (plain cylindrical alkaline, permanganate, etc., see guideline)</b>	<b>Batteries sold/y</b>	For consumption data see above. These plain type batteries are sold in the largest quantities. Global brands generally do not anymore contain mercury, but some regional or national brands do contain mercury adding up to potentially large amounts due to the high numbers sold. To distinguish which parts of the national sales of these plain battery types contain mercury, you need to contact importers and producers and ask them what share of the battery supply contains mercury. Data on import and export (but not production) may be available for your country in the UN Comtrade database available at <a href="http://comtrade.un.org/db/default.aspx">http://comtrade.un.org/db/default.aspx</a> (see Appendix 2).

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Polyurethane (PU, PUR) produced with mercury catalyst</b>	Number of inhabitants	No need to enter data; is based on population and electrification data from step 1.
<b>Paints with mercury preservatives</b>	Paint sold, t/y	Contact identified paint producers and importers and ask them, which nationally marketed paint types may contain mercury (to prolong shelf life of the paint or prevent microbial growth on the painted surface), and what amounts such paint types are sold in annually.
<b>Skin lightening creams and soaps with mercury chemicals</b>	Cream or soap sold, t/y	Contact identified producers and importers and ask them, which nationally marketed cosmetic types may contain mercury, and what amounts such product types are sold in annually. If this is not possible, make rough estimates of potential amounts based on surveys in a number of shops and extrapolation to national conditions. Report your assumptions and calculations.

# Data collection

Source sub-category	Input data types and units	Possible data sources
<b>Medical blood pressure gauges (mercury sphygmomanometers)</b>	Items sold/y	Consumption (or data for production, import and export) of medical blood pressure gauges may be found in the national statistics bureau, or at the ministry of commerce. Try to distinguish from supply of electronic blood pressure gauges. Otherwise, it may be possible to get data from importers, or from a representative number of hospitals, medical clinics and medical doctors and extrapolate to estimated national totals (via number of beds and number of doctors, respectively).
<b>Other manometers and gauges with mercury</b>	Number of inhabitants	No need to enter data; is based on population and electrification data from step 1.
<b>Laboratory chemicals</b>	Number of inhabitants	No need to enter data; is based on population and electrification data from step 1.
<b>Other laboratory and medical equipment with mercury</b>	Number of inhabitants	No need to enter data; is based on population and electrification data from step 1.



**Teşekkür Ederim**

