Reply to UNEP's call for submissions in relation to a series of technical issues regarding the Minamata Convention on Mercury (1 December 2014)

This reply includes factual information made available by the EU and its Member States

1. Article 3 - Guidance on the identification of stocks and sources

In its note of 1 December 2014, UNEP has asked for information regarding the development of draft guidance on the identification of individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks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, pursuant to paragraph 5 (a) of Article 3, drawing on the factors suggested in document UNEP(DTIE)/Hg/INC/6.9;

The list of factors suggested in document UNEP(DTIE)/Hg/INC/6.9 are a reasonable starting point although point (c) should be amended to "collection of mercury and mercury compounds gained from non-ferrous mining and smelting operations and from the cleaning of natural gas". Account should also be taken of any registered exemption that would be relevant for the identification of stocks.

The guidance should include information on the amounts of mercury and mercury compounds that could be expected to be stocked for or be generated by relevant activities during their activity or decommissioning, including:

- Mercury or mercury compound traders (i.e., companies exporting or importing elemental or commodity grade mercury, or mercury compounds);
- Primary mercury mining facilities ;
- Non-ferrous metal mining or processing facilities;
- Natural gas production facilities;
- Mercury cell chlor-alkali facilities;
- Mercury-added product manufacturers;
- Mercury waste treatment or product recycling facilities (i.e. facilities with mercury retorts);
- Mercury compound and catalyst producers;
- Disposal sites where elemental mercury or mercury compounds can be retrieved for use in commerce.

The guidance should outline methods for determining quantities of mercury or mercury compound stocks, such as visual inspection, records assessment (revenue, sales, etc.), process design capacity, area of unprocessed ore, etc.

2. Article 10 – Environmentally sound interim storage of mercury, other than waste mercury

In its note of 1 December 2014, UNEP has asked for information on sound mercury interim storage practices that have been adopted and successfully implemented.

The EU has not adopted measures regarding the environmentally sound interim storage of mercury, other than waste mercury.

However the EU has adopted criteria for the temporary storage of waste metallic mercury, which, by analogy, would be a relevant reference for the development of guidelines on the environmentally sound interim storage of mercury, other than waste mercury. These criteria are contained in Council Directive 2011/97/EU of 5 December 2011 amending Directive 1999/31/EC temporary storage of metallic mercury considered as waste. It is available at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1426155112295&uri=CELEX:32011L0097

3. Article 11 – Mercury wastes

In its note of 1 December 2014, UNEP has asked for information on the use of mercury waste thresholds and the levels established.

The EU does not have thresholds to define mercury waste.

More than one threshold for mercury wastes may be required given the quite different nature of the wastes that would be potentially affected. Defining such thresholds for mercury wastes should be 'evidence based' and this will require an extensive gathering of relevant information. Such relevant information should include data on 'limits of detection' and 'testing methods', 'existing background concentrations' in compartments such as soil, water and waste in addition to 'hazardous waste characterisation' & 'toxicity data'.

Annex 1 contains information on the mercury content of wastes.

EU waste law includes a number of elements that relate to mercury content of certain wastes:

- Criteria to define when a waste is hazardous can be found in Commission Decision 2000/532 of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive5/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste. See in particular Article 2. It is available at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000D0532

- The EU has adopted criteria for the temporary storage of waste metallic mercury, which, by analogy, would be a relevant reference for the development of guidelines on the environmentally sound interim storage of mercury, other than waste mercury. These criteria

are contained in Council Directive 2011/97/EU of 5 December 2011 amending Directive 1999/31/EC as regards specific criteria for the storage of metallic mercury considered as waste. It is available at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1426155112295&uri=CELEX:32011L0097

The latest consolidated version of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste Directive incorporating those criteria for temporary storage is available at:

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01999L0031-20111213&qid=1426155680779&from=EN

- Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) covers environmentally sound management of WEEE and in its Annex VII includes requirements on the separation of certain mercury containing components. It is available at:

http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1426155943783&uri=CELEX:32012L0019

Annex 2 contains information on mercury concentration thresholds used by certain EU Member States for soil characterisation, which may be of relevance for defining thresholds for mercury waste thresholds.

4. Article 22 – Effectiveness Evaluation

In its note of 1 December 2014, UNEP has asked for the information on the availability of monitoring data.

Under Directive 2004/107/EC of the European Parliament and the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air, mercury is monitored by EU Member States. The reported information is available at:

http://www.eea.europa.eu/data-and-maps/data/airbase-the-european-air-quality-database-8

Information on water monitoring reported under Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive), is available at:

http://www.eea.europa.eu/themes/water/status-and-monitoring/monitoring-of-waters/introduction-and-overview-of-monitoring-activities

Information on mercury releases held on the European-PRTR under EU Regulation 166/2006 may also be of relevance. It is available at:

http://prtr.ec.europa.eu/

Monitoring information made available by EU Member States is contained in Annex 3.

Annex 1: Information from Sweden on mercury containing waste

Swedish exemption values for reuse of waste material in construction work[1]

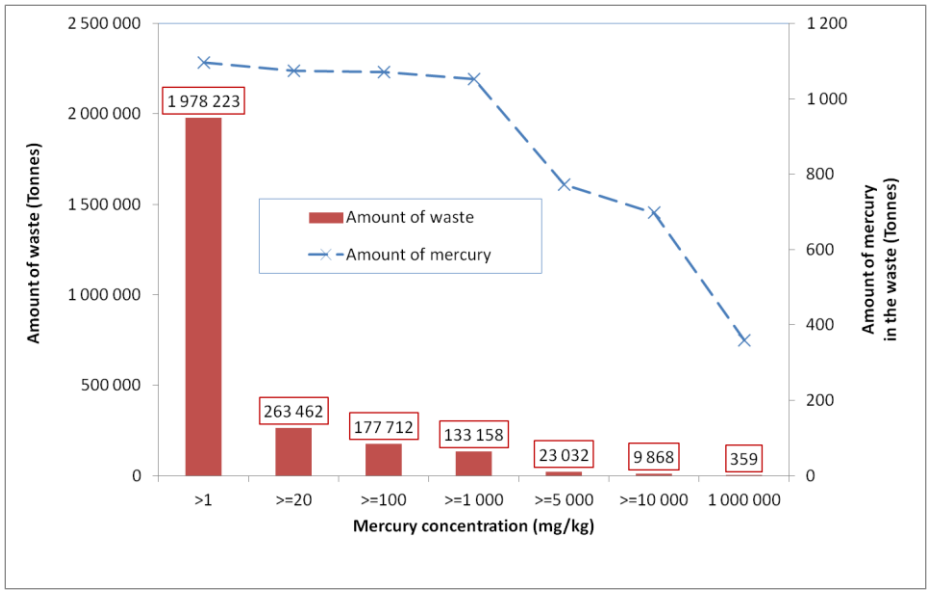
- Similar to the methodology used to define generic guideline values for soil. Classification of the risks for contaminant dispersion based on leach tests.
- Three classes of materials defined (here, considering only the concentration of mercury):
    - Wastes with concentrations above an upper threshold concentration that may not be reused for construction purposes (mercury > 1,8 mg/kg)
    - Wastes with concentrations between an upper and a lower threshold value that may be reused for construction purposes in cover layers in ESM disposal facilities (mercury concentrations between 0,1 and 1,8 mg/kg)
    - Wastes below the lower threshold value (exemption value) that may be used for other construction work (mercury concentrations below 0,1 mg/kg) and without any legal restrictions at all.

Illustration to the diversity of Swedish mercury waste

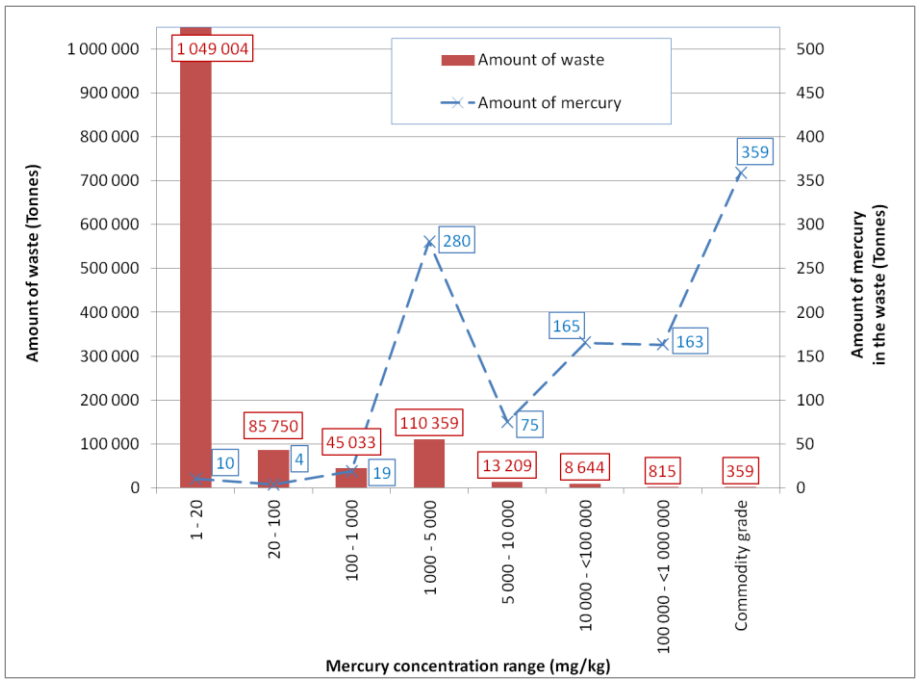
When expanding the scope from commodity grade mercury to different waste types with lower concentrations of mercury the amount of waste to be treated and disposed increases dramatically. Hence, the need to provide disposal capacity may soon become a critical issue. As an example, the Swedish data show that for a concentration limit of 1 % mercury (10 000 mg/kg), the amount would equal ~697 tonnes of mercury contained in ~9 800 tonnes of waste (modified from SEPA 2003[2]). If on the other hand a threshold value of 0,5 % mercury (5000 mg/kg) is applied, the amount would equal ~772 tonnes of mercury in ~23 000 tonnes of waste; and for a threshold value of 0,1 % mercury (1000 mg/kg) the corresponding amounts are 1052 tonnes of mercury in 133 000 tonnes of waste. The numbers are presented in the diagrams below. Figure 2 shows the cumulative amounts of mercury and amount of waste in descending order. The diagram clearly shows that a large fraction of the mercury inventory is contained in the wastes with the highest concentrations. About 97 % of the mercury is found in wastes with a mercury concentration of 1000 mg/kg or higher. From the second diagram it is clear that wastes with a mercury concentration in the range 1000-5000 mg/kg constitutes a significant source of mercury (280 tonnes). This observation supports the above suggested threshold limit of 1000 mg/kg for wastes that should be withdrawn from the society by deep geological disposal.

[1] Naturvårdsverket (2010): Återvinning av avfall i anläggningsarbeten, NV Handbok 2012:1

[2] SEPA (2003): A Safe Mercury Repository, English translation of the Swedish Government Official Report 2001:58 produced by the Swedish Environmental Protection Agency. Report 8105.



Inventory of Swedish mercury waste (modified from SEPA 1997[3]). The diagram shows cumulative amounts in descending order.



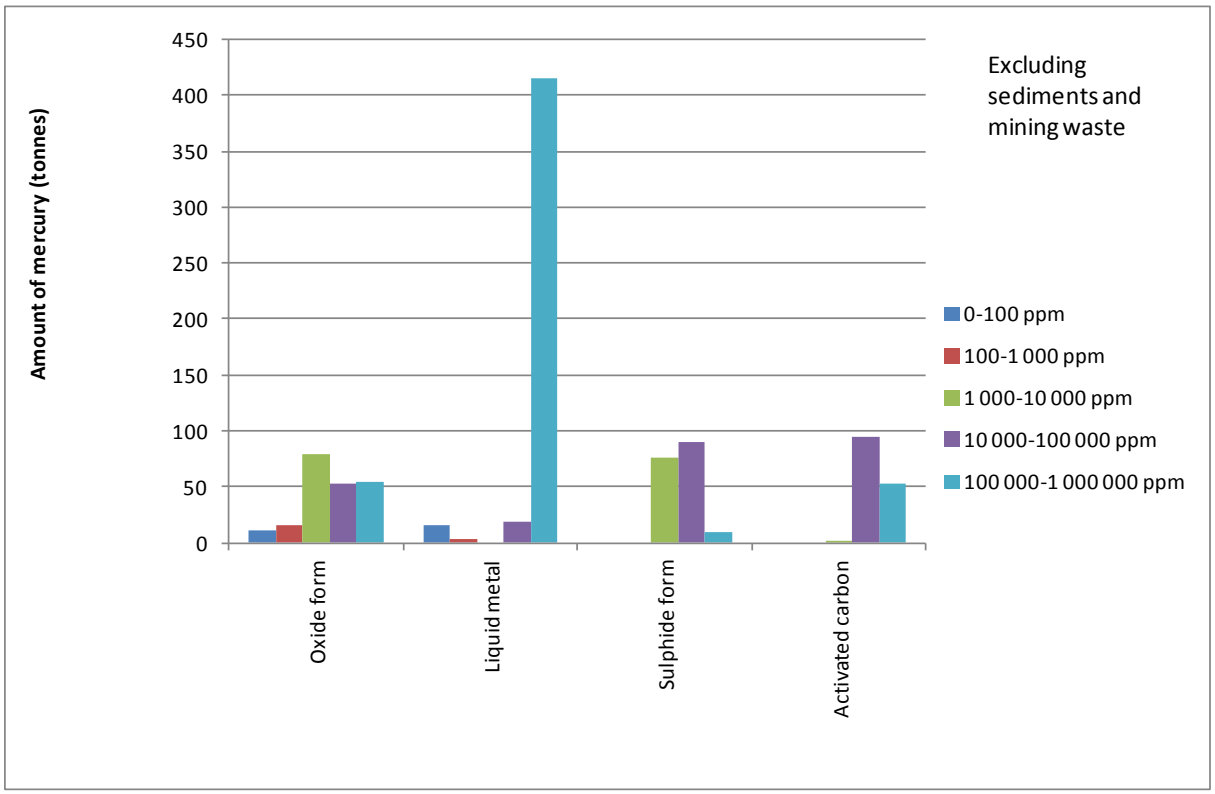
Inventory of Swedish mercury waste (modified from SEPA 1997). The diagram shows the amounts within specific mercury concentration ranges.

[3] SEPA (1997): Final disposal of mercury – Mercury containing waste in Sweden – Inventory, characterization and prioritizing. Karin Pers, Lars Gunnar Karlsson, Lars Olof Höglund, Kemakta Konsult AB, report to Swedish Environmental Protection Agency (SEPA) Rapport 4768 (in Swedish).

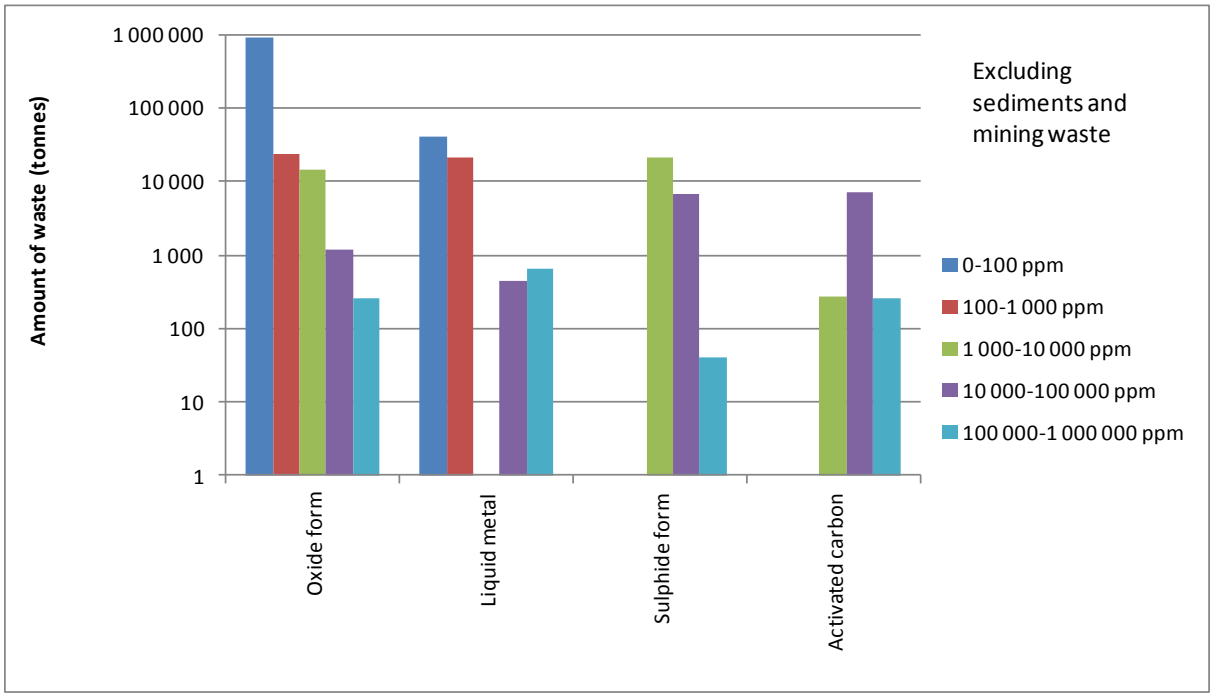
The Swedish inventory of mercury – a complex mix of different products and waste streams

The mercury content of the different mercury sources are of importance for the management and associated costs of the mercury. In general, the management of high grade mercury is comparatively simple and straightforward compared to the management of wastes containing a medium grade of mercury. Efficient technique is available on the market and the costs are reasonable.

However, mercury wastes occur in many different forms, ranging from pure mercury to waste forms where mercury is present in only trace amounts. In particular, the low grade mercury wastes may constitute very large amounts of waste. Consequently, the costs for ESM may be significant. In Figures 4 and 5 some data from the Swedish inventory illustrates this complexity.



The distribution of mercury amounts between different chemical forms of mercury in wastes with different mercury concentrations.



The amount of waste containing different chemical forms of mercury in wastes with different mercury concentrations.

The chemical form of mercury varies between the different types of mercury waste. The most common forms are:

- Elemental (liquid) mercury (commodity grade >99 % or other high grade formulations where mercury appears in elemental form such as in amalgams and mercury cell chlor-alkali production)
- Oxide form (examples are mercury button cell batteries and various forms of industrial dust and slag, e.g. from smelters)
- Sulphide form (precipitates from water cleaning, sludges from various industrial processes)
- Activated carbon (mercury captured in exhaust gas or water cleaning systems by activated carbon filters)

The different chemical forms calls for different techniques for reprocessing, stabilisation and disposal.

- Elemental mercury can be directly stabilised, e.g. by reaction with sulphur to form mercury sulphide.
- Mercury in amalgamated form and mercury in activated carbon may need an initial reprocessing, usually heating to evaporate the mercury and condensate the mercury vapour

to obtain pure elemental mercury. In a next step the mercury is reacted with sulphur. Depending on its chemical composition, the remaining components of the amalgam/activated carbon may need appropriate handling once the mercury has been removed.

- Mercury in oxide form is usually contained in a complex matrix of other chemical compounds and may call for high temperature incineration in order to chemically transform the mercury from oxide to elemental form and then condensate the mercury vapour. In a next step the mercury is reacted with sulphur. The remaining components of the oxide mercury waste streams may constitute a very complex and often highly toxic mixture that may call for appropriate handling once the mercury has been removed.

- Mercury in sulphide form does not necessarily need further stabilisation before disposal. It should be noted that this type of waste may contain other toxic chemical components than mercury.

Also the risk for market re-entry may vary for the different forms of mercury. Some general clues to this are:

- Commodity grade elemental and amalgamated mercury – risks are obvious and high. There is a need to isolate this fraction from the society, e.g. by deep geological disposal.

- Sulphide form – the mercury is fairly easy to recover by heating the mercury sulphide which thermally decomposes and mercury condensates from the vapour. This applies also to stabilised commodity grade mercury. There is a need to isolate this fraction from the society, e.g. by deep geological disposal.

- Mercury in activated carbon filters – the recovery of mercury may be slightly more difficult but still possible with simple equipment. There is a need to isolate this fraction from the technosphere, e.g. by deep geological disposal.

- Mercury in oxide form – the recovery of mercury from high grade fractions of oxide form may be possible, e.g. from button cell batteries. There is a need to isolate the mercury from this fraction from the society, e.g. by deep geological disposal. However, the mercury in various types of industrial dusts and sludges are judged to be more difficult to recover, in general the mercury concentrations are also lower, making the recovery expensive, hence the risk for market re-entry is judged to be lower.

In Table 1, examples are given on the origin of Swedish mercury waste with different content of mercury. Table 2 presents an overview of other toxic substances that may accompany the mercury, which may require special attention in the management of these wastes. Table 3 presents an overview of possible ESM techniques for the various types or mercury wastes and rough estimates of the associated costs for reprocessing, stabilisation and disposal.

Table 1 Overview of the amount of different Swedish mercury wastes with different mercury contents and different origin (numbers are provisional).

Mercury content	Example of uses/products/waste streams	Total Hg amount in Swedish inventory (tonnes)	Total amount of waste in Swedish inventory (tonnes)	Total volume of waste in Swedish inventory (m^3)	Fraction of total Swedish Hg inventory (% of Hg)	Fraction of total volume in Swedish Hg inventory (% of volume)
Commodity grade (>99%)	Chloralkali Thermometers[4] Manometers Electrical switches	359	359	27	33%	0.002%
10 - 99% (100 000 – 990 000 ppm)	Hg-sludge, button cell batteries[5], amalgam, chemical waste	163	815	136	15%	0.02%
1 – 10% (10 000 – 100 000 ppm)	Low grade dental waste, sludges and gas purification dust from smelters	165	8 700	5 770	15%	0.7%
0.5 - 1% (5 000 – 10 000 ppm)	Dust and sludge from smelters	75	13 200	8 800	7%	1%
0.1 – 0.5% (1 000 – 5 000 ppm)	Alkaline batteries, sulphide sludge, high grade demolition rubble from chloralkali plants	280	110 400	73 600	26%	8%
0.01 -0.1% (100 – 1 000 ppm)	Low grade demolition rubble, metal hydroxide sludge, lime sludge from arsenik manufacturing	19	45 000	30 000	1.7%	3.4%
0.002 – 0.01% (20 – 100 ppm)	Contaminated demolition rubble, sludges from lead manufacturing, contaminated soil	4	86 000	58 000	0.3%	6.5%

[4] Although present in pure, elemental form, the mercury content is low (on the order of a few percent by weight) in many consumer products such as thermometers, manometers, electrical switches etc.

[5] Button cell batteries may also be present in many consumer products such as toys, clocks, small electronic equipment etc.

0.000 1 – 0.002% (1 – 20 ppm)	Other batteries, dredged material, lead slags, ashes and dust from smelters	10	1 050 000	700 000	0.9%	80%

Table 2 Examples of the origin of Swedish mercury wastes with different mercury contents, expected content of other hazardous substances in these wastes and an indication of the risk for the corresponding mercury re-entering the market if handled wrongly.

Mercury content	Example of uses/products/waste streams	Other hazardous substances in the waste	Risk for mercury re-entering the market if handled irresponsible
Commodity grade (>99%)	Chloralkali Thermometers, Manometers, Electrical switches	None	Obvious
10 - 99% (100 000 – 990 000 ppm)	Hg-sludge, button cell batteries, amalgam, chemical waste	Mainly metals, e.g. silver, zinc, tin	Very high, heating the waste enables extraction of mercury.
1 – 10% (10 000 – 100 000 ppm)	Low grade dental waste, sludges and gas purification dust from smelters	May be very complex, e.g. arsenic, cadmium, lead, antimony, bismut	Moderate, likely to be a slightly more complex process to extract the mercury.
0.5 - 1% (5 000 – 10 000 ppm)	Dust and sludge from smelters	May be very complex, e.g. arsenic, cadmium, lead, antimony, bismut	Moderate to low, likely to be a complex process, involving also toxic risks due to other substances in the waste.
0.1 – 0.5% (1 000 – 5 000 ppm)	Alkaline batteries, sulphide sludge, high grade demolition rubble from chloralkali plants	Other metals, e.g. zinc, cadmium. May be contaminated by dioxins[6] and PAH[7]s	Fairly high for batteries / may be heated to extract mercury. Low for other types / involving possible toxic risks due to other substances in the waste.
0.01 -0.1% (100 – 1 000 ppm)	Low grade demolition rubble, metal hydroxide sludge, lime sludge from arsenik manufacturing	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony	Low, significant difficulties to extract mercury / involving possible toxic risks due to other substances in the waste.
0.002 – 0.01% (20 – 100 ppm)	Contaminated demolition rubble, sludges from lead manufacturing, contaminated soil	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony. PAHs	Very low.

[6] Dioxines refer to a group of chlorinated dibenso dioxins and dibenso furans. These are among the most toxic substances known.

[7] PAH refer to the group of polycyclic aromatic hydrocarbons

0.000 1 – 0.002% (1 – 20 ppm)	Other batteries, dredged material, lead slags, ashes and dust from smelters	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony. PAHs	Very low.

Table 3 Overview of possible ESM techniques for the various types or mercury wastes and rough estimates of the associated costs for reprocessing, stabilisation and disposal.

Mercury content	Example of uses/products/waste streams	Other hazardous substances in the waste	Example of ESM	Approximate cost of ESM (€/tonne Hg)	Approximate total cost of ESM (M€)
Commodity grade (>99%)	Chloralkali, Thermometers Manometers, Electrical switches	None	Stabilisation + deep geological disposal	2 000[8]	0.72
10 - 99% (100 000 – 990 000 ppm)	Hg-sludge, button cell batteries, amalgam, chemical waste	Mainly metals, e.g. silver, zinc, tin	Stabilisation + deep geological disposal	3 000-10 000[9]	0.5-1.7
1 – 10% (10 000 – 100 000 ppm)	Low grade dental waste, sludges and gas purification dust from smelters	May be very complex, e.g. arsenic, cadmium, lead, antimony, bismuth	Distillation/Incineration + condensation/absorption + stabilisation + deep geological disposal Direct physical/chemical stabilisation + deep geological disposal	100 000 – 150 000[10] 18 000 – 30 000[11]	20 – 30 3 – 5
0.5 - 1% (5 000 – 10 000 ppm)	Dust and sludge from smelters	May be very complex, e.g. arsenic, cadmium, lead, antimony, bismuth	Direct physical/chemical stabilisation + deep geological disposal	60 000 – 100 000[12]	5 – 7
0.1 – 0.5% (1 000 – 5 000 ppm)	Alkaline batteries, sulphide sludge, high grade demolition rubble from chloralkali plants	Other metals, e.g. zinc, cadmium. May be contaminated by dioxins and PAHs	Distillation/Incineration + condensation/absorption + stabilisation + deep geological disposal Direct physical/chemical stabilisation + surface or near-surface geological disposal	100 000 - 150 000 45 000 – 90 000[13]	30 – 50 12 - 25
0.01 -0.1% (100 – 1 000 ppm)	Low grade demolition rubble, metal hydroxide sludge, lime sludge from arsenic	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony	Direct physical/chemical stabilisation + surface or near-surface geological disposal	Costs should be allocated to all contaminants	6 – 12

[8] Assuming market prices for Hg stabilisation and deep disposal in 2010

[9] Assuming additional cost for distillation&condensation + costs for Hg stabilisation and deep disposal

[10] Assuming costs for reprocessing of Swedish battery waste with sorting, incineration and distillation + costs for Hg stabilisation and deep disposal

[11] Assuming 3000-5000 SEK/tonne of waste ➔ 3000*8700 tonnes/8.8 SEK/€ / 165 tonnes Hg = 18 000 €/tonne Hg

[12] Assuming 3000-5000 SEK/tonne of waste ➔ 3000*13200 tonnes/8.8 SEK/€ / 75 tonnes Hg = 60 000 €/tonne Hg

[13] Assuming 1000-2000 SEK/tonne of waste ➔ 1500 SEK/tonne * 110 000 tonnes/8.8 SEK/€ / 280 tonnes Hg = 67 000 €/tonne Hg

	manufacturing				
0.002 – 0.01% (20 – 100 ppm)	Contaminated demolition rubble, sludges from lead manufacturing, contaminated soil	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony. PAHs	Surface or near-surface geological disposal (+ possibly chemical stabilisation)	Costs should be allocated to all contaminants	10 - 20
0.000 1 – 0.002% (1 – 20 ppm)	Other batteries, dredged material, lead slags, ashes and dust from smelters	Other metals, e.g. zinc, cadmium, copper, lead, arsenic, antimony. PAHs	Surface or near-surface geological disposal	Costs should be allocated to all contaminants	100-200

Annex 2: Mercury concentrations set by EU Member States for soil

2. Bulgaria

Executive Environment Agency (ExEA) is a subsidiary body to the Ministry of Environment and Water to carry out management, coordination and information functions as regards monitoring in Bulgaria. It designs and manages the *National System for Environmental Monitoring* for monitoring and information on the state of environmental components and factors on the complete territory of the country.

ExEA has established *National network for soil monitoring*. Mercury is observed in 397 points, which are located throughout the country and are part of the National Network for soil monitoring. Soil samples are taken from topsoil depth of 0-20/0-10 depending on how the land is used (arable land or meadow). Data shall be taken each year from 1/3 of the points and full sampling (in the 397 points) is performed every fifth year. Data are available for the period 2005-2014.

Applicable legislation:

• *Ordinance on the way of recovery of sludge from wastewater treatment by their use in agriculture* (adopted by Decree № 339/14.12.2004, amend. SG.112/23.12.2004, Amend. SG. No 29/8.04.2011).

This ordinance govern the procedure and manner of utilization of sludge from sewage treatment plants and wastewater facilities through its use in agriculture requirements to be met sludge to ensure that it will not have harmful effects on human health and the environment including the soil, and the procedure for reporting recovered sludge.

Limit concentrations (LC) of heavy metals in the soil

pH[1]	LC mg/kg dry substance
	mercury
6 – 7.4	1
>7.4	1

Note: [1]Active reaction (pH) of the soil is determined in the suspension at a ratio of soil: water 1: 5, and during the reaction with water - 5 hours.

Limit concentrations (LC) of heavy metals and persistent organic pollutants in sludge for use in agriculture

Indicators	LC mg/kg dry substance
mercury	16

• *Ordinance № 3/2008 norms of permissible contents of harmful substances in soils (SG 71/12 August 2008).*

Norms of permissible concentrations of heavy metals and metalloids in soils (defined as overall content in mg/kg dry soil after extraction with aqua regia)

Soil	Heavy metals and metalloids (HMM)
	Hg
Standard soil with pH 6.0	
pH (H_2O) ≤ 6.0	0.03
1. Loamy sand and sandy soils	0.05
2. Sandy loams	0.07
3. Loam	0.08
4. Soils with naturally high levels of HMM	Be established, if necessary, on the basis of local background values.

Note: At a pH < 6.0 precautionary values for soils with sandy-clay mechanical structure apply to clay soils, and values for sandy loam and sandy soils - to soil with sandy clay mechanical structure.

Norms/Standards for maximum permissible concentrations and intervention concentrations of heavy metals and metalloids in soils of arable land and permanent grassland (defined as total content in mg/kg dry soil extraction with aqua regia)

Metals	pH (H_2O)(1)	Maximum permissible concentrations			Interventional concentrations
		Arable land	Permanent grassland	Correction factor (CF) (2)	
Mercury		1.5	1.5 mg/kg dry soil	1.2	10

Notes:
(1) pH is defined at soil:water ratio 1:5 and reaction time with water 5 h.
(2) CF – correction factor is applied to soils having clay (particle size < 0.01 mm) > 60% arable layer (depth 0-20 cm) and/or horizon A (0-10 cm) of uncultivated land by multiplying the values of the maximum permissive concentrations of arable land and permanent grassland with CF. Data content of physical clay taken from soil maps and essays or by testing location.

Standards for maximum permissible concentrations and intervention concentrations of heavy metals and metalloids in soils of settlements, parks, sports grounds and industrial/production sites (defined as total content in mg/kg dry soil extraction with aqua regia)

Metals	Settlements, parks, sports grounds		Industrial/production sites	
	MPC	IC	MPC	IC
Mercury	8	10	10	40

MPC – maximum permissible concentrations
IC – interventional concentrations

2. Sweden

Generic guideline values have been developed in Sweden for contaminated soils. It is believed that the basic considerations made in the development of these guideline values may to some extent be applicable also to support the handling of different waste materials, e.g. when considering defining threshold concentrations of mercury that would require different types of ESM. The Swedish guideline values for soil are based on an analysis of risks associated with generic multi-path exposure scenarios and toxicological data. Some brief characteristics of the tools developed to calculate the generic Swedish guideline values for soil are:

- Risk based for basic exposure scenario
- Accounts for natural background concentrations
- Accounts for other sources of mercury exposure
- Accounts for both health risks and environmental risks

To account for the contribution to the total exposure from different sources of a particular contaminant, a single source may only contribute with a fraction of the maximum permissible exposure. This has been interpreted as an allowed maximum 20 - 50 % contribution of the total exposure from the contaminated soil (depends on the specific contaminant, e.g. 20 % is used for Hg in Sweden). Although the derived guideline values for soil may perhaps not be applicable per se, they can still serve as a background information in the process to define appropriate threshold concentrations for mercury waste. The specific values are therefore included below with some comments.

- Integrated generic guideline value of mercury for sensitive land-use is 0,25 mg/kg. (In areas and soil where the future land-use is intended to be “sensitive land-use”, mercury levels may not exceed 0,25 mg/kg.) The contribution from protection of underlying risks:
    - Protection of human health (0,27 mg/kg)
    - Protection of soil environment (5 mg/kg)
    - Groundwater protection (2,2 mg/kg)

  - Surface water protection (6 mg/kg)
  - Background concentration (0,1 mg/kg)

- Integrated generic guideline value of mercury for less sensitive land-use is 2,5 mg/kg. (In areas and soil where the future land-use is intended to be "less sensitive land-use", mercury levels may not exceed 2,5 mg/kg.) The contribution from protection of underlying risks:
  - Protection of human health (2,4 mg/kg)
  - Protection of soil environment (10 mg/kg)
  - Groundwater protection (7 mg/kg)
  - Surface water protection (6 mg/kg)

Background concentration (0,1 mg/kg)

3. United Kingdom

UK Soil Guideline Value information for mercury in soil: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291227/scho0309bpqn-e-e.pdf

Underlying toxicological data: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313877/scho0309bpqg-e-e.pdf

Annex 3: Monitoring information made available by some EU Member States

1. Germany

Germany holds one of 13 Environmental Specimen Banks (ESB) in Europe where environmental and human samples are sampled, processed and archived in a highly standardized manner. The German ESB started operating in the 1980s and today time series are available for over 30 years. More than 500.000 subsamples are available from marine, terrestrial and limnic sampling sites in a range of German ecosystems. Mercury is one of the chemical parameters that is routinely measured in the samples. Long term trends are available for suspended particulate matter, mussel, fish, bird egg, tree samples, soil, and terrestrial animals. More information on the concept of the German ESB including results for mercury measurements in environmental and human samples is available at www.umweltprobenbank.de/en. An overview on the worldwide ESB community is provided at www.inter-esb.org.

In particular, the Federal Environment Agency holds the following mercury monitoring data:

Human biomonitoring

In Germany, information on human biomonitoring data for mercury is available through the following programmes: COPHES/DEMOCOPHES[14], German Environmental Survey (GerES[15]) and the Environmental Specimen Bank (ESB[16]). All studies analyzed total mercury content.

COPHES/DEMOCOPHES

Hg in scalp hair was surveyed in 2011 in the context of the COPHES/DEMOCOPHES project in Germany. In 17 European countries, mercury in hair and cotinine, phthalate metabolites and cadmium in urine was measured of totally 1844 children (5-11 years) and their mothers. Specimens were collected over a 5 month period in 2011-2012. In Germany 120 mother-child pairs participated (60 in Bochum and 60 in Higher Sauerland District in North Rhine Westphalia).

GerES

Mercury in human whole blood and morning urine samples was analyzed within the German Environmental Survey (GerES). So far, four GerES studies have been carried out. All GerES studies are

[14] Den Hond et al (2014): First Steps toward Harmonized Human Biomonitoring in Europe: Demonstration Project to Perform Human Biomonitoring on a European Scale. Environ Health Perspect. 2014 Dec 11. [Epub ahead of print]

[15] www.umweltbundesamt.de/en/topics/health/assessing-environmentally-related-health-risks/german-environmental-survey-geres

Schulz et al (2007): Twenty years of the German Environmental Survey (GerES): Human biomonitoring – Temporal and spatial (West Germany/East Germany) differences in population exposure. Int J Hyg Environ Health, 210(3-4):271-97, DOI:10.1016/j.ijheh.2007.01.034

[16] www.umweltprobenbank.de

designed cross-sectional and were built on population-representative samples in specific age-ranges. GerES V is currently conducted and will yield current human biomonitoring data on mercury for 3 – 17-year-old Germans by 2017/2018.

German ESB

In the frame of the German Environmental specimen bank (ESB) young adults (aged 20-29 years, mainly students) voluntary donate blood and 24-hour-urine. Sampling is performed every year in four German cities (Muenster, Halle/Saale, Greifswald, and Ulm) and aliquots of whole blood, plasma, and urine are long-term-stored on liquid nitrogen. Since 1995 urine has been analyzed regularly for mercury; between 2001 and 2010 Hg was measured in whole blood, too.

Water

In the Germany, information on mercury monitoring data in rivers and lakes are available at:

http://www.eea.europa.eu/data-and-maps/data/waterbase-rivers-10

http://had.bafg.de:8080/iksr-zt/

http://datenbank.fgg-weser.de/weserdatenbank/index.php

http://www.elbe-datenportal.de/FisFggElbe/content/start/BesucherUnbekannt.action

Air

Results of the measurement for the following parameters

- Total Gaseous Mercury in ambient air (TGM)
- Mercury deposition (including Hg-concentration in precipitation)

in German **rural background areas** in the context of

- EU Directive 2004/107/EC[17]
- UN/ECE EMEP[18]
- OSPAR/CAMP[19] and HELCOM[20]

following harmonised or standardised measurement methods

[17] Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

[18] United Nations Economic Commission for Europe (UN ECE) / European Monitoring and Evaluation Programme (EMEP)

[19] The Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR) / The Comprehensive Atmospheric Monitoring Programme (CAMP)

[20] Helsinki Commission (HELCOM)

- DIN EN 15852 (Ambient air quality - Standard method for the determination of total gaseous mercury)
- DIN EN 15853 (Ambient air quality - Standard method for the determination of mercury deposition)
- EMEP Manual (Chapter 3.12 Sampling of mercury in precipitation and air; Chapter 4.18 Analysis of mercury in precipitation and air)
- CAMP Monitoring Guidance (JAMP Guidelines for the sampling and analysis of mercury in air and precipitation)

are available in international databases, such as

- EBAS
- AirBase (includes data from urban stations).

The Air Monitoring Network of the Federal Environment Agency (UBA) continuously collects the following measurements:

- TGM: Measurements at 4 UBA-Stations (Waldhof, Schauinsland, Schmücke, Zingst)

Hg-Deposition: Measurements at 5 UBA-Stations (Westerland, Waldhof, Schauinsland

Summary of information on human biomonitoring data

Study	Period	Study group (age range)	Sample size	Matrix	Representative
COPHES/DEMOCOPHES[21]					
	2011/2012	mother-child (5-11) pairs	1844	hair	European
	2011	mother-child (5-11) pairs	120	hair	Regional
GerES[22]					
I	1985-1986	adults (25-69)	2731	whole blood + morning urine	National
II	1990-1992	adults (25-69)	4021	whole blood +	National

[21] Den Hond et al (2014): First Steps toward Harmonized Human Biomonitoring in Europe: Demonstration Project to Perform Human Biomonitoring on a European Scale. Environ Health Perspect. 2014 Dec 11. [Epub ahead of print]

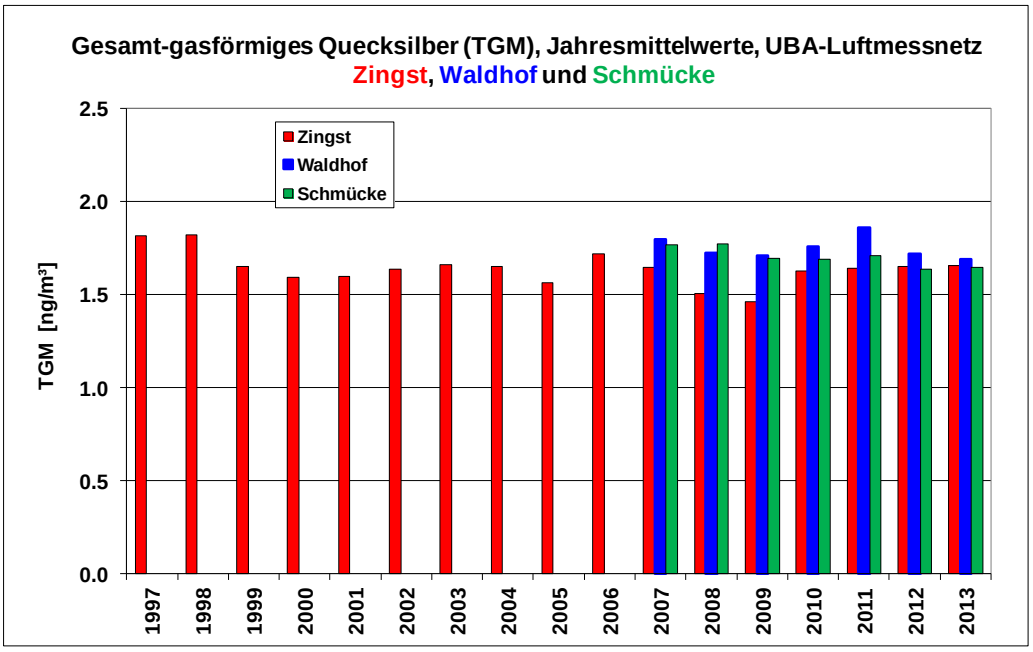
[22] www.umweltbundesamt.de/en/topics/health/assessing-environmentally-related-health-risks/german-environmental-survey-geres

Schulz et al (2007): Twenty years of the German Environmental Survey (GerES): Human biomonitoring – Temporal and spatial (West Germany/East Germany) differences in population exposure. Int J Hyg Environ Health, 210(3-4):271-97, DOI:10.1016/j.ijheh.2007.01.034

		children (6-14)	736	morning urine	
III	1997-1999	adults (18-69)	4822	whole blood + morning urine	National
IV	2003-2006	children (3-14)	1790	whole blood + morning urine	National
German ESB[23]					
	2001-2010	adults (20-29)	~450 per year	whole blood	Regional (4 cities)
	1995-ongoing	adults (20-29)	~500 per year	24h-urine	Regional (4 cities)

Summary of information on the mercury measurements of the Air Monitoring Network of the Federal Environment Agency

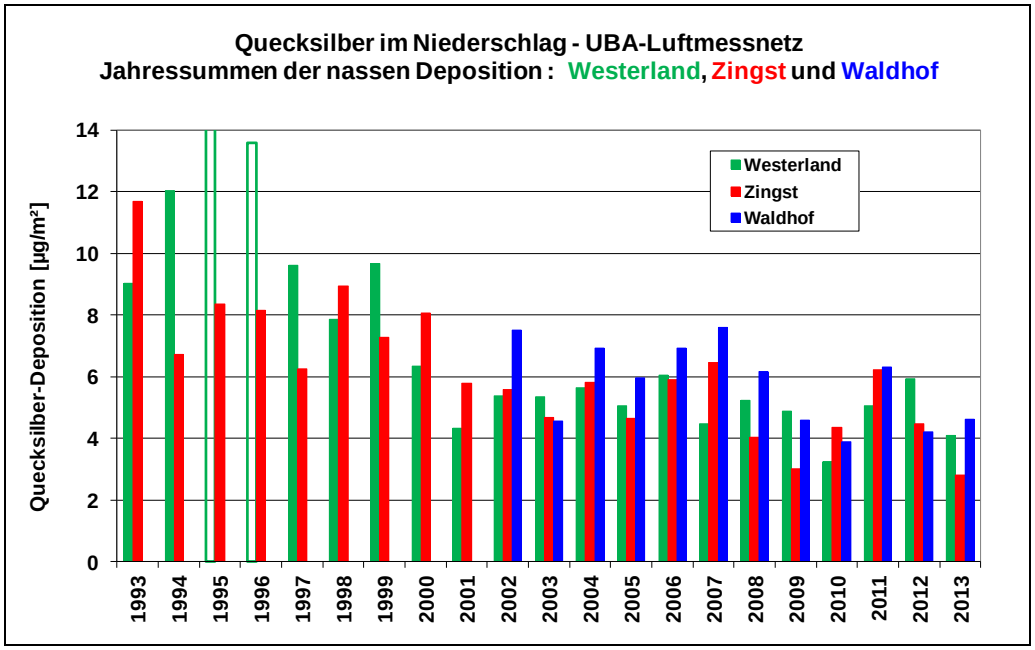
TGM measurements at 3 UBA-Stations (Waldhof, Schmücke, Zingst)



Source: Umweltbundesamt, Luftmessnetz (2014)

Hg-Deposition: Measurements at 3 UBA-Stations (Westerland, Waldhof, Zingst)

[23] www.umweltprobenbank.de [English version available]



Source: Umweltbundesamt, Luftmessnetz (2014)

2. Italy

Mercury Monitoring in ambient air, in water and in biota:

The Italian National Research Council - Institute of Atmospheric Pollution Research (CNR-IIA, www.iia.cnr.it), in cooperation with partners and other research and university institutions in the world is coordinating a 5-yr project "*Global Mercury Observation System - GMOS*, (www.gmos.eu)", funded by the European Union's Seventh Programme for research, technological development and demonstration, which is aimed to build a global observing system of mercury contamination. GMOS started in November 2010 and will end in 2015.

GMOS is aimed to build a worldwide observation system by integrating ground-based monitoring sites, ad-hoc oceanographic cruise campaigns and lower stratospheric and tropospheric observations (UTLS), which can provide concentration data for mercury and its compounds in air and precipitation, as well as in marine ecosystems.

GMOS has established a strong cooperation with on-going regional programs in US, Canada, Japan and China as well as with international programs i.e., UNEP, UNECE-TF HTAP, GEO/GEOSS. GMOS is involving nowadays more than forty institutions from Europe, North and South America, Asia and Africa.

Major recent GMOS outcomes include:

- Ground-based observational network has been established worldwide by including > 40 sites, with > 10 Site established in the Southern Hemisphere;
- Strong-cooperation with on-going regional programmes has been established to assure the involvement of countries in GMOS;

- Oceanographic campaigns have been carried out to better understand the cycle of mercury species in the ocean and between ocean and the atmosphere;
- Knowledge gaps on the vertical distribution of mercury species in the troposphere and lower stratosphere (UTLS) has been partly filled through aircraft intercontinental and regional aircraft campaigns;
- A Task Force on regional and global scale modeling has been established by involving major modelling groups worldwide, models will be validated for different scenarios of emission reduction strategies.
- A centralized repository archive and advanced web services has been developed (GMOS Spatial Data Infrastructure –SDI) in order to assure a timely and up-to-date sharing of information on mercury in the environment, including humans.

At the hub of the GMOS project is the Spatial Data Infrastructure (SDI). The SDI performs multiple roles, it is directly connected to ground based monitoring sites to collect (and store) real time mercury measurement data, it also gathers information on measurement instrument performance to enhance the data QA/QC, and is configured to provide alerts and reminders site operators in cases of both urgent routine instrument maintenance.

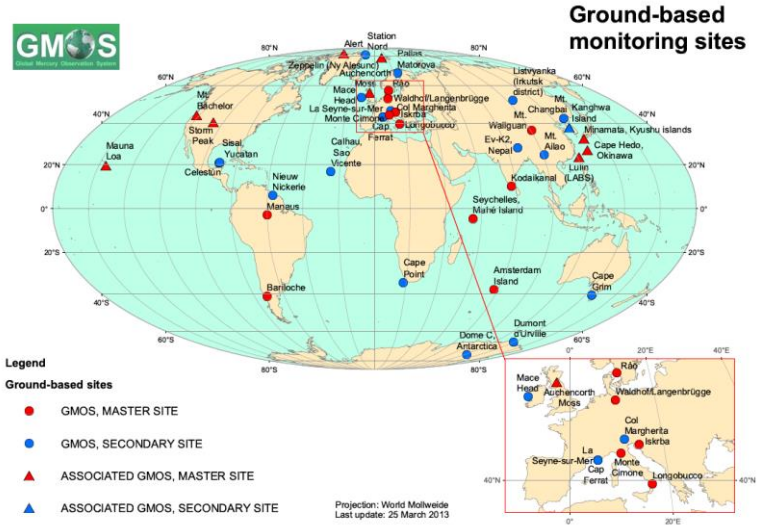
The SDI also serves as a repository for mercury emission databases, historical mercury measurement data, and also stores modelling output from the regional and global modelling initiatives within the GMOS project. The SDI is also the means by which data can be accessed using web services, visualised using mapping and graphical tools, and analysed using statistical software.

Duration	November 2010 – October 2015
Budget	9,000,000 Euro
Countries involved	20 including EU-Member States and International Cooperation Partner Countries
Lead partner	CNR-IIA (Italy)
Participants	NILU (Norway), IVL (Sweden), IJS (Slovenia), INIBIOMA (Argentina), IFREMER (France), INTEC (Suriname), CUT (Sweden), UNIVE (Italy), AU (Denmark), HZG (Germany), UJF (France), UoY (UK), IGCAS (China), APLBA (Brazil), MSC-E (Russia), MPG (Germany), JRC (Belgium), IOM-AUC (India), SAWS (South Africa), INMG (Capo Verde), IAPS (Latvia), SPBSU (Russia)
Associated partners *	BRI (USA), CzechGlobe (Czech Republic), DRI-SPL (USA), Ev-K2-CNR (Italy & Nepal), NIES (Japan), LGET-OMP (France), SBS (Seychelles), SETAC, Taiwan EPA (Taiwan), NCU (Taiwan), UoW-B (USA), USEPA-ORD (USA)
Monitoring stations *	39 of which 28 managed by GMOS partners
Cruise campaigns *	3
Tropospheric campaigns *	309 of which 299 global and 10 regional
Databases *	5 including historical land-based sites, oceanographic campaigns, tropospheric campaigns emissions, marine biota & near-real time raw data.

** Updated to February 2014*

The GMOS historical database is a collection from past (and in some cases continuing) monitoring programs, campaign based measurements and a number of individual monitoring/measurement initiatives. The historical data (collected before the GMOS project) has been harmonised as far as was feasible possible to render comparison with other measurements possible.

The on-going GMOS network consists of 28 monitoring stations which are part of the Consortium and 11 monitoring stations managed by external partners.



The GMOS Ground-based program will complement its efforts by integrating the monitoring sites that are part of other existing atmospheric monitoring programs such as the World Meteorological Organisation's Global Atmosphere Watch program (GAW), US and Canadian programs (i.e., CAMNet), the UN-ECE's European Monitoring and Evaluation Programme (EMEP) and the Arctic Monitoring and Assessment Program (AMAP).

Mercury in the air is measured as three operationally defined forms:

- Gaseous Elemental Mercury (GEM)
- Reactive Gaseous or Gaseous Oxidized Mercury (RGM or GOM),
- and Particle-Bound Mercury (PBM).

Where it is not possible to perform speciation, atmospheric mercury is measured as:

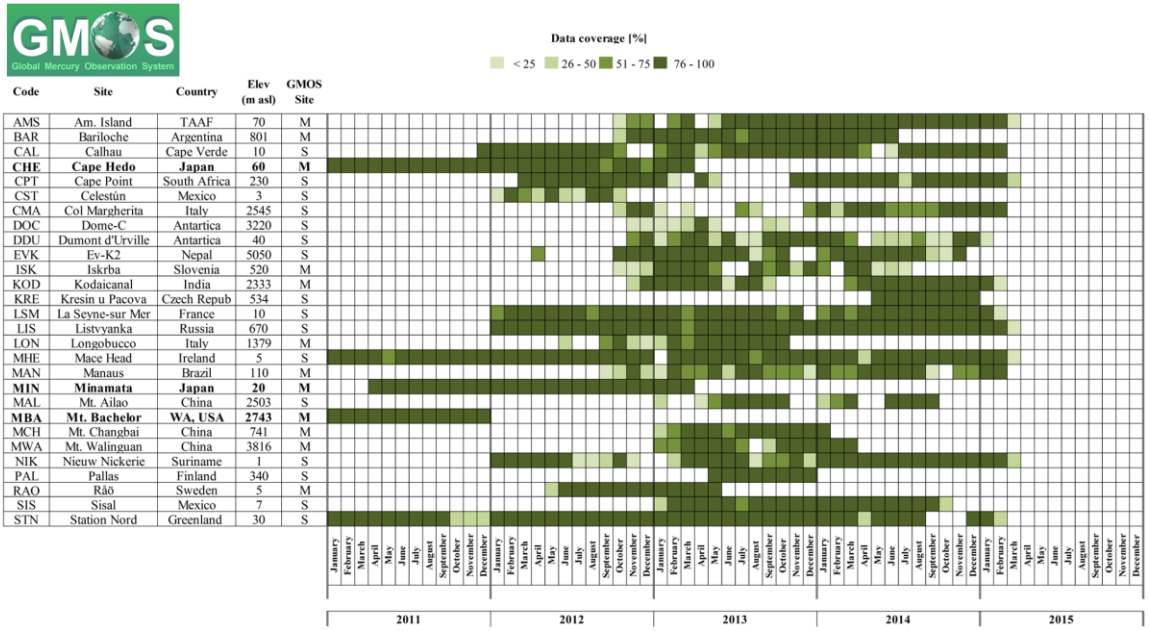
- Total Gaseous Mercury (TGM) consisting in the sum of GEM and GOM

Within the GMOS network, stations are classified as Master (M) if they provide mercury speciation measurements, Secondary (S) when they provide total mercury concentrations.

Almost all stations are providing in near-real time raw data that are archived in the GMOS SDI as they are for further Quality Assurance and Quality Control (QA/QC) analysis. In this respect, a great effort has been made to implement a centralized system, named GMOS-Data Quality Management

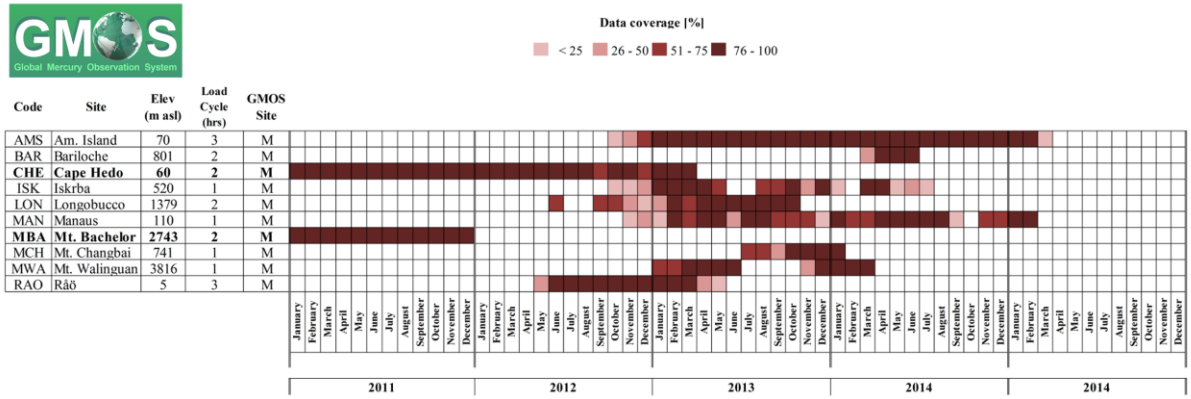
(G-DQM) able to ensure, control and report the quality of mercury datasets coming from the GMOS network. Based on a web application and by using automated quality checks, the system is able to fulfil the demands of processing monitoring data in near real-time, rapidly identifying and ideally preventing production of non-representative measurements, enhancing data comparability and reducing delays in releasing data. In such a way the GMOS project will be able to secure reliable and useful globally-based data for both the scientific and policy communities.

The following table shows the coverage, on monthly basis, of GEM/TGM raw data collected at the on-going GMOS stations (last update: 23 March 2015):



Code	Site	Country	Elev (m asl)	GMOS Site
AMS	Am. Island	TAAF	70	M
BAR	Bariloche	Argentina	801	M
CAL	Calhau	Cape Verde	10	S
CHE	**Cape Hedo**	**Japan**	**60**	**M**
CPT	Cape Point	South Africa	230	S
CST	Celestún	Mexico	3	S
CMA	Col Margherita	Italy	2545	S
DOC	Dome-C	Antartica	3220	S
DDU	Dumont d'Urville	Antartica	40	S
EVK	Ev-K2	Nepal	5050	S
ISK	Iskrba	Slovenia	520	M
KOD	Kodaicanal	India	2333	M
KRE	Kresin u Pacova	Czech Repub	534	S
LSM	La Seyne-sur Mer	France	10	S
LIS	Listvyanka	Russia	670	S
LON	Longobucco	Italy	1379	M
MHE	Mace Head	Ireland	5	S
MAN	Manaus	Brazil	110	M
MIN	**Minamata**	**Japan**	**20**	**M**
MAL	Mt. Ailao	China	2503	S
MBA	**Mt. Bachelor**	**WA, USA**	**2743**	**M**
MCH	Mt. Changbai	China	741	M
MWA	Mt. Walinguan	China	3816	M
NIK	Nieuw Nickerie	Suriname	1	S
PAL	Pallas	Finland	340	S
RAO	Råö	Sweden	5	M
SIS	Sisal	Mexico	7	S
STN	Station Nord	Greenland	30	S

The following table shows coverage, on monthly basis, of Gaseous Oxidized Mercury (GOM) and Particle-Bound Mercury (PBM) raw data collected at the on-going GMOS Master stations (last update: 23 March 2015) :



Code	Site	Elev (m asl)	Load Cycle (hrs)	GMOS Site
AMS	Am. Island	70	3	M
BAR	Bariloche	801	2	M
CHE	**Cape Hedo**	**60**	**2**	**M**
ISK	Iskrba	520	1	M
LON	Longobucco	1379	2	M
MAN	Manaus	110	1	M
MBA	**Mt. Bachelor**	**2743**	**2**	**M**
MCH	Mt. Changbai	741	1	M
MWA	Mt. Walinguan	3816	1	M
RAO	Råö	5	3	M

For further information:

- GMOS Home: http://www.gmos.eu/

- GMOS SDI: http://sdi.iia.cnr.it/geoint/publicpage/GMOS/sdi/

3. Finland

Nordic countries have a long tradition in mercury monitoring and assessment in the environment. Monitoring data exists in air and atmospheric deposition (Finnish Meteorological Institute), river waters, small catchments, ground waters and fish (Finnish Environment Institute) and some other wild animals (Finnish Food Safety Authority). Additionally, human health exposure assessments have been made by National Institute for Health and Welfare (e.g. Leino *et al.* 2013). At present, when most domestic industrial emissions are ceased, the major environmental concern regarding anthropogenic emissions of mercury is enrichment of the metal in for example forested ecosystems and the risk of methyl mercury (MeHg) formation and subsequent uptake into the food chain.

Air and deposition

Finnish Meteorological Institute has monitoring data on mercury in bulk deposition from several stations; Virolahti in South-Eastern Finland, Evo and Hyytiälä in Central Finland and Pallas in Northern Finland. More comprehensive measurements of gaseous and particulate mercury in air, are conducted at the station in the Pallas research area in northern Finland by the FMI in cooperation with the Swedish Environmental Research Institute IVL.

Mercury in precipitation has shown that long-range transport from European sources continued to deliver mercury to Nordic ecosystems. The paper by Wängberg et al. (2010) presents the results from the continued and enlargened monitoring of mercury in air and in precipitation. The paper also presents an overview of catchment mercury studies trying to quantify the mass balances of mercury in catchments as well as the effect of environmental characteristic and human activities determining the output fluxes of mercury and methyl mercury (MeHg) from the catchments to receiving surface waters.

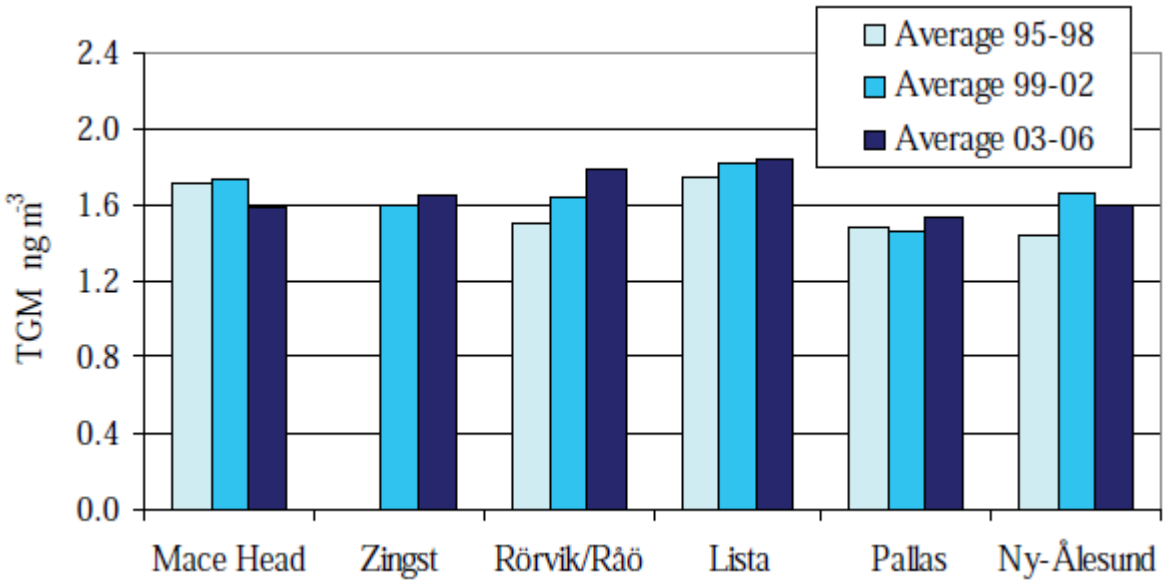


Fig. 1. Changes in total gaseous mercury (TGM) concentrations over time (Wängberg *et al*. 2010). Station locations from left: Ireland, N Germany, S Sweden, S Norway, N Finland, Svalbard (Norway)

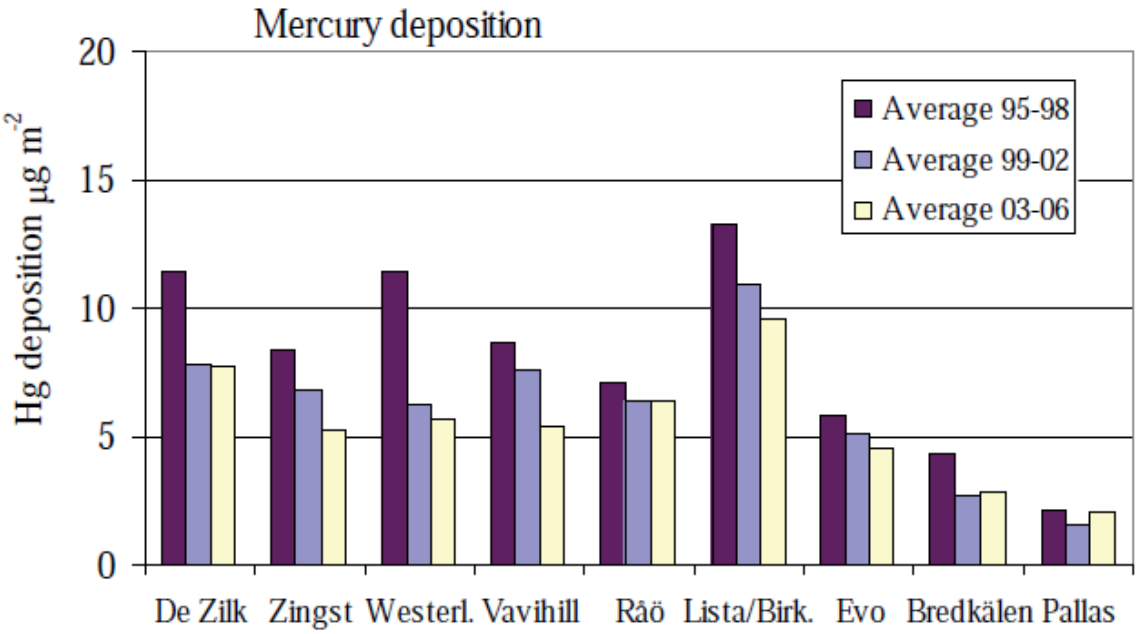


Fig. 2. Four year average mercury deposition values (Wängberg et al. 2010). Station locations from left: Netherlands, NW Germany, NE Germany, S Sweden, S Sweden, S Norway, S Finland, C Sweden, N Finland.

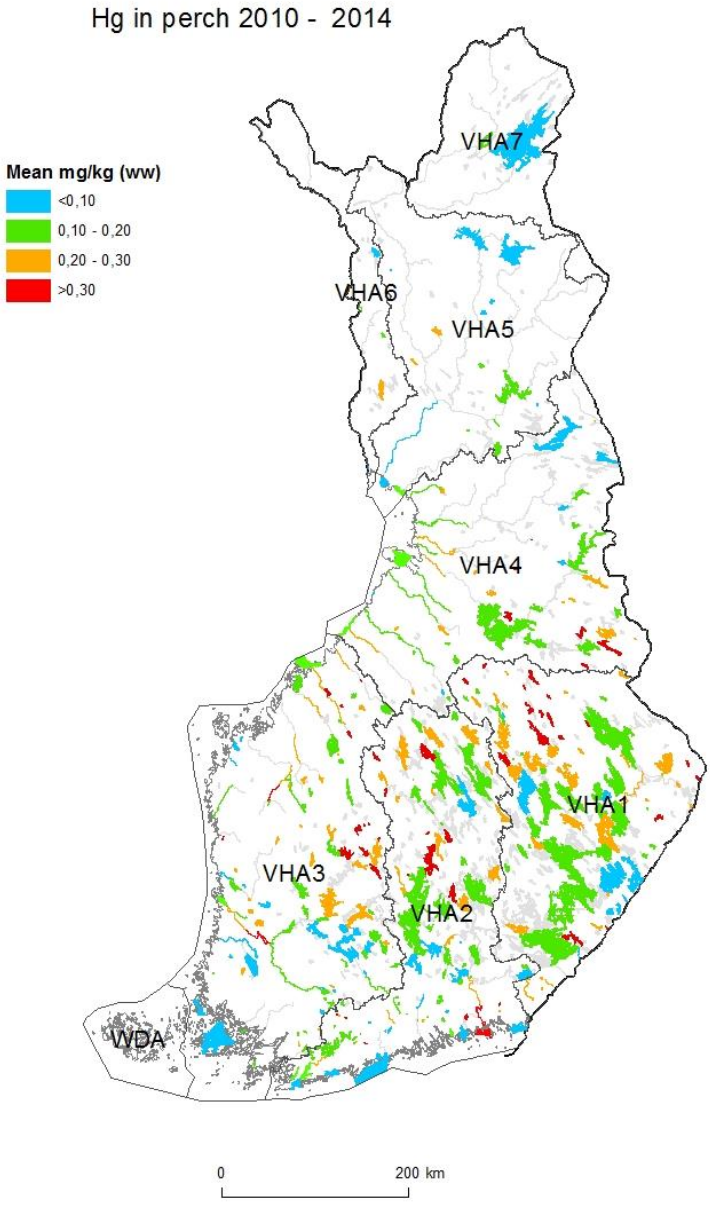
Surface waters

A compilation of surface water measurements of mercury in water phase and fish was performed in the context of defining metal background concentrations and monitoring principles for mercury and other metals for monitoring according to the EU Water Framework Directive (Verta et al. 2010).

The major environmental concern regarding anthropogenic emissions of mercury is enrichment of the metal in for example forested ecosystems and the risk of methyl mercury (MeHg) formation and subsequent uptake into the food chain. Munthe et al. (2007) has provided a comprehensive compilation and assessment of available data on mercury in Fennoscandia with the focus on lake sediments and fish. The main conclusion was that mercury levels in Nordic ecosystems continue to be affected by long-range atmospheric transport, but the geographical patterns of mercury concentrations in both sediments and fish are strongly affected by ecosystem characteristics and by historical pollution. Monitoring data in European perch from 1974 to 2005 in Sweden and Finland has been evaluated by Millet et al. (2012). Temporal trend analyses showed a significant decrease in mercury concentration in perch from Sweden ($p<0.001$) and a possible increase in mercury concentration in perch from Finland ($p<0.001$). No statistically significant geographical trends were seen.

For the second river basin management cycle of WFD, Finland has gathered a comprehensive perch data of nearly 400 studied sites in lakes and rivers (Fig 3, Table 1).

Fig. 3. Mercury concentration in perch 2010-2014 (10 indiv/ location). "VHA" is WFD River basin management area



RBM Areas		Hg concentration in perch (µg/g)		
	N	10 %	Median	90%
1	92	0.10	0.21	0.37

2	116	0.08	0.17	0.35
3	112	0.07	0.17	0.33
4	49	0.08	0.19	0.34
Lapland (5-7)	24	0.06	0.10	0.20

Table 1. Mercury concentration in lakes and rivers in WFD River Basin Management Areas in Finland.

Average mercury concentrations exceeded the EU WFD environmental quality standard (EQS) of 0.02 µg/g wet weight (ww) and is close to the national EQS in Finland of 0.20 – 0.25 µg/g ww (includes background concentration).

Draft chemical status in surface waters: http://paikkatieto.ymparisto.fi/Html5Viewer_2_2/Index.html?configBase=/Geocortex/Essentials/REST/sites/Vesikartta/viewers/Vesikartta/virtualdirectory/Resources/Config/Default

Mercury in water phase is not used for status assessments, which is solely based on fish (perch) data. In the context of HELCOM Baltic Sea Pollution Load Compilation, mercury has been monitored in Finland from 1990's in ca. 15 rivers flowing to the Baltic Sea. Part of the overall analytical data is below limit of detection and/or with high LOQ, therefore restricting trend estimation and source identification on Baltic Sea scale.

HELCOM http://www.helcom.fi/Lists/Publications/BSEP128.pdf

References

Leino O., Karjalainen A.K. & Tuomisto J.T. 2013. Effects of docosahexaenoic acid and methylmercury on child's brain development due to consumption of fish by Finnish mother during pregnancy: A probabilistic modeling approach. *Food and Chemical Toxicology* 54 (2013) 50–58

Miller A., Bignert A., Porvari P., Danielsson S. & Verta M. 2013. Mercury in Perch (Perca fluviatilis) from Sweden and Finland. *Water Air Soil Pollut*: 224:1472

Munthe J., Wängberg I., Rognerud S., Fjeld E., Verta M. Porvari P., Meili M. 2007. Mercury in Nordic ecosystems. IVL-report B1761. The report is available at www.ivl.se

Wängberg I, Aspmo Pfaffhuber K, Berg T, Hakola H, Kyllönen K, Munthe J, Porvari P, Verta M (2010) Atmospheric and catchment mercury concentrations and fluxes in Fennoscandia. Scientific Report TemaNord 2010:594 Nordic Council of Ministers, Copenhagen 2010, ISBN 978-92-893-2162-4

http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A701382&dswid=9426

Verta M., Kauppila T., Londesborough S., Mannio J., Porvari P., Rask M., Vuori K-M. and Vuorinen P.J. 2010. Background levels for metals and monitoring of priority substances in Finnish surface waters – Proposal for the implementation of Directive on Environmental Quality Standards (in Finnish, English summary). *Reports of the Finnish Environment Institute* 12/2010, 45p.

4. Lithuania

In the frame of the Lithuanian State Environmental Monitoring Programme monitoring of mercury monitoring has been carrying out from 1985 (monitoring of mercury in transitional and coastal waters of Baltic sea) and from 1999 (monitoring of mercury in certain environment compartments).

Monitoring of mercury in rivers and lakes

Monitoring of mercury in rivers' water has been carrying out from 1999 (yearly) within the frequency of 4–12 times per year, while in rivers' sediments monitoring was carried out in 2004-2008, 2011, 2013 and 2014 once per year.

Monitoring of mercury in lakes' water was carried out in 2003, 2004, 2008, 2011, 2013 and 2014 within the frequency of 2–6 times per year, while in lake' sediments monitoring was carried out in 2011, 2013 and 2014 once per year.

Year of monitoring	Number of monitoring stations		Frequency of monitoring of mercury (times per year)			
	Rivers	Lakes	Rivers		Lakes	
			water	sediments	water	sediments
1999	17	–	4	–	–	–
2000	18	–	4	–	–	–
2001	22	–	4	–	–	–
2002	24	–	4	–	–	–
2003	21	4	4	–	2	–
2004	18	7	4	1	2	–
2005	51	–	12	1	–	–
2006	25	–	12	1	–	–
2007	18	–	12	1	–	–
2008	22	8	12	1	4	–
2009	19	–	4-12	–	–	–
2010	14	–	4	–	–	–
2011	20	1	12	1	6	1
2012	15	–	4	–	–	–
2013	9	1	12	1	4	1

2014	14	1	12	1	4	1

Monitoring of mercury in transitional and coastal waters of ***Baltic Sea*** has been carrying out permanently since 1985.
Annual monitoring in transitional (Curonian lagoon, 9 station) and coastal and open sea (9 stations) waters started in 1994, with frequency of 1-12 times per year in water, 1-3 times per year in sediments, 1 time per year in biota from 1997.

Monitoring of mercury in ambient air
One background sampling point is installed in Lithuania for the measurements of concentration of mercury in ambient air and of the total deposition of mercury according to requirements of Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. Data are reported to European Commission according to the rules for the reciprocal exchange of information (EU EoI).

Station Aukstaitija EoI code LT00051	Measurement method type	Data reported by the EU EoI program
Total gaseous mercury (air+aerosol)	Automatic analyzer (continuously)	2009-2013
Mercury (precipitation+dry_deposition)	Monthly samples	2008, 2009, 2010, 2012, 2013

Monitoring of mercury in ground water
Geological Service of Lithuania collects information on potential trouble-spots which are polluted by certain chemicals from 1999. Moreover, the Geological Service has been carrying out the monitoring of mercury in groundwater within the frame of the State Environmental Monitoring Programme for many years; it should be noted that the monitoring of mercury is to be conducted not every year. The recent data are available from activities that were carried out within the frame of the State Environmental Monitoring Programme for 2005–2010. Currently mercury monitoring activities are being carried out according to the State Environmental Monitoring Programme for 2011–2017. Implementing the latter Programme, measurements of mercury content in ground water were conducted in 2014. Analysis of mercury was carried out in groundwater samples taken from 24 springs, 71 water abstraction wells and 101 monitoring wells included into national groundwater monitoring network. Analysis of mercury also is done during approval of groundwater resources of well-fields and operational monitoring of well-fields (usually 1-2 times in 5 years period). Currently groundwater resources are approved for 860 well-fields and monitoring is carried out in 210 of them.

Taking into account the above information and upon request from UNEP we have possibility to provide monitoring data from activities of the above mentioned Lithuanian State Environmental Monitoring Programmes.