Information on Mercury in Products and Processes, Quantities used, Demand, Levels of Substitution, Technology Change over, available substitutes.

Status of Mercury situation in Germany

Contact information	
Country	Germany
Name and address of Institution	Federal Environment Agency (Umweltbundesamt)
Web page	www.umweltbundesamt.de
Contact person	Dr. Steffi Richter
Telephone number of contact person	+49 340 2103 3275
E-mail address of contact person	steffi.richter@uba.de
Date	21. January 2008

For the following questions requesting quantitative data on mercury, we are interested in the current situation in your country as well as the historical (and expected future) trends. So if you have data, projections or qualitative considerations about the past and/or future trends, these will be of great value for the study.

Filling in the tables
In order to be able to compile and compare the data across countries we have prepared a number of tables for a consistent reporting of the information. Please add rows to the tables as necessary. In case you have only partial information (e.g. a total for the country) please fill in what is available and leave other cells open.

Some relevant information may not fit into the tables, and in this case we would appreciate if you add this information under "additional information" or enclose the original documents. You do not need to care about the lay-out of information pasted into the questionnaire, as it will be processed later.

Most tables include the option of giving the answer that data are not available, or that the process does not take place in your country. In such cases, please put a mark in the relevant box in order to distinguish your answer from "no answer" during the final compilation of the data.

If your answer is based on a published document, please add a reference to the document. When additional information concerns information in a specific table row, please add the row number.

DG Environment's stakeholder consultation
Some of the questions posed here were also asked during DG Environment's stakeholder consultation process conducted in 2005 before the development of the Commission's proposal for export ban and storage of mercury. If your country has previously answered a specific question, kindly indicate it in each table. Country submissions for that previous process will be reviewed and taken into consideration for this assessment.[1]. New or updated data on the same issues will of course be highly appreciated.

Supplementary material
If you have reports, memorandums, product brochures or other material describing the subjects raised in the questions below, this may be of great value for the study. Please submit such material with your reply to this questionnaire, or supply *specific* links to where this material can be found on public Internet sites. If the mate-

[1] If needed, you can check your country's earlier response at DG Environment's mercury home page at http://ec.europa.eu/environment/chemicals/mercury/consultation_responses_implem.htm

rial is in other languages than English, German, French or Scandinavian languages, we would very much appreciate a short summary in English of the subjects covered in the reports/material.

Appendixes
In Appendix 1, we have included a list of reports, papers etc., which we know already, and which you therefore do not need to send or find links for; you can simply refer to them in your response, as applicable.

A list of known types of mercury applications and products is given in Appendix 2 for reference.

1 Current consumption of mercury

Kindly report, for major product and process applications, the mercury consumption in your country by year and application, preferably for 2-3 years if such data are available, as trade and consumption may fluctuate significantly from year to year, and we intend to describe the average situation. If you have data on trends that may not fit into the tables, please add this information below the tables.

In the following we distinguish between 1) mercury used for production of mercury containing products and in production processes (e.g. chlor-alkali), and 2) mercury in products sold in your country, some of which may have been imported. The latter corresponds to what is often designated "consumption of mercury by product group". A list of known types of mercury applications and products is given in Appendix 2 for reference.

Mercury use in industrial processes and for <u>production</u> of mercury containing products					
No data available __ Mercury not used in processes or for production __ Data already submitted for the stakeholder consultation _X_					
	Process / produced product	Mercury consumption, t/year			Comment
		2004	2005	2006	
1	Chlor-alkali production (including paper mills)	Only capacity available see under cpomments	Only capacity available see under cpomments	Only capacity available see under cpomments	At the end of 2006, six out of originally 15 (1991) chlor-alkali plants had been completely converted to mercury-free electrolysis. Another two plants had closed down some mercury-cells and substituted that capacity by membrane cells. It is anticipated, that by the end of 2007 one additional plant will have completely substituted its mercury-based capacity by membrane technology and that by the end of 2009 another two plants will have completed conversion to mercury-free electrolysis. The following Table shows the phase-out by end of 2005 and the anticipated phase-out scenario by the end of 2009: **Year** **Chlorine capacity (Kt/a)** **[%] Base yr.: 1991** 1991 2478 100 2001 1595 64 2005 1291 52 2007 1104 45 2009 862 35
2	Polyurethane production	n.a.	n.a.	n.a.	
3	Small scale gold and silver mining	0	0	0	**Not relevant in Germany**
4					
	Production of:				
5	Dental amalgams	10	10	10	**Official estimate**
6	Light sources	1,0	1,0	1,0	**Expert estimate Federal Environment Agency**
7	Medical thermometers				
8	Other thermometers				
9	Switches, contacts and relays (electrical)	n.a.	n.a.	n.a.	
10	Other measuring and control equipment (non-electrical)	n.a.	n.a.	n.a.	
11					
12	Batteries	1,4	1,4	1,4	
13	Laboratory chemicals				**Data not available**
14	Other uses of metallic Hg				**Information not available**
15					
16	Mercury compounds (esp. Hg chloride, Hg oxide, and phenylmercuric acetate)				
17					
18					
19					
20					

Additional information:

Mercury amounts in products sold in the country (mercury consumption by product group)					
No data available __ Data already submitted for the stakeholder consultation __					
	Product type (add product types as necessary)	Total mercury amounts in products sold in the country, t/year			Comment
		2004	2005	2006	
1	Dental amalgams				**Data not available**
2	Light sources				**Data not available; for Fluorescent lamps 1 t/yr**
3	Medical thermometers				**Data not available**
4	Other thermometers				**Data not available**
5	Switches, contacts and relays (electrical)				**Data not available**
6	Other measuring and control equipment (non-electrical)				**Data not available**
7					
8					
9					
10	Other uses as metal				
11	Batteries	1,4	1,4	1,4	**Expert estimate (Federal Environment Agency)**
12	Laboratory chemicals				**Data not available**
13					
14					
15	Mercury compounds (esp. Hg chloride, Hg oxide, and phenylmercuric acetate)				**Data not available**
16	Total				**Data not available**

Additional information:

2 In your country are there any producers of mercury containing products?

For identified producers of mercury containing products in your country, kindly report:

Producers of mercury containing products				
No data available __ No use of mercury for production in the country __ Information already submitted for the stakeholder consultation __				
	Product type	Mercury use for the production, t/year	Year	Name and address of producers, contact details
1				
2				
3				
4				

Additional information:

3 Does your country export any mercury containing products?

Kindly report, for major product and process applications, the mercury quantities in products exported from your country by year and application.

Mercury amounts in products exported from the country
No data available __ Data already submitted for the stakeholder consultation __
For this Table as a whole – no data available !

	Product type (add product types as necessary)	Export to countries within the EU			Export to countries out- side the EU		
		Mercury amounts in exported products t/year	Year	The products are mainly produced within the country (yes/no)	Mercury amounts in exported products t/year	Year	The products are mainly produced within the country (yes/no)
1	Dental amalgams						
2	Light sources						
3	Medical thermometers						
4	Other thermometers						
5	Switches, contacts and relays (electrical)						
6	Other measuring and control equipment (non-electrical)						
7							
8							
9							
10	Other uses as metal						
11	Batteries						
12	Laboratory chemicals						
13							
14							
15	Mercury compounds (esp. Hg chloride, Hg oxide, and phenylmercuric acetate)						

Additional information:

4 Substitution status and production of mercury-free alternatives

a) Appendix 2 to this questionnaire contains a list of intentional mercury uses and existing alternatives. For mercury uses for which your agency/organization has information about the use of alternatives, kindly fill in your understanding of the current state of substitution in your country, following the instructions given in the appendix.

b) For identified producers of mercury-free alternatives in your country, please fill in the table.

Producers of mercury-free alternatives			
No data available __ Data already submitted for the stakeholder consultation __			
	Product type	Mercury use it substitutes for	Company name, city of main office and other contact details
1			
2			
3			
4			

Additional information:

5 Mercury waste management and waste flows in your country

We seek information that can illuminate the pathways and flows of mercury in various waste streams in the EU. Please fill in the following tables concerning disposal, export and/or recovery of mercury containing waste in your country.

Disposal of mercury containing waste within the country										
No data available __ Data already submitted for the stakeholder consultation __										
	Waste code (EWL)	Waste type	Landfilled		Incinerated		Recovered		Other (specify below)	
			Waste, t/year	Mercury, t/year	Waste, t/year	Mercury, t/year	Waste, t/year	Mercury, t/year	Waste, t/year	Mercury, t/year
1	06 03 13 06 04 04	Hg selenium waste from zinc production								
2	19 01 05 19 01 10	Activated carbon or filtercake waste from flue gas cleaning								
3	18 01 10	Dental amalgam waste								
4	05 07 01	Hg waste from natural gas cleaning								
5	16 06 03	Used silver oxide batteries					**50**	**3**		
6		Used alkaline and zinc-manganese batteries								
7		Hg lamp waste								
8		Meas./control equipment (thermometers, barometers, manometers, etc.)								
9		Waste metallic mercury								
10		Pesticides/fungicides containing Hg								
11										
12										
13		Total								

Additional information:

See also Attachment "Mercury containing waste"

Export of mercury containing waste for recovery							
No data available __ Data already submitted for the stakeholder consultation _X							
	Waste code (EWL)	Waste type	Export for recovery		Year	Recovery process	Country receiving the waste
			Waste, t/year	Mercury contents, t/year			
1	06 03 13 06 04 04	Hg selenium waste from zinc production					
2	19 01 05 19 01 10	Activated carbon or filtercake waste from flue gas cleaning					
3	18 01 10	Dental amalgam waste					
4	05 07 01	Hg waste from natural gas cleaning					
5	16 06 03	Used silver oxide batteries	**0**	**0**			
6	20 01 33	Unsorted household batteries	**0**	**0**			
7		Used alkaline and zinc-manganese batteries					
8		Hg lamp waste					
9		Meas./control equipment (thermometers, barometers, manometers, etc.)					
10		Waste metallic mercury					
11		Pesticides/fungicides containing Hg					
12							
13							
14		Total					

Additional information:

See also Attachment "Imports and Exports of Mercury containing waste"

6 Does your country have facilities for recycling/recovery of mercury from wastes such as consumer products like batteries, lamps and thermometers?

Supply of mercury from post-user recycling					
No data available __ No facilities in the country __ Data on facilities already submitted for the stakeholder consultation __					
	Name of facility, town	Types of waste supplied	Treatment method	Mercury amount recovered, tonnes	Year
1	GMR Gesellschaft für Metallrecycling mbH, Leipzig	All types of waste	No information	No information	No information
2	Remondis NQR, Lübeck	Batteries, button cells	Thermal vacuum destillation	3 t	2006
3					

Additional information:

7 Is mercury produced as a by-product of extraction or refining of metals, cleaning of natural gas, or other processes in your country?

Note: If already included in one of the "waste" or "recovery" tables above, please explain.

Supply of mercury from by-products of extraction of metals, cleaning of natural gas, etc						
No data available __ No by-product mercury supplied in the country __ Data already submitted for the stakeholder consultation __						
	Source of by-product mercury	If the mercury ends up in waste:		If the mercury is processed for marketing:		Year
		Amount of mercury in the waste, t/year	how is it managed ?	Amount of mercury produced, t/year	Form of mercury (pure/ which compounds)	
1	**No further legislation beyond EU**					
2						
3						
4						

Additional information:

8 Does your country have legislation on mercury that goes beyond EU legislation ?

a) On restrictions for marketing, use or export of mercury containing products?

Restrictions for marketing, use or export of mercury containing products which go beyond EU legislation?			
No legislation beyond EU legislation __ Information already submitted for the stakeholder consultation __			
	Name of the legislation and year of its formal adoption.	A short summary describing the key features beyond EU legislation	Specific Internet links to the legisla-tion/regulation
1	**No further legislation beyond EU**		
2			
3			
4			

b) On mercury waste management?

Waste management legislation/regulation which go beyond EU requirements, and which significantly affect the mercury waste management situation in the country			
No legislation beyond EU legislation __ Information already submitted for the stakeholder consultation __			
	Name of the legislation and year of its formal adoption.	A short summary describing the key features beyond EU legislation	Specific Internet links to the legisla-tion/regulation
1	**No further legislation beyond EU**		
2			
3			
4			

c) On monitoring and/or transfers of elemental mercury?

Additional information:

9 Have any significant (>50kg) mercury metal stocks been identified in your country?

Identified mercury metal stocks					
No data available __ No stocks of mercury in the country __ Data already submitted for the stakeholder consultation __					
	Town, region	Stock type	Estimated amount of mercury in tonnes	State of the mercury (pure, compounds, waste, ect.)	Owners name
1	**No identified stocks**				
2					
3					

In case certain data types cannot be disclosed, please report as much as possible, the mercury amounts being the most important. The stocks might be held at active or closed chlor-alkali facilities, stocks at non-ferrous

metal smelters, or other industrial facilities, publicly owned stocks or identified private stocks (e.g. dental supply, non-ferrous metals traders), concentrated mercury-containing waste (other than wastes already identified above), or other readily transportable stocks which may similarly be a current or future source of supply of mercury.

Additional information:

10 Have any mercury contaminated sites been identified in your country?

Please list major identified sites/areas of severe mercury contamination in your country, if any. Please add a note with a few lines summary of the history and characteristics of the contaminated site, original source of the mercury contamination and plans or considerations of decontamination, if any, including technical methods, if considered. Please indicate for each specific site, if the details of identification can be reported explicitly, or if it must be reported as an anonymous site. In case certain data cannot be disclosed, please report as much as possible, the area/volume and approximate location being the most important.

Identified sites contaminated with mercury						
No data available __	No mercury contaminated sites in the country __				Data already submitted for the stakeholder consultation __	
	Location (town, region)	Area of the contaminated site, m^2	Volume (m^3) and/or weight (tonnes)	Amount of mercury, tonnes	Original state of the mercury (pure, compounds, waste, ect.)	Owners name
1						
2						
3						

The contaminated sites might include former or operating chlor-alkali facilities, non-ferrous metal smelters, thermometer production or other industrial facilities where mercury has been used or stored, or other deposits or natural recipients of waste or materials or pollution with severe mercury contamination. Compared to the stocks already dealt with in question 8 above, these sites are characterised by mercury being mixed with soil, construction materials, or other materials, meaning that the mercury involved cannot be readily transported from the site in a concentrated form. Kindly coordinate response to this question with response to question 8 to avoid overlap.

Additional information:

11 Mercury accumulated in society, including in "hidden" stocks in society

We seek information about mercury circulating in or accumulated in society. This is for example the case in products which have a long life and are still in use, such as in medical thermometers and thermostats in the homes, in mercury switches in telephone hand sets, and many others. This is also the case in forgotten or hidden mercury metal, mercury compounds, or mercury containing products, such as for example mercury forgotten in school or university laboratories or in workshop shelves, or mercury caught in the water traps and piping in laboratories or dental clinics, etc.

Accumulated/circulating mercury in society can have many origins. Many of the mercury uses listed in Appendix 2 could be accumulated in society, notably those that can have a long technical life, or are incorporated into (and hidden in) long-life appliances, or can be thought of as technically valuable or merely fascinating by individuals who are not aware of the environmental risks mercury poses (and therefore be kept after active use, rather than handing them in for proper disposal).

To our knowledge this is a relatively poorly described subject, so any data, reports etc. that can describe aspects of such accumulation of mercury in society will be of great value for this study; this may be on an aggregated societal level, or for some specific mercury uses, or focused on some specific users. If the data are described in other languages than English, German, French and Scandinavian languages, kindly provide a short summary in English of the subjects covered in the reports/material.

Additional information:

12 Supplementary material

Please list all supplementary documents and indicate whether the document is enclosed or is available via the Internet. Please note that Appendix 1 includes a list of reports, papers etc., that we have already on file.

	Name of document	Enclosed	URL (Internet address of document)
1	BREF document about the Chlor-Alkali manufacturing Industry		http://eippcb.jrc.es/pages/FActivities.htm
2	About batteries		www.grs-batterien.de/engl/information/download/monitor6.pdf
3			
4			
5			

Short summaries in English of relevant key findings and issues dealt with (add row number):

fax (-) an [illegible]

Request for Information[A] of Mercury in Products and Processes, Quantities Used, Demand, Level of Substitution, Technology Change-over, Available Substitutes

A. Products containing mercury	Estimated Demand /Quantity used (in tonnes/year)[B]	Level of mercury substitution[C]	Experience with technology change-over/ alternatives[D]
1. measuring and control devices			
1. a. thermometers	n.a.	1-2	positive
1. b. blood pressure gauges (sphygmomanometers)	"	"	"
1. c. thermostats	"	"	"
1. d. others (specify)	—	—	—
2. batteries	1,4 t/a	2	positive
3. dental use	~20 t/a	(1-)2	positive
4. electrical and electronic devices (excluding batteries and lamps)	n.a.	n.a.	n.a.
4.a. electrical switches	"	"	"
4.b. electrical relays	"	"	"
5. lamps/lighting ~~(e.g.~~ fluorescent tubes ~~and CFLs)~~ only)	1 t/a	2	positive
6. other products	—	—	—

[A] Please provide latest and best available information by 15 February 2008
[B] Please indicate the source of information-could be national statistics, import/export data, or estimates based on production or use of relevant products
[C] Please use the following to designate level of substitution
0- no available substitutes in the market
1- substitutes available in market but minimally used
2- substitutes available in market and commonly used
[D] Please state positive or negative experiences with alternatives, and related costs if available

6.a. pharmaceuticals (e.g. disinfectants, vaccine preservatives)	0	2	positive
6.b. traditional medicine	not	relevant	in GER
6.c. ritual and cultural uses	"	"	"
6.d. soaps/baby powder/skin lightening creams	0	2	positive
6.e. paints	0	2	"
6. f. biocides/pesticides (except for in paints)	0	2	"
6.g. others (specify)			
B. Processes using mercury			
1. chlor alkali production	* 1104 Ktla	1-2	positive
2. small scale/artisanal gold mining	not	relevant	in GER
3. vinyl chloride monomer production	"	"	"

C. Other relevant information: mercury in products and processes in your country

* estimated capacity of running production plants in 2007 based on a phase-out scenario till 2009

Please send the above requested information to

UNEP Chemicals Or by fax.: 41 22 7973460 11-13, chemin des Anémones CH-1219 Châtelaine Geneva, Switzerland	Or by email: mercury@chemicals.unep.ch	For queries, please contact: +41 22 9178865

Contact information (other information in main questionnaire)	
Country	Germany

Appendix 2: List of mercury uses and assessment of level of substitution in your country

Column 1 in the table on the following pages lists all known uses (or groups of uses) of mercury. In case you know of other uses, you are welcome to add them at the bottom of the list. Note that many of the applications listed may no longer be used in your country.

1) In column 2, kindly indicate your judgement of the level of substitution of mercury use IN YOUR COUNTRY for mercury uses you have information for, using the following indications. We understand and accept that your indication may be uncertain, and that the substitution level of many uses may not be known in your country:

Index	Description of substitution level
0	No substitution indicated in assessed data sources; some substitution may be underway
1	Alternatives are becoming commercially available, or are present on the market but with marginal market shares
2	Alternatives are commercially matured and have significant market shares, but do not dominate the market
3	Alternatives dominate the market, but new products containing mercury also have significant market shares
4	Mercury use in this application is entirely, or almost entirely, substituted by mercury-free alternatives
N	No knowledge of substitution level

2) In column 3, kindly indicate data source(s), on which your judgement of substitution level is based, using the following designations:

Designation	Data source type
P	P) Publicly available reports/documentation (give references in remarks)
U	Unpublished official surveys/assessments
O	Own observations/background knowledge
I	Information from relevant industry and commercial organisations
M	Other sources (note which type in remarks)

(See list of mercury uses on the following pages)

Mercury use (table continued over several pages)	**Indication of substitution level in your country**	**Based on data from source type**	**Remarks**
	0,1,2,3,4,N	P,U,O,I,M	
<u>Intentional use of mercury in industrial/production processes</u>			
Chlor-alkali production with mercury cells	**2**		
VCM (vinyl-chloride-monomer) production with mercury-dichloride (HgCl2) as catalyst	n.a.		
Acetaldehyde production with mercury-sulphate (HgSO4) as catalyst	n.a.		
Polyurethane production (Hg catalysts)	n.a		
Vinyl acetate production (Hg catalysts)	n.a.		
Production of the cube (1-amino anthrachion) colours/pigments with Hg catalyst	n.a.		
Small scale gold and silver mining	-	-	**Not relevant for Germany**
<u>Consumer products with intentional use of mercury</u>			
Dental amalgam fillings			
Skin lightening creams and soaps	4		
Thermometers containing mercury:			
Medical thermometers			
Other glass thermometers (laboratory, educational, etc.)			
Other (non-glass) mercury thermometers (industrial, marine diesel engines, etc.)			
Hygrometer/psychrometer (thermometer-based)			
Pyrometers (high temperature range thermometers)			
Electrical and electronic switches, contacts and relays with mercury:			
Level switches (in sewer pumps, float switches, pressure switches, car hoods/bonnets, movement detectors, alarms, etc.)			
Multiple pole level switches in excavation machinery			
Mercury-wetted contacts (in electronics)			
Data transmission relays or "reed relays"			
Displacement (or "plunger") relays			
Thermo-switches (thermostats)			
Infra-red light detection semiconductors			
ABS brake activators and airbag activators in cars			
Continuous conductors in rotating seam welding wheels			
Ignitrons and Hg-arc rectifiers in AC/DC converters			
Light sources with mercury:			
Linear fluorescent lamps			
Compact fluorescent lamps (CFL, commonly called energy saving lamps/bulbs)			
Street advertisement with fluorescent “neon” tubes containing argon gas and Hg			
High pressure Hg and Na lamps (for street lighting etc.)			
Backlight in LCD flat screens			
In liquid diode material in LCD flat screens			
Laboratory atomic absorption spectrometry lamps			

Mercury use (table continued over several pages)	**Indication of substitution level in your country**	**Based on data from source type**	**Remarks**
Headlamps in some car models			
Exit signs (green signs in public buildings etc.)			
Batteries containing mercury:			
Mercury oxide /mercury zinc batteries (cylindrical and button)	4		
Alkaline cylindrical batteries (containing mercury)	4		
Zinc-manganese batteries (paste and paper types)	4		
Alkaline button cell batteries (containing mercury)	2		
Zinc-air button cell batteries	2		
Silver oxide button cell batteries	2		
Biocides and pesticides containing mercury:			
Agricultural pesticides (seed dressing, dipping sugar cane and grape seedlings, spraying insecticides, etc.)			
Slimicides/fungicides used in paper and paper pulp factories	N		
Preservation of wood (other than wood for paper production)	N		
Latex and other paints (Hg added for shelf life preservation and hindering mould on painted surfaces in humid conditions)	N		
Antifouling paints for boats	N		
Pharmaceuticals for human and veterinary uses, including biocides in vaccines, in eye drops, some herbal medicines, disinfectants, etc.			
Biocides for preservation of eye cosmetics and in liquids for contact lenses	N		
Manometers and pressure gauges:			
Blood pressure gauges (sphygmomanometers)			
Blood pressure "strain gauge plethysmographs"			
Manometers/pressure controls for industrial uses, gas lines, district heating, etc.			
Barometers, meteorological			
Flow meters (gas flows, etc., applying a manometer)			
Manometers for educational purposes			
Laboratory chemicals and equipment:			**No information available**
Specialized laboratory apparatus (Coulter Counters, tensiometers, and others)			**No information available**
Chemical reactants for analysis (COD analysis, Kjeldahl analysis (nitrogen analysis), Nesslers reagent, etc.)			**No information available**
Electrodes and references for physio-chemical measurements, such as calomel electrodes, references for Hg analysis etc.			**No information available**
Porosimetric analysis (pore size distribution)			**No information available**
<u>Other mercury metal uses:</u>			
Marine navigation lights in lighthouses (in some types the lens/lamp unit floats on mercury)			
Ethnic/cultural/ritualistic uses and folklore medicine			**Not relevant for Germany**
Gyroscopes/gyro compasses with mercury			
Vacuum pumps with mercury			
Mercury in large bearings of rotating mechanic part, for example, older waste water treatment plants			
<u>Miscellaneous products/processes not mentioned above:</u>			

Mercury use (table continued over several pages)	**Indication of substitution level in your country**	**Based on data from source type**	**Remarks**
Esophageal dilators (Bougie tubes) and gastrointestinal tubes with Hg			
Hydrometer (measuring density of liquids)			
Tanning equipment (esp. lamps)			
Pigment (vermilion, HgS)			
Browning and etching steel			
Gilding			
Certain colour photograph paper types			
Recoil shock-absorbers in rifles			
Mercury fulminate, Hg(ONC)2, used as a detonator for explosives, in ammunition and in fireworks			
Fireworks (other uses of Hg besides as detonator)			
Executive toys, pendants	4		
Neutron source in synchrotron light equipment and perhaps other high-intensity physical instruments			

Information on Mercury in Products and Processes, Quantities used, Demand, Levels of Substitution, Technology Change over, available substitutes for Germany in 2005

(1) **Mercury waste flows in your country?**
a) Total amounts in your country? What kind of waste and what is the mercury content?
b) Amounts recycled? What kind of waste and what is the mercury content?
c) Amounts landfilled? What kind of waste and what is the mercury content?
d) Amounts incinerated? What kind of waste and what is the mercury content?
e) Amounts exported for recovery to other OECD countries? What kind of waste and what is the mercury content?

(2) **Mercury recycling and processes with mercury as a by-product in your country?**
E.g. recycling of mercury in batteries and thermometers, mercury as a by-product from mining and production of other metals, and from cleaning of natural gas.
a) Amounts of mercury from these sources? In which form, metallic mercury or as a mercury compound?
b) Considered as waste or a product? If waste, how is it managed?

Answers to Questions 1 and 2:

A) Mercury containing wastes from industrial processes and certain product groups in Germany

Mercury containing waste from chemical processes:	500 t[1,2]
Used batteries containing mercury (button cells):	700 t[1] (76 t)
Wastes of dental amalgam:	70 t[1]
Fluorescent lamps and mercury vapour lamp (35-45 Mio. lamps):	7000- 9 000 t
Total (max.:	**16 270 t**

Fluorescent lamps: 35- 45 Mio. used fluorescent lamps are usually taken back each year in Germany. The average weight of one lamp is 0.2 kg. This results in a total amount of mercury containing waste of 7 000 – 9 000 t/a. **One lamp** contains app. **10 mg Hg**. The total amount of mercury from this source is between **0.35 t Hg/a**. This material is usually **landfilled**.

Batteries: Since 2001, the retail of round cells containing mercury is forbidden. Only button cells may contain up to **2 %** mercury. According to the recycling industry **5 t/a** of mercury were extracted **for reuse** from the **76 tons** of returned button cells plus previously stored button cells in 2004. But it is not known how many mercury-containing batteries are contained in the mixed battery fractions disposed to underground **landfills**. There is, however, a research project (UFO-Plan) running to conduct random tests of heavy metal contents of round and button cells retailed in Germany. There are still batteries used and, hence, returned to the recycling system which were produced and sold prior to 2001. In addition, it cannot be ruled out that a certain percentage of imported "mercury-free batteries" does not comply with

[1] Extrapolation for all of Germany based on the Bavarian and Schleswig-Holstein hazardous waste statistic 2003
[2] very small mercury content: app. 0,5%

the law and may still contain certain amounts of mercury. The amount of mercury thus imported cannot be quantified.

Dental Amalgam: About **70 t** wastes of dental amalgam are collected each year in Germany. The content of mercury is **3 – 5 %**[3] **(2 – 3.5 t Hg/a).** The mercury is **recycled** and used for batteries within the EU. The amount is slowly declining.

Mercury containing wastes from chemical processes: 6500 t/a[1] of mercury containing wastes are approximately coming from the Chemical Industry especially from the chlorine-alkali-production (Production of Chlorine and NaOH). The **mercury content** in this waste is **app. 0.5 %. 35 t Hg** were safely deposited and about **37 t** were landfilled in the year 2003.

Between **1997 and 2000** 8 plants converted to mercury free technology. Of the **2 030 t recovered mercury** 1 380 t were sold to the Almadèn mine in Spain, 190 t were sold to other chlorine-alkali-plants and 460 t were sold to other recycling companies.

There is no data for **measuring equipment** available.

B) Domestic wastes

The mercury content in domestic wastes in Germany is **0.12 g/t** [3]. Of the **20 Mio. t/a** domestic wastes in Germany 10 Mio. t are incinerated and the other 10 Mio. t are landfilled. The total amount of mercury is approximately **2.4 t Hg/a**. Therefore **app**. **1.2 t Hg** are **incinerated** and **1.2 t Hg** are **landfilled** above ground.

C) Crematoria

The total number of cremations in the 126 crematories in Germany is app. between 400.000 and 450.000 per year. The mercury emission load of one cremation was calculated between 2 mg (based on a very efficient mercury removal) and 100 mg (very conservative estimation of mercury removal) with the use of different BAT. For cremations without the use of BAT (for mercury emissions abatement), an average emission load of 300 mg mercury per corps was estimated (by one state).

Measurements of mercury in **clean flue gases of co-flow filters** were recently performed in selected crematoria in 6 federal states. **Mercury concentrations** between **0.0001 mg/m³ and 0.03 mg/m³** were recorded.

Investigations at another crematory using an **amalgator technique** showed **mercury concentrations in the clean flue gas between 0.01 and 0.02 mg/m³**. At one oven with the same technique, a maximum **concentration of 0.7 mg/m³** was found, while another amalgator cleaner resulted in an **average mercury concentration of 0.028 mg/m³**.

Measurements at one installation using a **catalytic adsorber** showed **mercury concentrations between 0.003 and 0.043 mg/m³ in the cleaned gas**.

Measurements at one crematory using a **solid bed filter with activated coke** showed **average mercury concentrations of 0.039 mg/m³.**

Investigations of the efficiency of a **tube filter with activated coke** (installed as end-of-pipe in a crematory oven) showed **mercury concentrations between 0.0009 and 0.33 mg/m³.**

[3] Bayerisches Landesamt für Umweltschutz (Hrsg.): Zusammensetzung und Schadstoffgehalt von Siedlungsabfällen. 2003

As a result, the total annual mercury load from German crematoria is estimated at 0.036 t in treated flue gases. Approximately one half originates from those 21 crematoria without adsorptive flue gas treatments.

(3) **Which effects could be expected on the recycling industry in your country by an export ban for mercury and storage requirements for surplus mercury?**

The amount of Mercury in the products is already declining; therefore there are lower amounts of mercury for recycling available. Still the recycling industry for batteries and dental amalgam in Germany is not concerned, since the export ban is for Europe and not for Germany. The mercury from **batteries** and **dental amalgam** is reused mainly within the EU. It is a slow declining process already going on. The export ban will not have a surprisingly large negative effect on this industry. Positive for the recycling companies is the rising mercury prize because of the expected export ban.

For the large amount of mercury coming from the transition to mercury-free technology in the Chlorine-Alkali-Industry the situation is different. So far mercury was sold to other Chlorine-Alkali-plants, to recycling companies within the EU or to the Almadén mine in Spain to substitute primary mercury production. This mercury was sold on the global market. With the export ban entering into force from 2011 on, this option is no longer possible. New solutions for disposal for the surplus mercury in the EU have to be found. Permanent storage underground in barrels in the liquid form or as inert material are possible. At the moment permanent storage of liquid mercury is not allowed in Germany. Two German underground landfills were interested in acquiring mercury for permanent storage provided this option would be legalised.

(4) **How much mercury is used today in your country for products, amalgam etc? Will this change in the future? Estimated amounts needed after the export ban has entered into force (Commission proposal 2011)?**

Chlor-Alkali-Industry: The biggest amount of mercury is used in the Chlorine-Alkali Industry. About **2 700 t Hg** are still in use in German installations. PARCOM Decision 90/3 incorporates a recommendation "that existing mercury cell chlor-alkali plants be phased out as soon as practicable. The objective is that they should be phased out completely by 2010." In any case, based on a voluntary commitment of those chlor-alkali industries organised within EUROCHLOR, those installations are expected to be converted to mercury-free technology by 2020 at the latest. Based on information provided by the relevant German industry, by the end of 2003 nearly half the mercury-cell capacity that existed in 1991 had been phased out. Figures for the subsequent years 2005 and 2007 show anticipated phase-out scenarios:

Year	Chlorine capacity (kt/a)	[%] Base year: 1991
1991	2478	100
2001	1595	64
2003	1265	51
2005	1128	46
2007	988	40

Socio-economic factors have to be considered in defining the time scale for phasing out the remaining mercury-based cells on the basis of the provisions of the IPPC Directive or the non-binding recommendation with PARCOM Decision 90/3.

Batteries: Since 2002 the production of round cells containing mercury is prohibited, but 2 % Hg-content in other button cells are still allowed. The resulting amount of Hg in 2004 was **1.3**

t/a in the products. The amount of mercury in batteries is expected to decline, possibly even down to zero, because of the battery ordinance and further technical improvements.

Fluorescent tubes: The amount of mercury used in fluorescent tubes in Germany is about **1 t**. This amount is expected to decline.

Dental amalgam: App. **10 t** Hg is used each year in dental amalgam. The total number of amalgam-based fillings is declining so that the total amount of mercury used for dental amalgam is expected to decline, too.

New estimate: **20 – 30 t** of Hg are used in dental amalgam in **Germany** each year.

(5) **Do you have national legislation that goes further than the European legislation and that need to be considered while developing this new legislation?**

a) Restrictions for landfilling of waste containing mercury
b) Restrictions for incineration of waste containing mercury
c) Restrictions for export of waste containing mercury
d) Treatment requirements for waste containing mercury before landfilling/incineration
e) Special requirements for landfilling of mercury

For disposal of waste two German regulations are in force: the "Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste-Treatment Facilities" and the "Landfill Ordinance". They do not restrict the mercury content of wastes for disposal but stipulate emission limit values (ELV) for leakages from disposal sites. The German ELV for leakages from controlled land fills for hazardous wastes is 0.1 mg/l while the relevant EU-legislation stipulates 0.2 mg/l.

With regard to incineration there are again no restrictions on the mercury contents of wastes but on the flue gases of waste incineration. The relevant emission limit values for mercury are laid down in the 17. Ordinance Implementing the Federal Immission Control Act: Ordinance on Incinerators for Waste and similar Combustible Material:

***Germany**: 0.03 mg/Nm³ (daily average) and 0.05 mg/Nm³ (half hour average)*

Restrictions on exports: permits for the export of mercury containing wastes have to comply with the EC - waste conveyance ordinance (259/93) and depend on the treatment and the importing country. (See table below):

treatment	**EU-member state**	**in EFTA-countries**	**in other OECD-countries**	**in non-OECD-countries**
disposal	permit necessary	permit necessary	not allowed	not allowed
recycling	permit necessary	permit necessary	permit necessary	not allowed

Import and Export of Mercury containing waste in t for 2006

AVV-Code	Type of Mercury containing waste	Import [t]	Export [t]
050701	Mercury containing waste from cleaning of natural gas	920	0
060404	Mercury containing waste from processes of inorganic chemistry	2.665	0
060502	Slags from waste water treatment after inorganic processes, containing hazardous substances	13	0
070208	Halogen free residuals from reaction and distillation of polymer and rubber industry	139	0
101401	Mercury containing waste from waste gas cleaning in cremation	9	0
160213	Other hazardous fractions of used equipment	6	0
160603	Mercury containg batteries	2	0
170409	Metal waste, contaminated by hazardous substances	25	0
170901	Mercury containing waste from building demolition	218	0
180110	Dental amalgam waste	9	16
200121	Leuchtstoffröhren und andere quecksilberhaltige Abfälle	3.552	117
Sum	Fluorescent tubes and other Mercury containing waste	**7.558**	**133**

Mercury containing waste, Input of waste disposal installations in 1000 t

Source: Statistisches Bundesamt, Fachserie 19, Reihe 1, 2005

EAV		Waste disposal plants (total)	Landfill	Thermal waste disposal plants	Chemical/ physical treatment plants	Sorting plant	Decomposing plants for for elektronic equipment	Other waste treatment plants
05 07 01	Mercury containing waste from natural gas cleaning and – transport	0,7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
06 04 04	Mercury containing waste from inorganic- chemical processes	3,7	2,1	0,0	0,6	n.a.	0,3	0,7
10 14 01	Mercury containing waste from waste gas cleaning of cremation	0,2	0,2	n.a.	n.a.	n.a.	n.a.	n.a.
16 06 03	Mercury containing batteries	0,2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
17 09 0	Mercury containing waste from demolition of buildings	2,3	1,2	0,0	n.a.	n.a.	n.a.	n.a.
20 01 21	Fluorescent tubes and other Mercury containing waste	14,3	0,3	n.a.	4,5	0,8	6,7	1,1
19 01 05	Filtercake waste from flue gas cleaning in incineration or pyrolysis of wastes	23,0	21,2	n.a.	n.a.	n.a.	n.a.	n.a.
19 01 10	Activated carbon or filtercake waste from flue gas cleaning in incineration or pyrolysis of wastes	7,3	n.a.	6,9	n.a.	n.a.	n.a.	n.a.
18 01 10	Dental amalgam waste	0,1	n.a.	n.a.	0,0	n.a.	n.a.	n.a.
16 06 04	Used alkaline batteries (without 16 06 03)	8,1	4,0	n.a.	0,6	n.a.	0,2	0,8
20 01 19	Pesticides from collected fractions of municipal waste	2,7	n.a.	2,6	n.a.	n.a.	n.a.	0,1