ZERO MERCURY

Key issues and policy recommendations for the EU Strategy on Mercury

This publication is financed by the Sigrid Rausing Trust, UK

December 2005

EEB

een
epha environment network

Health Care Without Harm

Ban-Hg-Wg
Mercury Policy Project

The European Environmental Bureau (EEB), www.eeb.org, is a federation of over 145 environmental citizens' organizations based in all EU Member States and most Accession Countries, as well as in a few neighbouring countries. These organisations range from local and national, to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

European Public Health Alliance Environment Network (EEN), www.env-health.org, is an international non-governmental organisation advocating environmental protection as a means to improving health and well-being. Member groups and organisations represent health, environment, women, health professionals and others. The group has a diverse membership of 41 member groups (6 international organisations, 11 European networks and 24 national/local organisations), including non-governmental organisations, professional bodies representative of doctors, nurses and other healthcare workers, academic institutions and other non-profit organisations.

Health Care Without Harm Europe (HCWH), www.noharm.org, is an international coalition of hospitals and health care systems, medical and nursing professionals, community groups, health-affected constituencies, labour unions, environmental and religious organisations. HCWH is dedicated to transforming the health care industry worldwide without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

The Ban Mercury Working Group, www.ban.org/Ban-Hg-Wg/, is an international coalition of 28 public interest non-governmental organisations from around the world formed initially in 2002 by two US-based NGOs, the Basel Action Network (www.ban.org) and the Mercury Policy Project (www.mercurypolicy.org), working to end pollution from toxic metal mercury.

Editor responsible:
John Hontelez,
European Environmental Bureau

December 2005

European Environmental Bureau
Boulevard de Waterloo 34 | B-1000 Brussels | Belgium
Tel.: +32 2 289 1090 | Fax: +32 2 289 1099
E-mail: eeb@eeb.org
Websites: www.eeb.org, www.ecotax.net,
www.participate.org, www.chemicalreaction.org,
www.zeromercury.org
An International non-profit association

European Public Health Alliance Environment Network
28 Boulevard Charlemagne | B-1000 Brussels | Belgium
Tel: +32 2 02 234 3640 | Fax +32 2 234 3649
E-mail: info@env-health.org
Website: www.env-health.org

Health Care Without Harm Europe
Chlumova 17 | 130 00 Praha 3 | Czech Republic
Tel: +420 222 78 14 71 | Fax +420 222 78 28 08
E-mail: europe@noharm.or

Ban Mercury Working Group / Mercury Policy Project
1420 North Str. Montpelier 05602, Vermont, USA
Tel: +1 802 223 9000
Email: mercurypolicy@aol.com
Website: www.ban.org/Ban-Hg-Wg, www.mercurypolicy.org

Cover pictures kindly offered by Stephan Boese-O´Reilly, EkoList (Martin Mach), Lars Hylander, Elena Lymberidi and Karen Suassuna.

The EEB gratefully acknowledges financial support from the Sigrid Rausing Trust, UK

This publication is also available at www.zeromercury.org, in English and in French.

Printed on 100% recycled chlorine-free paper.

ZERO MERCURY

Key issues and policy recommendations for the EU Strategy on Mercury

Editor: Elena Lymberidi (EEB)

European Environmental Bureau,
European Public Health Alliance - Environment Network,
Health Care Without Harm Europe,
Ban Mercury Working Group / Mercury Policy Project

This publication is financed by the Sigrid Rausing Trust, UK

December 2005

CONTENTS

CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Mercury is a highly toxic metal, causing damage to the nervous system even at relatively low levels of exposure. It is particularly harmful to the development of unborn children. It collects in human and animal bodies and can be concentrated through the food chain, especially in certain types of fish. The Commission's Directorate General for Health and Consumer Protection has recommended that women who are breastfeeding or who are or might become pregnant should limit their consumption of large predatory fish, such as swordfish, shark, marlin, pike and tuna.

Once emitted, mercury has no respect for national or regional boundaries, travelling long distances through the atmosphere and contaminating both the European and global food supplies at levels posing a significant risk to human health, wildlife and the environment. Mercury levels have tripled over the past 150 years due to human activities. It is therefore clear that although progress has been achieved to reduce both anthropogenic mercury use and release, present measures are not sufficient to reduce mercury levels in certain fish and seafood to the point where they are considered "safe" to eat. For over a billion people, seafood is the primary source of protein and restrictions can result in substitution of less healthy types of food in the diet worldwide. Therefore, further actions must be undertaken to drastically reduce mercury pollution in order to bring mercury levels down to background levels over time and to preserve the viability of fish as one of the world's most important protein sources.

The European Commission, acknowledging the problem and taking action on the issue, adopted a Community strategy on mercury, with the twin goals of reducing mercury levels in the environment and human exposure, especially from methylmercury in fish. The strategy includes 20 actions focusing on reducing mercury emissions, supply, demand and exposure, but also addresses surpluses and reservoirs, as well as supporting and promoting international actions.

In the present document, a coalition of public interest groups from the environmental and health sector analyse and present their views on the different actions proposed in the EU strategy on mercury and provide policy recommendations. A structure similar to that of the EU Mercury Strategy is followed for ease of reading.

Implementation of a strong EU strategy on mercury is absolutely essential in reducing and eliminating anthropogenic mercury uses and releases to the greatest extent possible. In particular, attention should be drawn to the importance of the proposed EU mercury export ban, the need to store surplus mercury and eliminate primary mining of mer-

cury, and to pass the necessary legislation to allow this to occur in the most expeditious manner possible.

Besides decisive actions within the EU, a strong and clear EU position is absolutely essential to foster the global actions presented in this Community Strategy. Simply put, the EU must send a clear message to the world community that mercury emissions, supply and demand should be reduced to a minimum and wherever possible eliminated, as rapidly as possible. In the meantime, strong and effective measures should be put in place to protect the health of those populations most specifically at risk, such as children, the developing foetus, and other susceptible populations including those who consume large quantities of fish high in mercury.

The main non-governmental organisations' (NGO) recommendations on the different aspects of the EU Mercury Strategy as well as additional relevant issues are summarised below.

Reducing emissions

Emissions to air

Emission Limit Values (ELVs) for mercury from coal combustion and other relevant activities under the Integrated Pollution Prevention and Control (IPPC) Directive, other existing legislation or a separate legislative instrument should be introduced and the Commission should take action as soon as possible.

National mass emission limits as well as local air quality limits for mercury should be set under relevant existing or a separate legislative instrument.

Mercury emissions from coal-fired power plants are the largest source of combustion-related emissions. Implementation of existing instruments such as Directive 2001/80/EC to reduce sulphur dioxide will bring some reductions to mercury emissions. However, elemental mercury in particular (with a lifetime in the atmosphere of up to one year), which can travel globally, will still be released to the environment, thereby contributing to global pollution.

Beyond emission limit values, it should be considered that there is no direct relation between rates of emission (as represented by ELVs) and the mass of emissions (total amount emitted). Thus, while coal-fired plants would be subject to controls on their rates of mercury emissions under ELVs, increased coal-fired production in the face of increased gas prices and concerns about the security of gas supplies (as is currently happening) could still lead to an increasing mass of emissions. ELVs also take no direct account of the concentration of coal-fired activity in any particular area – increased economic activity could comply with ELVs while still leading to pollution hotspots.

The co-benefit from the reductions of other pollutants is not enough. Reduction in mercury emissions could be achieved when technologies to control other pollutants are used, but this may not exceed 50% of mercury removal capability. Combinations of such technologies could reach higher percentages of mercury removal, but such multiple measures are not widely used.

In addition to mercury emission control technologies, the use of low-mercury coal, coal cleaning, selection of coal for low-mercury emissions, or switching to a cleaner fuel should be implemented over time.

Methods for preventing mercury pollution before coal is even burned are available, and given that BAT must lead towards "emission limit values designed to prevent emissions and the impact on the environment as a whole", pre-combustion techniques should be promoted within the strategy to control mercury emissions to the atmosphere. The use of activated carbon injection (ACI), in which a powdered activated carbon (PAC) sorbent is injected into the flue gas should also be further promoted.

In light of the major contribution of the industrial sector to mercury air emissions, it is necessary to set Emission Limit Values for mercury, as minimum action, from all relevant activities – including the chlor-alkali sector, cement manufacturing, and secondary steel production.

Most of the industries contributing to mercury emissions to air fall within the scope of the IPPC directive and relevant BAT reference documents have been developed. However, although the large majority of the Member States take into account the developed BREFs, this is not systematically addressed in all of the relevant legislation and as a result, "remarkable variations in implementation" have been noted. NGOs are concerned that mercury emissions to air from at least three important sources – the chlor-alkali industry, the cement industry and secondary steel production – are underestimated. Regarding the chlor-alkali industry, given that the magnitude of emissions is likely to be much greater than currently estimated, it should be a high priority to phase out reliance on mercury at these plants, in accordance with established and recommended deadlines.

We thus strongly urge the EU to make the actual phase-out of mercury at chlor-alkali facilities by 2010 one of its highest priorities, following the PARCOM Decision 90/3.

Monitoring of emissions and good record-keeping are necessary. Technologies preventing the use of mercury and eventually reducing mercury emissions are available and should be adopted. The respective BREFs should be revised and/or separate legislative instruments should be set to consider mercury emissions control, including mercury-free fuel when possible.

Mercury emissions from crematoria should be further investigated, including relevant technologies or other effective approaches, for eventual control at EU level. Emission limit values for this source should be proposed by the European Commission by the end of 2006 at the latest.

It has been estimated that there are between 2 and 3.5 tonnes of mercury released annually from crematoria. In the UK crematoria are responsible for 16% of mercury emissions and, without controls, will be the largest source of mercury pollution by 2020. No specific action is included in the EU Mercury Strategy. Legislation on crematoria is already in place in Denmark, the Netherlands, Germany and the UK and should be compared and evaluated as part of this investigation. The relevant OSPAR recommendation covers only 12 of the 25 EU Member States and no sanctions are foreseen in cases of non-implementation.

Emissions to water

Mercury emissions to water come from many different sources. One important source is the mercury from dental tooth filling waste from dental clinics. Dental offices are a well-documented and significant source of mercury discharges to water. The second largest use of mercury in Europe is for dental amalgams. In 2000, 70 tonnes were used in the 15 Member States alone. Although mercury-containing dental amalgam waste is considered to be hazardous waste within the European Union and must be disposed of in accordance with applicable laws, enforcement has not been consistent.

A review of the implementation of the Community requirements regarding dental amalgam waste should be carried out as soon as possible and before the end of 2006 at the latest while appropriate measures should be taken soon thereafter to reduce both the use and release of amalgam. More rigorous installation and monitoring as regards separation, introduction of devices in the wastewater system of dental offices, good record-keeping and devices that meet a high standard would be needed as well as consumer information at dental clinics.

Emissions to water are covered by different pieces of existing legislation, such as those for chlor-alkali plants, waste incineration, etc., as well as the Water Framework Directive adopted in 2000. Nevertheless, existing emission limit values to water date from the 1980s and need to be revised.

It is absolutely necessary for the Commission to proceed as soon as possible with their obligations under the Water Framework Directive to propose adequate emission controls and quality standards to phase out discharges, emissions and losses of mercury and its compounds into the aquatic environment.

Reducing supply

The reduction of global trade in mercury is a cornerstone strategic objective that is of the utmost importance. The EU is an extraordinarily important player on the global mercury market because it is home to the world's largest primary mercury mine and it is the dominant exporter of excess mercury to the developing world. There is significant trade within Europe and the annual export in recent years has been around 1,000 tonnes.

The proposed ban on EU mercury exports should be implemented as soon as possible, preferably by 2008 as originally proposed in earlier Commission drafts and by the Luxembourg Presidency, but certainly no later than 2011. The decision for such a ban should be taken as soon as possible and no later than September 2006.

As the world's primary mercury-exporting region, EU leadership in dealing with global mercury problems is an economic and moral requirement. Strong EU leadership will not only encourage other countries to reduce mercury consumption, it will also encourage further global trade deliberations needed to significantly reduce the role of mercury as a global pollutant in the international economy.

The mercury exported to non-OECD countries is largely consumed in poorly controlled and outmoded or illegal activities. According to the best information available, most of this mercury is intended for either battery production, use at chlor-alkali plants, or small-scale gold mining. All three of these activities, as practised in much of the developing world, result in substantial exposure of workers and their families, and pollution of the local and global environments.

Furthermore, this ban on mercury exports will contribute to decreasing demand for mercury due to an eventual price rise. For low-technology uses such as small-scale gold mining, higher prices have been demonstrated to encourage direct reductions in mercury uses and releases, without adverse economic impacts. The GEF/UNDP/UNIDO Global Mercury Project, which has worked with small-scale gold miners for many years, has strongly advocated an EU export ban as an effective way to reduce mercury demand (and mercury releases) in small-scale gold mining.

The proposed export ban must apply to mercury compounds as well as elemental (liquid) mercury, and the compounds covered must include mercuric chloride and mercuric oxide at a minimum.

A ban on the export of mercury-containing products, which are or soon will be subject to use and marketing restrictions within the EU, should be considered.

Since a principal purpose of the export ban is to discourage global mercury trade and thus mercury use, it makes little sense to enable the EU export of these mercury compounds which are the feedstock for some of the largest global mercury uses.

The EU should consider prohibiting imports of mercury and mercury compounds so that it can effectively manage its mercury supply and demand.

A trade tracking system should be put in place to record all imports and exports of mercury between the Member States and between the EU and other countries where this trade is not restricted.

Measures on trade tracking of mercury and mercury compounds to/from and within the EU should not await the export ban date, but should take effect as soon as practically possible. Until the export ban takes effect, the trade tracking should cover exports from the EU as well.

Reducing demand

Progress has been made in reducing use of mercury in products and the chlor-alkali industry is beginning to phase out mercury cells in Europe. However, substantial product uses still remain, with dental amalgam being the largest (after batteries). These remaining uses of mercury must be phased out, as there are substitutes for nearly all of them, as discussed in the sections below. For the few remaining specialised categories where alternatives do not exist, research should be pursued.

The restriction on the use of mercury in dental amalgams should be evaluated and pursued, given that viable non-mercury alternatives exist. The Commission should propose recommendations by the end of 2006 at the latest.

Restrictions on the use and marketing of dental amalgams, given that alternatives exist, will have indisputable positive environmental effects and would be prudent in light of potential health concerns. Some Member States, including Sweden, Norway and Denmark, have already taken relevant measures. In addition, it has to be considered that technologies to reduce crematoria emissions from dental amalgams and other releases are costly and more difficult than replacing mercury as a dental filling material.

The marketing and use of mercury in all measuring and control equipment for both consumer and professional uses (especially in households, healthcare facilities and schools) should be restricted while allowing for some exemptions for a limited time and subject to ongoing review, where adequate alternatives are not yet available.

These devices can pose a risk to human health and the environment during usage because they are easily broken, and after usage because they end up in the waste stream and ultimately are released to the environment. Alternatives do exist for most of them and such restrictions have already been in place in several Member States.

Existing directives dealing with mercury-containing products, such as the one on Batteries, the one on Restriction of Certain Hazardous Substances from Electrical and Electronic Equipment, and the one on End-of-life Vehicles, should be revised to eliminate exemptions for mercury uses, as soon as alternatives are available.

Other uses of mercury should also be considered, such as in vaccines. Mercury use as a preservative in vaccines, called thimerosal or thiomersal, are not addressed in the EU Mercury Strategy; however, the Council Conclusions (June 2005) on the Commission's Mercury Strategy highlighted the need to address vaccines.

An expert assessment should be undertaken to determine the extent to which mercury can be appropriately eliminated from vaccines to better protect public health.

Addressing surpluses and reservoirs

It has been reasonably determined that the estimated 12,000 tonnes of mercury in the EU mercury-cell chlor-alkali plants destined for decommissioning over the coming years will not be needed to meet shrinking EU and global demand.

Temporary storage of decommissioned mercury from the chlor-alkali industry should be pursued as soon as possible in storage areas which are secure sites, continuously monitored and located where intervention can take place immediately if necessary.

As an integral part of the EU strategy to simultaneously address global mercury supply and demand, temporary storage of decommissioned mercury from the chlor-alkali industry should be investigat-

ed immediately and implemented in the near future. The need for such storage is not disputed by the industry association Euro Chlor, which has already begun to study the options available.

Furthermore, the pursuit of temporary storage for surplus mercury must incorporate the ultimate intention of permanent retirement. Otherwise, this measure will only delay the use, releases and impacts of surplus mercury, not prevent it. Financing of storage should be the responsibility of those who own the mercury, in line with the Polluter Pays Principle. We anticipate that location and the number of the storage facilities in Europe, including whether the mercury will be stored on existing sites (e.g. storage areas of a chlor-alkali plant) or in new certified storage facilities, will be resolved in the short term.

Separate collection and treatment measures for all mercury-containing products already circulating in society should be improved or introduced where none exists.

There is already broad waste legislation in the EU for addressing landfilling, incineration, and spreading of sewage sludge, as well as specific product-related legislation (for batteries, vehicles and electric and electronic equipment). However, the effectiveness of these policies in reducing mercury emissions is questionable. In fact, the Commission states that "present Community policy generally encourages recovery over disposal", though the extent to which it is effective in keeping mercury out of the waste stream is unknown.

It is imperative that existing separate collection and recycling targets for batteries, end-of-life vehicles and waste electrical and electronic equipment should be met.

The EU Mercury Strategy did not address issues relating to mercury-contaminated sites due to past mercury mining (or other activities). The Environment Council, however, invited the European Commission to examine potential initiatives in relation to the rehabilitation and monitoring of contaminated former mining sites, including the proper handling of mining waste while respecting the polluter-pays principle.

Contaminated sites (former mining sites and others) should be identified and classified according to the degree of contamination and urgency of remediation. These areas also need to be further restored and brought to a reasonable condition.

Protection against human exposure to mercury

In its Extended Impact Assessment, the European Commission has stated that most people in coastal areas of Mediterranean countries, and around 1-5% of the population in central and northern Europe (i.e. around 3-15 million people in the EU), are around the "reference dose", i.e. the level at which health agencies consider that people may be at risk from exposure to methylmercury. In addition, large numbers of the Arctic populations and Mediterranean fishing communities are well above the US "Benchmark Dose Limit" (BMDL) (limit value of the reference dose), namely the lowest level at which it is believed there are clear neurological effects from exposure (10 times the health reference dose).

Although some data from Member States was submitted to the European Food Safety Authority to use in assessing mercury exposure, there is still a need for national intake data on amounts of fish and seafood consumed per meal and per week; preferred fish/seafood species, including details of fresh and canned fish; and consumer details such as gender, age, pregnancy, to get a better sense of just how many people in Europe are at risk.

EU commitment to funding and resources is imperative to investigate dietary intake and ensure awareness-raising on the health problems associated with mercury and a healthy diet, highlighting in particular the concerns for vulnerable populations.

The EU pilot human biomonitoring programme to be launched in 2006 should also prioritise work on methylmercury to contribute to a better picture of actual exposure, particularly in vulnerable groups.

Most importantly, this dietary intake guidance for methylmercury should take into account mercury concentrations in fish, the amount of fish consumed and the weight of the person consuming the fish, similar to the "health reference dose" approach used in the US. The EU should take the lead in promoting a revision of the JEFCA (Joint FAO/WHO Committee on Food Additives) standards to ones that afford similar protection as that of the US EPA.

Public awareness of potential dangers should be effectively communicated to all vulnerable populations on fish intake and mercury exposure risks, but also in general regarding toxicity, where it is in the environment, how to avoid it, what to do if mercury spillage occurs and if one is exposed, etc. Education and training of health care professionals are also needed and would be a vital part of any strategy to reduce exposure of vulnerable populations. This could also cover accidental exposure to mercury through spillages (in hospitals, dental clinics, schools, homes, etc.).

The European Union (particularly the Directorate General for Health and Consumer Protection) and national governments must prioritise and provide resources for awareness-raising campaigns for vulnerable groups, so that they have the information needed to protect themselves and their families through wise dietary choice as part of the Community Public Health Programme.

New fish advisories should be issued as soon as data collected throughout the EU is analysed, with an emphasis on precautionary approaches, and guidelines for vulnerable groups established. Any new guidelines must be widely publicised and highlight consumption recommendations for fish with high and low levels of mercury.

EU-funded projects should be encouraged to raise awareness on mercury. While Member States must be encouraged to give advice, the EU has a coordinating role, as well as an active role to play in raising awareness and therefore giving EU added value to protecting EU citizens' health.

Supporting and promoting international action

All relevant actions proposed by the European Commission in the respective sections are strongly supported by environmental and health NGOs.

The European Union and the Member States need to send a clear message to the international community that measures should be taken as quickly as possible to control global supply and demand in order to significantly reduce mercury contamination, starting with activities aimed at curbing primary mining and storing excess mercury from decommissioning chlor-alkali plants. Most of the global mercury demand, encouraged by available mercury supplies, arises from the use of technologies or processes in the developing world that are already illegal or being phased out in the EU and most OECD countries.

It is absolutely necessary for the EU (European Commission and Member States) to intensify its efforts and continue the collaboration started in Nairobi in February 2005 in order to prepare the ground for the negotiations at the 24th UNEP Governing Council due to take place in February 2007. In principle, this line of action will also be supported by the EU Environment Ministers when they draw conclusions on the EU Mercury Strategy.

Coordination should be sought by the EU with the G-77 and other interested parties, through bilateral negotiations and other activities, as soon as possible and prior to February 2007, to prepare the ground for global mercury reduction strategies and agreements, to target demand-reduction activities of global significance in developing countries, and to work towards an international treaty on mercury.

Along these same lines, the EU should enter into a dialogue with the other major primary mining countries in the world, including Algeria and Kyrgyzstan, towards phasing out primary mercury entering the global market. EU supportive measures and actions with these countries should also be considered.

Efforts to reduce human and environmental exposure to mercury must be prioritised because of adverse health and environmental effects. In a world of increasing population, nutritive food resources such as fish and other seafood and mammals should not be compromised or withdrawn from human consumption due to anthropogenic pollution. Prevention through continuously reducing mercury uses combined with control measures is the only option to avoid further deterioration and to ensure the recovery of large and especially vulnerable regions such as the Arctic. All in all, to prevent pollution, regulations to phase out the use of mercury have proved to be most cost-effective.

Finally, we wish to reiterate our support for this European Commission initiative. The recognition of the EU's responsibility for its share in solving the global mercury crisis, as described in the Community strategy, is most welcome and absolutely necessary. The value of adopt-

ing a strong EU strategy to address mercury problems on the global stage cannot be underestimated. This is a straightforward opportunity to reduce health risks to millions of EU citizens, and many more globally, that we cannot afford to miss.

Acknowledgments

The editor and the EEB wish to thank the following for their input and comments and for contributing to the completion of this publication:

- Christer Agren, The Swedish NGO Secretariat on Acid Rain (Sweden)
- Ojars Balcers, Environmental Protection Club - VAK (Latvia)
- Leticia Baselga, Ecologistas en Acción (Spain)
- Peter de Pous, European Environmental Bureau (EU-Belgium)
- Christian Farrar Hockley, EPHA Environment Network (EU-Belgium)
- Linda Greer, Natural Resources Defence Council (USA)
- Gunnar Grini, Bellona (Norway)
- Lesley James, Friends of the Earth England, Wales and N. Ireland (UK)
- Pendo Maro, European Environmental Bureau (EU-Belgium)
- Kerstin Meyer, European Environmental Bureau (EU-Belgium)
- Mecki Naschke, European Environmental Bureau (EU-Belgium)
- Dominique Proy, Ile-de-France Environnement (France)
- Paco Ramos, Ecologistas en Acción (Spain)
- Stefan Scheuer, European Environmental Bureau (EU-Belgium)
- Melissa Shinn, European Environmental Bureau (EU-Belgium)
- Lisette van Vliet, EPHA Environment Network, Health Care Without Harm, International Chemical Secretariat (EU-Belgium)

We would also like to thank Peter Maxson, Concorde East/West sprl., for significant input on a wide range of technical aspects of the publication.

The EEB is also grateful for the financial assistance provided by the Sigrid Rausing Trust, UK.

1. BACKGROUND

1. BACKGROUND

1.1. Introduction

Methylmercury is highly toxic, causing damage to the nervous system at even relatively low levels of exposure. It is particularly harmful to the development of unborn children. It collects in human and animal bodies and can be concentrated through the food chain, especially in certain types of fish. The Commission's Directorate General for Health and Consumer Protection has recommended that women who are breastfeeding or who are or might become pregnant should limit their consumption of large predatory fish, such as swordfish, shark, marlin, pike and tuna.

It is well known that mercury has no respect for national or regional boundaries, travelling long distances through the atmosphere, and has contaminated both the European and global food supplies at levels posing a significant risk to human health, according to the World Health Organisation, food safety authorities, and medical and public health professionals around the world. Researchers have found that even the Arctic, which has no sources of mercury pollution, has dangerously high levels of contamination in its marine mammals and other species that are part of the native peoples' food supply.

The EU Extended Impact Assessment states that anywhere from 3 to 15 million people in Europe have mercury levels around the recommended "safe" limit and a certain percentage has levels ten times as high, where health authorities believe there can be clear neurodevelopmental effects. Although the EU assessment does not calculate the costs of such contamination, a similar US study[1] estimates that between 300,000-600,000 babies born each year are at risk from intelligence loss due to methylmercury exposure, and potential loss is estimated at about 8.7 billion dollars a year in lost earnings to the economy.

In response to a request from the Council of Ministers in 2002, the Commission presented the Community Strategy on Mercury in January 2005, in the form of a Communication. This Strategy was used as a basis for the Community's input into the international debate on mercury, which took place at the 23rd United Nations Environment Programme (UNEP) Governing Council (GC), in Nairobi, Kenya on 21-25 February 2005. Prior to that, the UNEP Global Mercury Assessment concluded that releases of mercury and mercury compounds constitute a global threat that warrants immediate action at global level.

1 Mount Sinai study: Public health and economic consequences of Methyl Mercury Toxicity to the Developing Brain, February 28, 2005 http://ehp.niehs.nih.gov/members/2005/7743/7743.pdf

At European level, after the Community strategy was presented, conclusions were adopted by the Council of Environment Ministers in June 2005. Currently, the European Parliament is developing a resolution that expresses its opinion on the EU Strategy with a view to adopting a final resolution by April 2006.

On a global level, governments made a decision on the future of mercury as a global pollutant at the 23rd UNEP GC, where they agreed that UNEP has to carry out a global report on trade flows of mercury, that voluntary partnerships between developed and developing countries or countries with economies in transition would be pursued and reported upon, and finally that at the 24th UNEP GC (February 2007) and on the basis of a progress report, the need for further action on mercury would be assessed, considering a full range of options including the possibility of a legally binding instrument, partnerships and other actions.[2]

1.2. Objectives

Using the adoption of a strong EU strategy as a model, the aim of this document is to provide policy recommendations and actions necessary to ensure the continued reduction of exposure to mercury, in order to protect both the environment and health as well as reducing and eliminating the uses and releases of mercury in Europe and globally, towards a mercury-free world.

In general terms, the objectives of NGOs overlap and are generally similar to those expressed by the EU; however, the means and targets may differ. These objectives are:

- Reducing and whenever possible eliminating mercury **emissions**;
- Reducing and whenever possible eliminating the use of mercury in society by greatly reducing **supply** and **demand**;
- Controlling the **mercury currently circulating on the market** (storing and/or disposing of excess mercury, encouraging the use of mercury-free products, separate collection of mercury-containing products, etc.) and ensuring no re-introduction onto the market;
- Protecting populations, in particular vulnerable groups, against the **damaging health effects of mercury exposure;**
- Raising **awareness** and improving the understanding of the mercury problem and its solutions; and
- Supporting and promoting **international actions, strategies and agreements to reduce mercury pollution.**

2 UNEP 23rd GC Decision 23/9 IV on Mercury Programme.

1.3. The chemistry of mercury and its forms in the environment[3]

Mercury occurs naturally in the environment and exists in different forms. In pure form, it is known as "elemental" or "metallic" mercury (Hg(0) or Hg^{o}). Mercury is rarely found in nature as a pure, liquid metal, but rather within compounds and inorganic salts. Mercury can be bound to other compounds as monovalent or divalent mercury (also expressed as Hg(I) and Hg(II) or Hg2+, respectively). Many inorganic and organic compounds of mercury can be formed from Hg(II).

Several forms of mercury occur naturally in the environment. The most common natural forms of mercury found in the environment are metallic mercury, mercuric sulphide, mercuric chloride, and methylmercury. Some micro-organisms and natural processes can change the mercury in the environment from one form to another.

Mercury is mined as mercuric sulphide (cinnabar ore). Through history, deposits of cinnabar have been the source ores for commercial mining of metallic mercury. The metallic form is most simply refined from mercuric sulphide ore by heating the ore to temperatures above 540º C. This vaporises the mercury in the ore, and the vapours are then captured and cooled to form the liquid metal mercury.

Elemental mercury is a shiny, silver-white metal that is a liquid at room temperature and is traditionally used in thermometers and some electrical switches. If not enclosed, at room temperature some of the metallic mercury will evaporate and form mercury vapours. Mercury vapours are colourless and odourless. The higher the temperature, the more vapours will be released from liquid metallic mercury. Some people who have breathed mercury vapours report a metallic taste in their mouths. Elemental mercury in the atmosphere can undergo transformation into inorganic mercury forms, providing a significant pathway for deposition of emitted elemental mercury.

Inorganic mercuric compounds include mercuric sulphide (HgS), mercuric oxide (HgO) and mercuric chloride (HgCl2). These mercury compounds are also called mercury salts. Most inorganic mercury compounds are white powders or crystals, except for mercuric sulphide, which is red and turns black after exposure to light. Some mercury salts (such as HgCl2) are sufficiently volatile to exist as an atmospheric gas. However, the water solubility and chemical reactivity of these inorganic (or divalent) mercury gases lead to much more rapid deposition from the atmosphere than for elemental mercury. This results in significantly shorter atmospheric lifetimes for these divalent mercury gases than for the elemental mercury gas.

When mercury combines with carbon, the compounds formed are called "organic" mercury compounds or organomercurials. There is a potentially large number of organic mercury compounds (such as methylmercury, dimethylmercury, phenylmercury, and ethylmercury); however, by far the most common organic mercury compound in the environment is methylmercury.

3 UNEP Global Mercury Assessment, December 2002, Summary of the report, paragraphs 39-46 and 48.

Like the inorganic mercuric compounds, both methylmercury and phenylmercury exist as "salts" (for example, methylmercuric chloride or phenylmercuric acetate). When pure, most forms of methylmercury and phenylmercury are white crystalline solids. Dimethylmercury, however, is a colourless liquid.

The most common organic mercury compound that micro-organisms and natural processes generate from other forms is methylmercury. Methylmercury is of particular concern because it can build up (bioaccumulate and biomagnify) in many edible freshwater and saltwater fish and marine mammals to levels that are many thousand times greater than levels in the surrounding water.

Being an element, mercury cannot be broken down or degraded into harmless substances. Mercury may change between different states and species in its cycle, but its simplest form is elemental mercury, which itself is harmful to humans and the environment. Once mercury has been liberated from either ores or from fossil fuel and mineral deposits hidden in the earth's crust and released into the biosphere, it can be highly mobile, cycling between the earth's surface and the atmosphere. The earth's surface soils, water bodies and bottom sediments are thought to be the primary biospheric sinks for mercury.

1.4. Mercury sources, uses and emissions[4]

Mercury is released by natural sources like volcanoes, by evaporation from soil and water surfaces, as well as through the degradation of minerals and forest fires. However, it should be noted that a part of today's emissions from soil and water surfaces is composed of previous deposition of mercury from both anthropogenic and natural sources.

Mercury is also contained as a trace element in coal. The large use of coal-fired power plants in generating electricity makes mercury emissions to the air from this source among the world's largest.

Furthermore, mercury is available on the world market from several sources:

- Mine production of primary mercury (extracted from ore) still mainly occurs in Algeria, Kyrgyzstan, and China, and until only recently (2003) in Spain. Several of the mines are state-owned. There are also reports of small-scale artisanal mining of mercury in China, Russia (Siberia), Outer Mongolia, Peru and Mexico, mainly serving local demand.
- Mercury occurs as a by-product of mining or refining of other metals (such as zinc, gold, silver) or minerals, as well as refining of natural gas.
- Reprocessing or secondary mining of historic mine tailings containing mercury.

4 UNEP Global Mercury Assessment, December 2002, Summary of the report, paragraphs 91-92,101-103, 109-110.

- Recycled mercury recovered from spent products and waste from industrial processes.
- Private stocks (such as mercury used in the chlor-alkali and other industries).

Examples of uses of mercury, in no particular order, include:

As a metal (among others):

- For extraction of gold and silver (for centuries)
- As a cathode in the mercury-cell process for chlor-alkali production
- In electrical and electronic switches
- In fluorescent lamps
- In discharge lamps (e.g. streetlights and some automobile headlights)
- In thermometers
- In thermostats
- In manometers for measuring and controlling pressure (sphygmomanometers)
- In barometers
- In dental amalgam fillings

As a chemical compound (among others):

- In batteries
- Vaccines (as a preservative in the form of ethylmercury in thimerosal)
- Biocides/fungicides in paper industry, paints and on seed grain
- In pharmaceutical antiseptics
- Laboratory analysis reactants
- Catalysts (e.g. to product vinyl chloride monomer)
- Pigments and dyes (may be historical)
- Detergents (may be historical)
- Soaps and creams (as a bactericide and/or whitening agent)
- Explosives (may be historical)

Many of these uses have been reduced significantly in many industrialised countries, particularly during the last two decades. However, many of the uses discontinued in OECD countries are still alive in other parts of the world. Several of these uses have been prohibited or severely restricted in a number of countries because of their adverse impacts on humans and the environment.

In the EU, mercury is not used in detergents, soaps, paints, biocides, gold mining (except in French Guyana) and mercury-containing soaps are banned for export by Annex V of Regulation (EC) No. 304/2003 of the European Parliament and of the Council of 28 January 2003 concerning the export and import of dangerous chemicals (OJ L 63, 6.3.03, p. 1-26).

Mercury enters the environment (air, water and soil) mainly through:

Coal combustion.

- Municipal and medical waste incinerators.
- Steel production.
- Cement production.
- Chlor-alkali production
- Crematoria
- Artisanal gold-mining
- Dental amalgams
- Mercury-containing waste
- Smelting and refining of metal ores

1.5. Mercury exposure and effects

Mercury and its compounds are highly toxic to humans, ecosystems and wildlife. High doses can be fatal to humans, but even relatively low doses can have serious adverse neurodevelopmental impacts, and have recently been linked with possible harmful effects on the cardiovascular, immune and reproductive systems.[5]

The toxicity of mercury depends on its chemical form, and thus symptoms and signs are rather different according to exposure to elemental mercury, inorganic mercury compounds, or

5 European Commission. SEC(2005)101, Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury - Extended Impact Assessment {COM(2005)20 final}28.1.2005, p. 12.

organic mercury compounds (notably alkylmercury compounds such as methylmercury and ethylmercury salts, and dimethylmercury). The sources of exposure are also markedly different for the different forms of mercury. For alkylmercury compounds, among which methylmercury is by far the most important, the major source of exposure is diet, especially fish and other seafood. This is because methylmercury bioaccumulates, meaning larger predatory fish (such as swordfish, tuna, shark, marlin) have much higher levels of methylmercury in their bodies than non-predatory fish.[6] For elemental mercury vapour, the most important source for the general population is dental amalgam, but exposure at work may in some situations exceed this by many times (for example for nurses in hospitals, for dental nurses, dentists and workers in labs). For inorganic mercury compounds, diet is the most important source for the majority of people. However, for some segments of populations, use of skin-lightening creams and soaps that contain mercury, and use of mercury for cultural/ritualistic purposes or in traditional medicine, can also result in substantial exposures to inorganic or elemental mercury.[7]

Organic mercury, in the form of methylmercury, is the most toxic form humans are usually exposed to. Methylmercury is a well-documented neurotoxicant, which may in particular cause adverse effects on the developing brain. Moreover, this compound readily passes both the placental and the blood-brain barriers, so exposures during pregnancy are of highest concern. Also, some studies suggest that even small increases in methylmercury exposures may cause adverse effects on the cardiovascular system, thereby leading to increased mortality. Given the importance of cardiovascular diseases worldwide, these preliminary findings suggest that methylmercury exposure needs close attention and additional follow-up. Moreover, methylmercury compounds are considered to be possibly carcinogenic to humans (group 2B), according to the International Agency for Research on Cancer (IARC, 1993), on the basis of their overall evaluation.[8]

Eating contaminated fish[9] is the major source of human exposure to methylmercury. The populations most at risk are foetuses, infants, and young children.[10] Consequently, fish consumption by pregnant women, young children, and women of childbearing age is cause for concern because of the likelihood of mercury exposure. Experts estimate that almost half (44%)

6 Physicians for Social Responsibility - Mercury in fish http://www.mercuryaction.org/uploads/PSR_Hg3_FishC.pdf

7 UNEP, Global Mercury Assessment, December 2002, Summary of the report, paragraph 53.

8 UNEP, Global Mercury Assessment, December 2002, Summary of the report, paragraph 56.

9 Methylymercury bioaccumulates, meaning larger predatory fish have much higher levels of methylmercury in their bodies than non-predatory fish. For a list of fish with low and high levels of mercury see: Physicians for Social Responsibility - Mercury in fish http://www.mercuryaction.org/uploads/PSR_Hg3_FishC.pdf

10 A recent study has estimated that 15.7% of women of childbearing age in the United States have mercury levels in their blood that would pose adverse risks to a developing fetus. Based upon the 4,058,814 US births in year 2000, the number of newborns at risk exceeds 637,000 in the US alone. See Mahaffey et al, Blood Organic Mercury and Dietary Mercury Intake: National Health and Nutrition Examination Survey, 1999 and 2000, Environmental Health Perspectives, April 2004, pp. 562-570; Kathryn R. Mahaffey, (USEPA, Washington, DC), Methylmercury: Epidemiology Update, presented at the National Forum on Contaminants in Fish, San Diego, 26 January 2004. More and KR Mahaffey in Mercury Exposure: Medical and Public Health Issues, Transactions of the American Clinical and Climatological Association, Vol. 116, pp.127-153 (2005).

of young children in France[11] could have levels exceeding health standards, which would put them at risk of mercury poisoning. The EU Extended Impact Assessment states that anywhere from 3 to 15 million people in Europe alone have mercury levels around the recommended limit and a percentage has levels ten times as high, at which there are clear neurodevelopmental effects.[12]

One of the worst industrial disasters in history was caused by the dumping of mercury compounds into Minamata Bay, Japan. The Chisso Corporation, a fertiliser and later petrochemical company, was found responsible for polluting the Bay from 1932-1968. It is estimated that over 3,000 people – consuming fish from the lake – suffered various deformities, severe mercury poisoning symptoms or death from what became known as Minamata disease.[13] In November 2005 the Supreme Court held the central government and Kumamoto Prefecture responsible for Minamata disease, awarding 71.5 million yen in damages to plaintiffs in the nation's worst-ever case of industrial poisoning[14].

The main route of exposure for elemental mercury is by inhalation of the vapours. About 80 percent of inhaled vapours are absorbed by the lung tissues. This vapour also easily penetrates the blood-brain barrier and is a well-documented neurotoxicant. Intestinal absorption of elemental mercury is low. Elemental mercury can be oxidized in body tissues to the inorganic divalent form.

Neurological and behavioural disorders in humans have been observed following inhalation of elemental mercury vapour. Specific symptoms include tremors, emotional instability, insomnia, memory loss, neuromuscular changes, and headaches. In addition, there are effects on the kidney and thyroid. High exposures have also resulted in death. With regard to carcinogenicity, the overall evaluation, according to IARC (1993), is that metallic mercury and inorganic mercury compounds are not classifiable as to carcinogenicity to humans (group 3). A critical effect on which risk assessment could be based is therefore the neurotoxic effects, for example the induction of tremor. The effects on the kidneys (the renal tubule) should also be considered; they are the key endpoint in exposure to inorganic mercury compounds. The effect may well be reversible, but as the exposure to the general population tends to be continuous, the effect may still be relevant.[15]

---

11 European Commission. SEC(2005)101, Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury - Extended Impact Assessment {COM(2005)20 final}28.1.2005, p. 84.

12 European Commission, SEC(2005)101, Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury - Extended Impact Assessment {COM(2005)20 final}28.1.2005, p. 12-13.

13 http://en.wikipedia.org/wiki/Mercury_(element)#Applications

14 The Supreme Court on 11/11/2005 held the central government and Kumamoto Prefecture responsible for Minamata disease, awarding 71.5 million yen in damages to plaintiffs in the nation's worst-ever case of industrial poisoning. http://www.asahi.com/english/nation/TKY200410160138.html

15 UNEP, Global Mercury Assessment, December 2002, Summary of the report, paragraphs 57-58.

1.6. A global perspective

The global dimension of initiatives on mercury is key to finding solutions for the world community. Reducing global mercury supply and demand is the cornerstone of the Commission's Mercury Strategy, which proposes that the EU take a leading role in addressing these problems. This is not only recognition of the EU's responsibility for its share of the problems, but also a pragmatic realisation that there is little point in reducing mercury demand simply within the EU, only to export unwanted mercury to the developing world where it will be used under far less stringent controls, released, and ultimately transported back into the EU atmosphere and wind up in the fish that EU citizens consume. Mercury emissions, supply and demand should be reduced to a minimum, as rapidly as possible.

More details on the global scope of the Strategy and our policy recommendations can be seen in chapter 3.

1.7. Existing legislation related to mercury

It is important to note at this point that at EU level, many pieces of legislation referring to mercury already exist. A presentation of those policies, with a small summary, can be found in the Extended Impact Assessment on the EU Mercury Strategy, Annex 4.

These refer to the following issues and respective legislation:

- Integrated Pollution Prevention and Control - Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (OJ L 257, 10.10.1996, p. 26-40).
- European Pollutant Emission Register - Commission Decision 2000/479/EC of 17 July 2000 on the implementation of a European pollutant emission register (EPER) according to article 15 of Council Directive 96/61 concerning integrated pollution prevention and control (OJ L192/36, 28.7.2000)
- Incineration of Waste - Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste (OJ L 332, 28.12.2000, p. 91-111).
- Electrical and Electronic Equipment – Directive 2002/95/EC of the European parliament and of the Council of 27 January 2003 on the restrictions of the use of certain hazardous substances in electrical and electronic equipment (RoHS) (OJ L 37, 13.2.03, p 19-23), and Directive 2002/96/EC of the European parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE) (OJ L 37, 13.2.03, p 24-38), and relevant amendments.
- End-of Life Vehicles - Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles (OJ L 269 of 21.10.2000, p. 34-43), and relevant amendments.

- Batteries and Accumulators Containing Certain Dangerous Substances - Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances (OJ L 078, 26.03.1991, p. 38-41) adapted to technical progress by Commission Directives 93/86/EEC of 4 October 1993 (OJ L 264, 23.10.1993, p. 51-52) and Directive 98/101/EC of 22 December 1998 (OJ L 1, 5.01.1999). In November 2003 the Commission presented a proposal for a Directive of the European Parliament and of the Council on batteries and accumulators and spent batteries and accumulators, which is currently (end 2005) under conciliation procedure at the European Parliament. Once it is adopted, the proposed directive will repeal Directive 91/157/EEC on batteries and accumulators containing certain dangerous substances.[16]

- Hazardous Waste - Commission Decision 2000/532/EC (OJ L226/3 of 6.9.2000) as amended by Council Decision 2001/573/EC (OJ L203/18 of 23.7.2001) as regards the list of wastes pursuant to Article 1(4) of Council Directive 91/689EEC on hazardous waste (OJ L 47/1 of 16.2.2001).

- Landfilling of Waste - Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L182, 16.7.99, p. 1-19), Council Decision 2003/33/EC of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (OJ L11, 16.1.2003, p. 27-49).

- Sewage Sludge - Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (OJ L181, 4.7.86, p. 6-12).

- Packaging and Packaging Waste - European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste (OJ L 365, 31.12.1994, p10-23), as amended by Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004 (OJ L 47, 18.2.04 p 26 – 32), and relevant amendments.

- Discharges of Dangerous Substances to Water - Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (OJ L 129, 18.05.1976, p. 23-29), Council Directive 82/176/EEC of 22 March 1982 on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry (OJ L 81, 27.03.1982, p. 29-34), Council Directive 84/156/EEC of 8 March 1984 on limit values and quality objectives for mercury discharges by sectors other than the chlor-alkali electrolysis industry (OJ L 74, 17.03.1984, p. 49-54).

- Protection of Waters - 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 (OJ L 327, 22.12.2000, p. 1-73), Decision 2001/2455/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy (OJ L 331, 15.12.2001, p. 1-5).

16 Developments on the progress of the directive can be seen at: http://europa.eu.int/prelex/detail_dossier_real.cfm?CL=en&DosId=187011

- Protection of Groundwater - Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (OJ L 20 of 26.1.80, p.43-48).

- Quality of Shellfish Waters - Council Directive 79/923/EEC of 30 October 1979 on the quality required of shellfish waters (OJ L 281, 10.11.79, p. 47-54).

- Drinking Water Quality - Council Directive 98/83/EEC of 3 November 1998 on the quality of water intended for human consumption (OJ L 330 of 5.12.1998, p.32-54).

- Air Quality - Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (OJ L 296/55, 21.11.96) and proposed Directive of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (COM (2003) 423 final).

- Restrictions on Marketing and Use of Dangerous Substances - Council Directive 89/677/EEC of 21 December 1989 amending for the 8th time Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (OJ L 398 of 30.12.1989, p. 19-23).

- Restrictions on Marketing and Use of Plant Protection Products - Council Directive 79/117/EEC of 21 December 1978, prohibiting the placing on the market and use of plant-protection products containing certain active substances (OJ L 033, 8.02.1979, p. 36-40). Commission Directive 91/188/EEC of 19 March 1991, amending for the fifth time the Annex to Council Directive 79/117/EEC prohibiting the placing on the market and use of plant protection products containing certain active substances (OJ L 092, 13.04.1991, p. 42).

- Restrictions on Marketing of Biocides - Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market (OJ L 123, 24.4.98, p 1-63).

- Export and Import of Certain Dangerous Chemicals - Regulation (EC) No. 304/2003 of the European Parliament and of the Council of 28 January 2003 concerning the export and import of dangerous chemicals (OJ L 63, 6.3.03, p. 1-26).

- Classification, Packaging and Labelling of Dangerous Substances - Council Directive 67/548/EEC of 27 June 1967 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (OJ L 196, 16.08.1967, p. 1-5), as amended by Commission Directive 2001/59/EC of 6 August 2001 (OJ L 225, 21.08.2001, p. 1-333).

- Registration, Evaluation and Authorisation of Chemicals - Proposal for a Regulation of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency and amending Directive 1999/45/EC and Regulation (EC) {on Persistent Organic Pollutants}, Proposal for a Directive of the European Parliament and of the Council amending Council Directive 67/548/EEC in order to adapt it to Regulation (EC) of the European

Parliament and of the Council concerning the registration, evaluation, authorisation and restriction of chemicals, COM(2003) 644 final, 29.10.2003.

- Safety of Toys - Council Directive 88/378/EEC of 3 May 1988 on the approximation of the laws of the Member States concerning the safety of toys (OJ L 187, 16.7.88, p 1-13).

- Medical Devices - Council Directive 76/764/EEC of 27 July 1976 on the approximation of the laws of the Member States on clinical mercury-in glass, maximum reading thermometers (OJ L 262, 27.9.76, p 139-142) (now repealed), Council Directive 93/42/EEC of 14 June 1993 concerning medical devices (OJ L 169, 12.7.93, p 1-43).

- Cosmetics - Council Directive 76/768/EEC of 27 July 1976 on the approximation of the laws of the Member States relating to cosmetic products (Official Journal L 262 , 27.9.76, p. 169-200).

- Protection of the Health and Safety of Workers from the Risks related to Chemical Agents at Work - Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (OJ L 131, 5.05.1998, p. 11-23).

- Contaminants in Foodstuffs - Commission Regulation (EC) No 466/2001 of 8 March 2001 setting maximum levels for certain contaminants in foodstuffs (OJ L 77, 16.03.2001, p. 1-13), as amended by Commission Regulation (EC) No 221/2002 of 6 February 2002 (OJ L 37, 7.02.2002, p. 4-6). Commission Directive 2001/22/EC of 8 March 2001, laying down the sampling methods and the methods of analysis for the official control of the levels of lead, cadmium, mercury and 3-MCPD in foodstuffs (OJ L 77, 16.03.2001, p. 1421).

- Environment and Health - European Environment and Health Action Plan 2004-2010.

- Protection of the Marine Environment - Thematic Strategy being developed pursuant to the EU's 6th Environment Action Programme.

- Protection of Soil - Thematic Strategy being developed pursuant to the EU's 6th Environment Action Programme.

- Air Quality - Thematic Strategy being developed pursuant to the EU's 6th Environment Action Programme.

- Waste, Resources and Products - Thematic strategies on waste prevention and recycling and on sustainable use of resources being developed pursuant to the EU's 6th Environment Action Programme. Implementation of the Commission's Integrated Product Policy Communication is ongoing.

2. ACTION AT EU LEVEL

2. ACTION AT EU LEVEL

2.1. Reducing emissions

2.1.1. Emissions to air

European emissions of mercury from anthropogenic sources to the atmosphere have decreased from about 630 tonnes in 1990 (Pacyna, 1996) to 340 tonnes in 1995 (Pacyna et al., 2001) and then to about 240 tonnes in 2000 (Pacyna et al., 2003). The global anthropogenic emissions to the atmosphere have decreased from about 3600 tonnes/year in the 1980's to about 2000 tonnes/ year in the second half of the 1990's (Pacyna and Pacyna, 2002; Pacyna et al., 2002). However, they are thought to have increased substantially since then, especially due to China's ever-increasing reliance on coal-fired power plants.[17]

Thus, European emissions have decreased by a factor of 3, while the global emissions have decreased by a factor of less than 2. The main anthropogenic source of Hg in the atmosphere is thought to be through the combustion of coal.[18] However, although much uncertainty still exists due to the lack of good estimates from around the world, ,there are other sources with similar effects, such as mercury releases from artisanal and small-scale gold mining[19] and emissions from waste disposal.[20]

17 Anthropogenic Mercury Emissions in China, David G. Streets, Jiming Hao, Ye Wu, Jingkun Jiang, Melissa Chan, Hezhong Tian, Xinbin Feng, Submitted to Atmospheric Environment, August 19, 2005.

18 Comparison of emissions with concentrations in the air and precipitation of mercury, lead and cadmium measured at selected EMEP stations, Elisabeth G. Pacyna, Kevin J. Barrett and Jozef M. Pacyna EMEP Chemical Coordinating Centre, Kjeller, Norway, http://www.nilu.no/projects/ccc/reports/cccn1-2002.txt

19 M. Veiga et al, Origin of mercury in artisanal gold mining, accepted 12 August 2004 for publication by the Journal of Cleaner Production, Elsevier (in press). Personal communication with M Veiga on 15 August 2005.

20 Jakob Maag, Peter Maxson and Aase Tuxen, Global Mercury Assessment (Key Findings, p.3), United Nations Environment Program, Chemicals Directorate, UNEP Technology, Industry & Environment Division (Geneva, December 2002).

FIGURE 1 (SOURCE: PACYNA ET AL, 2003)[21]

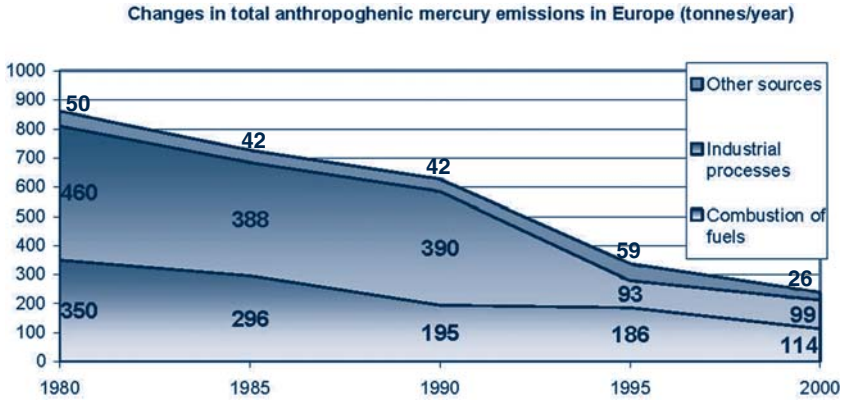


Figure 1 above shows that European emissions from the combustion of fuels contribute an estimated 114 tonnes per year of mercury, and as other sources of emissions decline, they comprise an ever-increasing percentage of total mercury emissions from EU countries. Coal combustion is particularly important. Table 1 below indicates that half of total anthropogenic air emissions come from this source, making it much larger than any other source of atmospheric emissions.

TABLE 1. GLOBAL EMISSIONS OF TOTAL HG FROM ANTHROPOGENIC SOURCES IN THE YEAR 2000 (IN TONNES)[22]

Continent	Africa	Asia	Australia	Europe	South America	North America	Total
Stationary combustion	215	912	112	114	32	107	1492
Cement production	5	82		30	6		123
Non-ferrous metal production	8	87	4	15	25	25	164
Pig iron & steel production	1	12		13	1		27
Caustic soda production		31	1	40	5	2	79
Mercury production					23		23
Gold production	178	47	8			2	235
Waste disposal		33		12		64	109
Other				15		2	17
Total	407	1204	125	239	92	202	2269

21 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, Annex 3, p. 119. Europe is understood in geographical terms here and covers also European parts of Russia and Turkey.

22 Sources: Pacyna E.P. and Pacyna J.M. (2005), Global atmospheric mercury emission inventories for 2000 and 1995, Journal of Air and Waste Management Association (in preparation); also Pacyna J.M., Wilson F., Steenhuisen F. and Pacyna E.G. (2005), Spatially distributed inventories of global anthropogenic emissions of mercury to the atmosphere (http://www.amap.no/Resources/HgEmissions)

2.1.1.1 Coal Combustion plants

In the EU, coal burning in plants above 50 MW is covered by the Integrated Pollution Prevention and Control (IPPC) Directive[23] – as are other major sources like the metals, cement and chemical industries – and Directive 2001/80/EC on Large Combustion Plants (LCP)[24], however there are no limits on mercury emissions from LCPs. No legislation exists for small-scale combustion plants at European level at the moment.

Large combustion plants

As illustrated above, the large combustion facilities are responsible for the majority of mercury emissions to air and two of the proposed actions by the Commission refer to these sources. Nevertheless, looking at the content of these actions, the Commission has decided that no further legislative action beyond existing Directives is needed at the moment. The actions proposed are the following:

> Action 1. The Commission will assess the effects of applying IPPC on mercury emissions and consider if further action like Community emission limit values is needed, as data under the IPPC and EPER[25] reporting requirements are submitted, and in a broader strategy review by the end of 2010. This will include review of the co-benefit effect of controls to be implemented by 1 January 2008 under Directive 2001/80/EC to reduce sulphur dioxide emissions from large combustion plants.
>
> Action 2. The Commission will encourage Member States and industry to provide more information on mercury releases and prevention and control techniques so that conclusions can be drawn in BREFs[26], helping to reduce emissions further. The second edition of the chlor-alkali BREF will include information to address the risk of releases in decommissioning mercury cells.

In general, mercury emissions from industries are in many cases taken into account when legislation is prepared at European level, with some cases where emission limit values have been set (such as in the Waste incineration directive – to be discussed further down). On the other hand, under Council Directive 96/62 on ambient air quality assessment and management, mercury is covered by the "4th Daughter" Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. In this directive, methylmercury is recognised as a possible human carcinogen while elemental mercury is considered not to be classifiable in terms of carcinogenicity. In Europe, concentrations of mercury in ambient air are below a level where they are believed to have adverse effects to human health. Therefore, mercury in ambient air

23 Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, OJ L 257, 10.10.96.

24 Communication on the Community Strategy Concerning Mercury, 28.1.1005

25 Commission Decision 2000/479/EC of 17 July 2000 on the implementation of a European pollutant emission register (EPER) according to Article 15 of Council Directive 96/61 concerning integrated pollution prevention and control, OJ L192, 28.7.2000.

26 Best available technique REFerence documents, under the IPPC directive.

is not regulated via a target value in the fourth daughter Directive. However, regardless of the concentration level, all substances covered by the measure, including mercury, are to be measured at background sampling points with a spatial resolution of 100,000 km2 in order to provide information on geographical variation and long-term trends. The same requirements are laid down for deposition measurements of heavy metals and polyaromatic hydrocarbons. Monitoring of particulate and gaseous divalent mercury is also recommended. A review is foreseen by the end of 2010[27].

Environmental and health NGOs are concerned that the existing measures with respect to emissions control as well as ambient air quality are not enough to ensure the protection of the environment and human health.

It is unfortunate that the 4th daughter directive on ambient air does not include air quality limit values for mercury. Research in the area of mercury emissions, transport, deposition, transformation and bioaccumulation should continue and Member States should be obliged to join existing international networks monitoring gaseous mercury in ambient air and mercury in precipitation (i.e. wet deposition).

Specific mercury controls should be included in existing directives before the review date of 2010 and emissions limit values (ELVs) should be introduced in existing or new legislation where relevant.

Beyond emission limit values, one needs to consider however, that there is no direct relation between ELVs (rates of emissions) and mass emissions (total amount emitted). Thus, whilst coal-fired plants would be subject to controls on their rates of mercury emissions under ELVs, increased coal-fired production in the face of increased gas prices and concerns about the security of gas supplies (as is happening) could still lead to increasing mass emissions. ELVs also take no direct account of the concentration of coal-fired activity in any particular area – increased economic activity could comply with ELVs while still leading to pollution hotspots.

As a result, national mass emission limits as well as local air quality limits for mercury should be set under relevant existing legislation or a separate legislative instrument.

Small-scale coal combustion facilities

In relation to mercury emissions from small-scale coal combustion facilities, the Commission has proposed the following action:

Action 3. The Commission will undertake a study in 2005 of options to abate mercury emissions from small-scale coal combustion, to be considered alongside the broader CAFE assessment.

27 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, Annex IV, p.133-134.

The above-mentioned study is expected to include consideration of the need for restrictions regarding mercury emissions, abatement options, recommendations and emission inventories.

Smaller coal-fired power plants are responsible for nearly the same magnitude of emissions in total as larger plants, as can be seen in Table 2 below. The cumulative effect of mercury emissions from these installations substantially contributes to the overall level of emissions. Thus, the EU does not have the luxury of ignoring this sector.

Table 2 – Emissions of mercury to air in EU25+2 and other European countries[28], 2000 (source: Pacyna et al, 2003)[29]

Sector	Tonnes/year
Coal Combustion – Power Plants Above 50MW	38.38
Coal Combustion – Power Plants Below 50 MW and Residential Heat	34.96
Cement Production	22.61
Other	12.99
Waste Disposal	11.39
Pig Iron & Steel	7.74
Non-Ferrous Metals – Zinc	7.64
Chlor-Alkali (OSPAR region only, as reported by industry)[30]	5.74
Non-Ferrous Metals – Lead	1.63
Oil Combustion	1.47
TOTAL 2000	144.42

Similar to the approach that should be taken for mercury emissions from LCPs, existing and new small-scale coal combustion facilities (less than 50 MW) should be required to incorporate guidelines or limit values of mercury emissions. Such ELVs should be included in a proposal from the EC until the end of 2006.

The LCP and IPPC Directives should either be extended to cover mercury emissions from coal combustion power plants below 50MW and residential coal combustion, or a separate legislative instrument should be developed.

28 Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Monaco, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, U.K.

29 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, Annex 3, p. 110

30 OSPAR Commission 2003, Mercury losses from the chlor-alkali industry (1982-2001).

Arguments will be provided further down on our reasoning behind the above-mentioned recommendations which should be followed with respect to better controlling mercury emissions from coal-fired power plants and other industries.

The co-benefit effect from the reductions of other pollutants is not enough

Emissions from coal-fired power plants are particularly important, as the largest source of combustion-related emissions. Implementation of existing instruments such as the Large Combustion Plants Directive (2001/80/EC) to reduce dust and sulphur dioxide (SO2) can, in some cases, lead to significant reductions in mercury emissions. However, as the LCP BREF states, "control technologies designed for controlling pollutants other than mercury vary in their mercury removal capability, but generally may achieve reductions no greater than 50%"[31]. Combination of those technologies could reach higher percentages of mercury removal, as can be seen in the table below, but such multiple measures are not widely used.

Technologies for reducing SO2 emissions and particulate matter (PM) recommended as Best Available Technique (BAT) in the IPPC LCP BREF, and mostly widely used, include Electrostatic Precipitator (ESP) or Fabric Filter (FF) for PM and wet Flue Gas Desulphurisation (FGD) and spray-dry FGD for removal of sulphur dioxide (SO2). These pollution control measures vary significantly in the percentage and type of mercury captured, depending on mercury and other chemical contents in the coal and coal type.

TABLE 3 POLLUTION CONTROL MEASURES FOR LCPS AND ESTIMATED MERCURY REMOVAL[32]

Control options	Mercury removal efficiency %	BAT
ESP (Electrostatic Precipitator)	10	For plants 50-100MWh (dust)
FF (Fabric Filter)	29	For plants 50-100MWh (dust)
ESP or FF + wet FGD (Flue Gas Desulphurization)	85	For plants > 100MW (dust and SO_2)
ESP + FGD sd (semi dry)	67	Mainly used for plants <300 MW (dust and SO_2)
ESP + carbon filter beds	90-95	Mainly used for mercury Since no ELVs exist for mercury,
FF + ACI (Activated Carbon Injection)	50-90+	the BREF doesn't recommend any technologies as BAT

31 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 124.

32 Information compiled from: European Commission. Ambient Air Pollution by Mercury (Hg) Position Paper Prepared by the Working Group On Mercury 17 October 2001 Luxembourg: Office for Official Publications of the European Communities, 2002 and Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. vi.

Mercury has a high vapour pressure at the typical control device operating temperatures. Its collection by particulate matter control devices is highly variable and total removal rates are highly dependent on the control device used for SO2 removal. Table 3 shows some mercury removal estimates for different control options. Other studies show that mercury removal for a wet FGD and a cold-side ESP averages 49%, but only about 26% for FGD in combination with a hot-side ESP. Total removal with FGD and FF is around 88%, while for a spray dry FGD with ESP, the average mercury removal is only 18%.[33] Spray dry FGD only accounts for a small percentage of FGD in use; on the other hand, however, the effectiveness of the different wet FGD technologies, which account for the majority of the market share, varies widely[34]. There is some evidence that use of selective catalytic reduction (SCR), one available technology for NOx control, enhances oxidation of Hg^0 in flue gas and results in increased mercury removal in wet FGD.[35] The addition of a high dust SCR to a plant with ESP and FGD can lead to an average removal rate of 90%.[36] SCR is however not widely used in the EU currently, and the main policy instrument - the LCP directive - will make SCR more widely applied only for the largest plants and only after 2015.

Mercury capture rates are highly dependent on the type of fuel used.

In a recent study the US EPA[37] found that applying control measures for SO2 and PM led to capture of between 49% and 98% of the mercury when bituminous coal is used, but only 24 to 35% with sub-bituminous coal and 0 to 44% with lignite.[38] Although the majority of coal burned in Europe is bituminous, lignite or sub-bituminous accounts for more than 15% of consumption, from which significant reductions in emissions are unlikely to be achieved with existing measures.[39] While a higher percentage of mercury in bituminous coal is captured, this type of coal tends to have higher mercury concentrations to begin with, and the majority of the emissions are in the form of oxidized mercury, which is most readily transformed into

33 Profiles PF 04-14 November 2004 IEA Clean Coal Centre. http://www.iea-coal.org.uk/publishor/system/component_view.asp?PhyDocId=5542&LogDocId=81125

34 p. 272 of the LCP BREF (final, May 2005) - 3rd paragraph of section 4.5.8. This refers to wet scrubbers, spray dry scrubbers and dry sorbent injection and states that 'these techniques have a market share of more than 90% ...' Also p.68, 2nd para — 'Today wet limestone scrubbers are the most widely used of all the FGD systems, with a share of c.80% of all the installed FGD capacity'

35 US EPA, Preliminary Estimates of performance and cost of mercury emission control technology applications on electric utility boilers. An update. June 2004. http://www.epa.gov/mercury/control_emissions/preliminary_estimates.pdf, p. 4.

36 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. vi.

37 United States Environmental Protection Agency.

38 US EPA, Preliminary Estimates of performance and cost of mercury emission control technology applications on electric utility boilers. An update, June 2004. http://www.epa.gov/mercury/control_emissions/preliminary_estimates.pdf, p. 18.

39 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p. 44.

methylmercury.[40] On the other hand, controlling sub-bituminous coals cannot be neglected, since emitted mercury (elemental) will disperse more broadly before being, once more, converted into methylmercury and deposited.

In general, approximately 20-50% of the mercury emissions from coal combustion have been found to be elemental mercury and 50-80% oxidised mercury[41]. Elemental mercury in vapour form is not water soluble and therefore cannot be captured by wet FGD.[42] As a result, there is a significant amount of elemental mercury that will not be retained with the proposed measures and will still be added to the global pollution. Elemental mercury can travel globally and has a lifetime in the atmosphere of up to one year[43]. Oxidized mercury tends to settle near the region where it is released, through both wet and dry deposition, creating hotspots of pollution.

Rather than relying on the incidental capture of mercury by pollution control technologies designed to capture other pollutants, it is imperative that Emission Limit Values be established, as in the case of waste incinerators, to achieve consistently high reductions in mercury emissions. In this way, pollution control measures for mercury can be integrated into retrofits to meet ELVs for SO_2, PM, and NOx by 2008 under the LCP Directive and BAT in the IPPC BREF.

Approaches to Mercury Emissions Reduction

Pollution control technologies aimed specifically at removing and capturing mercury exist and are more consistent than the varying amounts captured as a side effect of other pollutant controls. In 2000 the US Environmental Protection Agency (EPA) stated that cost-effective technologies existed at that date, or would exist in the near future, to control most mercury emissions. They stated that this cost would be "far lower than 1% of utility industry revenues"[44]. As discussed below, electric utilities can make significant mercury reductions with currently available and affordable technology. But this will require more than the mere application of the IPPC and Large Combustions Plants directive.

In addition to mercury emissions control technologies, the use of low-mercury coal, coal cleaning, selection of coal for low mercury emissions, or switching to a cleaner fuel should be implemented over time.

---

40 Facts on Mercury Emissions and Draft EPA Rules.

41 Control of Mercury Vapor Emissions from Combustion Flue Gas, Rong Yan, David Tee Liang and Joo Hwa Tay, Institute of Environmental Science and Engineering, Nanyang Technological University, p.400, http://dx.doi.org/10.1065/espr2003.04.149

42 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 181.

43 Control of Mercury Vapor Emissions from Combustion Flue Gas, Rong Yan, David Tee Liang and Joo Hwa Tay, Institute of Environmental Science and Engineering, Nanyang Technological University, http://dx.doi.org/10.1065/espr2003.04.149

44 U.S. EPA, Fact Sheet, EPA to Regulate Mercury and Other Air Toxics Emissions from Coal- and Oil-Fired Power Plants (Dec. 14, 2000), http://www.epa.gov/ttn/atw/combust/utiltox/hgfs1212.html, accessed on 8 Aug. 2005.

Table 4: Estimates of current and projected annual operating costs for retrofit mercury emission control technologies[45]

Coal Type (sulphur content)	Existing air pollution control device a	Retrofit mercury control b	Current cost (cents/kWh)	Projected cost (cents/kWh)
Bituminous (3% S)	CS-ESP+FGD	PAC	0.07 - 0.12	0.04 - 0.07
	FF+FGD	PAC	0.03 - 0.05	0.02 - 0.03
	HS-ESP+FGD	PAC+PFF	0.15 – NA c	0.09 – NA c
Bituminous (0.6% S)	CS-ESP	SC+PAC	0.1 - 0.18	0.06 - 0.1
	FF	SC+PAC	0.04 - 0.08	0.03 - 0.05
	HESP	SC+PAC+PFF	0.18 - 0.38	0.1 - 0.23
Sub-bituminous (0.5% S)	CS-ESP	SC+PAC	0.12 - 0.19	0.07 - 0.11
	FF	SC+PAC	0.04 - 0.11	0.03 - 0.07
	HESP	SC+PAC+PFF	0.14 - 0.27	0.09 - 0.16

a/ CS-ESP = cold-side electrostatic precipitator; HS-ESP and HESP = hot-side electrostatic precipitator; FF= fabric filter; FGD = flue gas desulphurization

b/ PAC=powdered activated carbon; SC=spray cooling; PFF=polishing fabric filter

c/ NA = not available

Pre-combustion techniques

The LCP IPPC BREF cites methods for cleaning coal to remove mercury before combustion, which include mechanical devices that use pulsating water or air currents to physically stratify the coal and remove impurities, sometimes in combination with centrifugal force, and dense media washing, a chemical separation process.[46]

In the U.S., coal cleaning is currently used for about 77 percent of eastern (bituminous) coals, and two studies of its effectiveness in removing mercury in the coal showed average removal rates of 21% and 30%[47]. Similarly, KFx, a U.S. company, has developed a pre-combustion process that it maintains will lower the mercury content of sub-bituminous coal up to 60-70%[48].

45 UNECE 2002, Control of Mercury Emissions from Coal-Fired Electric Utility Boilers. Note prepared by the Secretariat based on information submitted by the US delegation. p. 14 http://www.unece.org/env/documents/2002/eb/wg5/eb.air.wg.5.2002.6.e.pdf

46 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 124.

47 US EPA, Office of Research and Development, Control of Mercury Emissions From Coal-Fired Electric Utility Boilers: Interim Report Including Errata Dated 3-21-02, at p. 2-10 (April 2002).

48 Scott A. Baily, GrandView Partners, A description of the K-Fuel Plus™ Technology and an examination of the benefits of the K-Fuel Plus product (Feb. 2004), available online at http://www.kfx.com/ScottBailyWhitepaper.pd (visited May 4, 2004).

To supplement these approaches, coal which results in lower mercury emissions can be selected. Coal containing higher levels of chlorine and calcium create chemical reactions during the combustion process, which can lead to increased capture of mercury emissions.[49]

> Methods of preventing mercury pollution before coal is even burned are available, and given that BAT must lead to "emission limit values designed to prevent emissions and the impact on the environment as a whole,"[50] pre-combustion techniques should be promoted within the strategy to control mercury emissions to the atmosphere.

Pollution control measures during and after combustion

Carbon filter beds have been successfully used in Germany on utility boilers and municipal waste incinerators.[51] At a coal gasification plant in the US, 90%+ mercury removal is achieved by a carbon absorbent bed. However, carbon filter beds have not been tested for mercury removal at coal-fired power plants.[52]

The use of activated carbon injection (ACI), in which powdered activated carbon (PAC) sorbent is injected into the flue gas prior to the ESP or FF, for application to the coal combustion sector, should be further promoted. The Extended Impact Assessment mentions the high removal rates that can be achieved by the addition of ACI or fabric filter (baghouse filter) technologies, but only in the context of consideration of costs. It does acknowledge that the addition of ACI to FDG can bring the total mercury removal to above 90%, or adding an activated carbon-containing reagent in combination with a fabric filter can bring the total removal to above 95%.[53] Furthermore, carbon-containing reagents and mainly halogenated activated carbon (activated carbon that has been augmented with a halogen) seem to be particularly promising in controlling mercury, in particular from sub-bituminous or lignite coals (or other coals with lower chlorine levels), and where high control can in some cases be achieved without use of an add-on fabric filter, which significantly lowers control costs.

---

49 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 241.

50 Council of the European Union, Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, Article 2(11).

51 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 124.

52 Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, Submission filed by Environment Canada on March 30, 2004, http://www.ec.gc.ca/mercury/en/mcepa.cfm, accessed on 12 September 2005.

53 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, p. 52.

Emission standards based on this technology would be far stricter than a no-further-control approach, which is relying on more conventional technologies designed primarily for the removal of other air pollution contaminants. A recent US EPA analysis indicates that ACI is capable of controlling mercury emissions by 90 percent or more from all coal types, and can be cost effective and available by 2010.[54] And equipment vendors are even more confident; according to an informal study of companies looking at mercury controls by U.S. Senator James Jeffords, two manufacturers estimate that their technology – which is either available now or will be within the next two years – can achieve 80-90 percent reduction in mercury from all coal types. A summary of this Senator's survey indicates that the responses "show with certainty that stringent control of utility mercury emissions in the range of 60-90%, depending on the technology, is economically feasible and technically achievable for even the dirtiest coal types."[55]

Other sectors

Although European emissions fell about 60% between 1990 and 2000, Europe remains a major source of mercury deposited in other continents and the Arctic.

Most of the industries contributing to mercury emissions to air fall under the scope of the IPPC directive, and relevant BAT Reference documents have been developed.[56] Permitting of IPPC installations, with limited exceptions for some new Member States, is to be completed by 30 October 2007.

With respect to the implementation of the IPPC directive, a report has been recently published by the European Commission, mentioning that although the large majority of the EU Member States take into account the developed BREFs, this is not systematically addressed in all of the relevant legislation. Furthermore, the European Parliament in its Resolution of 28 February 2004 expressed concerns about the "remarkable variations in implementation" and called for more efforts to monitor the implementation of the Directive.

In light of the major contribution of the industrial sector to mercury air emissions, it is necessary to set, as a minimum action, Emission Limit Values for mercury from all relevant activities - including the chlor-alkali sector and secondary steel production. As mentioned before, national mass emission limits as well as local air quality limits for mercury should be set under relevant existing legislation or a separate legislative instrument.

54 U.S. EPA, Office of Research and Development, Control of Mercury Emissions from Coal-Fired Electric Utility Boilers, p. 15 (2004).

55 U.S. Senate Committee on Environment and Public Works, Senator Jeffords' Statement on Pending EPA Proposal To Deregulate Mercury: The Real Status of Mercury Control Technology (Dec. 3, 2003), http://epw.senate.gov/pressitem.cfm?party=dem&id=216052 (visited on May 4, 2004).

56 http://eippcb.jrc.es/pages/FActivities.htm

Considering that many BREFs are still under development, and some completed ones are entering into revision, discussion in the relevant working groups should focus on the mercury emissions from all industrial activities and emission limits should be set wherever possible.

Concerns also exist about how mercury emissions to air from at least three important sources, the chlor-alkali industry, the cement industry and secondary steel production, are underestimated.

Mercury Cell Chlor-alkali Sector

At present some 12,000 – 15,000 tonnes of mercury are contained in factories using the mercury cell process for chlorine production in the EU. Mercury cell production accounts for nearly 50% of chlorine production in Europe.[57] Although some of this mercury is largely contained and recycled within the chemical process, mercury emissions into air, water and also in waste are generated.

Mercury consumption by the Western European chlor-alkali industry in 2000, extrapolated from the chlorine industry trade association Euro Chlor's report to OSPAR[58], was 95 tonnes[59]. The Mercury Strategy Extended Impact Assessment states that consumption in 2003 was 120 tonnes per year,[60] demonstrating not so much a steady increase, but rather the variability in mercury consumption from one year to the next – as typically calculated and reported by industry. Industry estimated that total mercury emissions to air, water and products from chlor-alkali plants in western Europe were 9.5 tonnes in 1998,[61] and somewhat lower in 2000 — less than 10% of the total mercury consumption reported as releases. This low figure is based on individual facility reports to the OSPAR Commission and the EPER database. We question these emission estimates in light of the quantities of mercury that this industry purchases each year to replace "lost" mercury and the difficulties that facilities appear to be having in creating accurate mercury mass balances to account for the fate of mercury within their operations. Difficulties known to be associated with the accurate monitoring of fugitive releases in this industry, particularly episodic fugitive releases caused during upset conditions, cast further doubt on the accu-

57 Maxson, Peter, Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, report for the European Commission – DG Environment (Brussels: February 2004). p. 3.

58 Oslo Paris Commission , http://www.ospar.org/

59 Maxson, Peter. Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, report for the European Commission – DG Environment (Brussels: February 2004). p. ES-4.

60 Maxson, P. (2005). "Global mercury production, use and trade", Chapter in: Dynamics of Mercury Pollution on Regional and Global Scales – Atmospheric Processes and Human Exposures around the World (eds.: Pirrone and Mahaffey), Kluwer Academic Publishers.

61 European Commission Integrated Pollution Prevention and Control (IPPC). 2001. Reference Document on Best Available Techniques in the Chlor-Alkali Manufacturing Industry, p. ii

racy of this mercury emission figure.[62] Typical monitoring of emissions, which Euro Chlor recommends at monthly intervals[63], is highly unlikely to catch these upsets.

The 2002 draft OSPAR Commission report[64] documents some alarming disappearances of mercury in reported "differences-to-balance" between the mercury purchased annually for replacement in this industry versus the quantities of mercury emissions and waste from each plant. Euro Chlor insists that much of the mercury "consumed" annually in the industry has not escaped as emissions or waste.[65] It points to the fact that emissions are measured at these plants and that these monitoring data reveal the low emissions that are reported. However, the measurement and estimation of total mercury inventories and emissions from this sector, even when done carefully, are difficult, technically challenging and subject to a range of measuring and administrative errors and omissions. It is thus likely to be inaccurate for several reasons.

The EC should note that these are the realities that have recently led the U.S. Environmental Protection Agency to hedge its support for the industry hypothesis of the fate of annually consumed mercury[66] and to reconsider its proposed air pollution rules for this industry.[67] The industry has long maintained that most of the "disappearing" mercury is merely accumulated in plant piping and equipment and may eventually be recovered during a thorough decommissioning and plant clean-up. Unfortunately, this theory is not supported by actual experience in recovering mercury during previous decommissionings and site clean-ups.

The Implications of These Monitoring Challenges

Given all the uncertainties regarding the current emission estimates, we recommend that the EU should estimate mercury emissions from the chlor-alkali sector using an emissions range. The upper bound of the range could be based on a worst-case assumption that annual mercury releases are equal to annual consumption minus properly monitored quantities of mercury in safely deposited wastes.[68]

62 US EPA. Hazardous Air Pollutant Emissions from Mercury Cell Chlor-Alkali Plants. Background Information Document for Proposed Standards. EPA-453/R-02-007. February 2002. Kinsey, J.S. 2002. Characterization of mercury emissions at a chlor-alkali plant, vols. I and II. US EPA, EPA-600/R-02-007a and EPA-600/R-02-007b. and J.S. Kinsey et al, 2004, Characterization of fugitive mercury emissions from the cell building at a US chlor-alkali plant. Atmospheric Environment 38: 623-631

63 Euro Chlor. Measurement of Air Flow and Mercury in Cellroom Ventilization, February 1999. Euro Chlor Publication. p. 15.

64 OSPAR Commission 2004. Draft Mercury Losses from the Chlor-Alkali Industry in 2002. SPDS 03/7/1-E. Annex 1.

65 We recognize and appreciate Euro Chlor's initiative to monitor mercury emissions from these plants, which far exceeds practices in the United States (where monitoring is not required), let alone in developing countries, which are not likely to use routine housekeeping to reduce emissions.

66 Federal Register USA at vol. 70, p. 920. 2004.

67 Letter and Motion to Hold Case in Abeyance from Michele Walker, US Dept of Justice to Judge Mark Langer, US Court of Appeals, DC Circuit. April 12, 2004

68 Releases include air and water emissions and well as mercury in solid wastes. See OSPAR Commission 2004. Mercury Losses from the Chlor-Alkali Industry in 2002. SPDS 03/7/1-E. Annex 1.

Given the high quantities of mercury reported in "difference-to-balance" for many individual facilities, the newly calculated high end of the range would likely mark the chlor-alkalisector as an extremely important mercury emitter, perhaps the single largest source of mercury air pollution in the EU.

The magnitude and uncertainties surrounding mercury emissions from the chlor-alkali sector underscore the crucial importance of the phase-out of outdated mercury production processes in the European Union. The IPPC has clearly indicated that Best Available Techniques for chlor-alkali manufacturing is considered to be conversion to membrane cell technology.[69] The Mercury Strategy Consultation Document was equally clear that all installations should meet permit conditions based on BAT and operate in accordance with the requirements of Directive 96/61/EC of September 1996, including the phase-out of this technology by 30 October 2007.[70] Nonetheless, the licence for an individual plant takes a range of factors into account[71], not just the need to discontinue its mercury cells, and licences can therefore be legally issued by local authorities to an individual plant still using mercury cells after 30 October 2007.

While Chapter 4.2 of the IPPC Chlor-alkali BREF gives more details about available techniques for prevention and/or reduction of emissions, handling and treatment of wastes, energy use, decommissioning of mercury cell plants and conversion to membrane cell technology for mercury cell plants[72], it doesn't address how precisely a mercury cell could be considered BAT in terms of the necessary technology to minimise emissions. It seems that there is considerable deference to the competent authority in the issuing of permits.

The main factor that could influence the evolution of ELVs is the finalisation of new BREF documents by the IPPC Bureau, leading to the identification of "binding" BAT[73]. It is not clear, however, if this will occur in the revised chlor-alkali BREF – revision work is likely to start in 2008.[74] It seems that at least as reported until now, the new BREF will more fully address BAT for the decommissioning of mercury cells, using information from Euro Chlor and other sources.[75]

---

69 European Commission Integrated Pollution Prevention and Control (IPPC). 2001. Reference Document on Best Available Techniques in the Chlor-Alkali Manufacturing Industry. p.100.

70 European Commission. Mercury Strategy Consultation Document, p. 2.

71 IPPC Permits are to include emissions limit values (or equivalent parameters or technical measures), which are to be based on the "Best Available Techniques" (BAT) for the sector, but taking account of the technical characteristics of the installation concerned, its geographical location and local environmental conditions.

72 European Commission. Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques in the Chlor-Alkali Manufacturing industry. December 2001. p. 72-98.

73 Analysis of Member States' first implementation reports on the IPPC Directive (EU-15) Final Report. June 2004 LDK-ECO Environmental Consultants S.A. Athens, Greece p. 118.

74 Editor's personal communication with DG ENV.

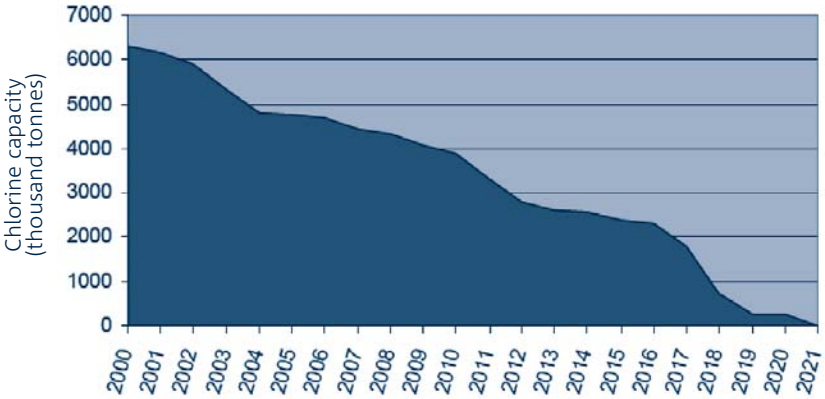
75 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p.67

The revision of the BREF on chlor-alkali manufacture needs to start as soon as possible.

Clearly, Euro Chlor has no intention of complying with the 2007 deadline or the PARCOM (OSPAR) Decision 90/3 recommending a decommissioning by 2010. Its presentation at a meeting with the European Commission on 16 February 2004, for example, as well as at the 31 March 2004 EU Strategy stakeholder meeting, referenced 2020 as its anticipated "voluntary" deadline for a mercury chlor-alkali phase-out[76], with the phase-down schedule more or less as indicated below.[77] It is important to point out that this figure shows the capacity for only the EU-15 plus Norway and Switzerland. The 10 New Member States plus Bulgaria and Romania would add about 800 thousand tonnes of additional capacity to what is shown here.

Figure 2 (source: Maxson, 2004) [78]

Industry Self-Commitment phase-out of Western European mercury cell chlorine capacity



Even based on these data, limited to the EU-15, the leisurely pace of the phase-down provided in this figure is of great concern to the NGO group. We observe that the current capacity of 5370 kt (at year end 2002) is projected to decrease only about 16% to approximately 4500 kt by 2007. By 2010, projected decommissioned capacity is only about 10% more, to 4000 kt. Thus, Euro Chlor figures indicate that more than half of the mercury cell capacity in Western Europe that existed in 1990 will continue to operate past a 2007 or 2010 deadline.

76 Mercury cells in the chlor-alkali industry in Europe: Euro Chlor's points of view, Euro Chlor, February 2004, Brussels.

77 Maxson, Peter. Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, report for the European Commission – DG Environment (Brussels: February 2004). p. 55.

78 Maxson, Peter. Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, report for the European Commission – DG Environment (Brussels: February 2004). p. 55.

The likely underestimation of actual mercury emissions from this sector has perhaps contributed to a lack of urgency on the part of the EC in ensuring aggressive mercury phase-outs in this sector consistent with its directive. However, given that the magnitude of emissions is likely to be much greater than currently estimated, as described above, it should be a high priority to phase out reliance on mercury at these plants, in accordance with established and recommended deadlines. Considering the many arguments for putting the mercury cell technology behind us for good, there is no reason why the PARCOM target date of 2010 could not be achieved. Encouraged by subsidies from their national government, for example, two Italian facilities have recently announced that they will convert to mercury-free technology by 2007.[79] Many other facilities are also studying the cost and timing of conversion. They only need sufficient encouragement from government authorities and others to accelerate their plans.

We thus strongly urge the EU to make the actualisation of the phase-out of mercury at chlor-alkali facilities by 2010 one of its highest priorities, following the PARCOM Decision 90/3.

Cement plants and clinkers

Mercury emissions to air from the cement production accounts for around 23 tonnes per year (around 15.5% of the total mercury emissions to air), as it can be seen in Table 2, making it the third largest contributor of mercury emissions to air per year in Europe.

Cement is a basic material for building and civil engineering construction. Output from the cement industry is directly related to the state of the construction business in general and therefore reflects the overall economic situation closely. The production of cement in the European Union stood at 172 million tonnes in 1995, equivalent to about 12% of world production.

After mining, grinding and homogenisation of raw materials, the first step in cement manufacture is the calcinations of calcium carbonate followed by burning the resulting calcium oxide together with silica, alumina, and ferrous oxide at high temperatures to form clinker. The clinker is then ground or milled together with gypsum and other constituents to produce cement.

The cement industry is an energy-intensive industry, with energy typically accounting for 30-40% of production costs (i.e. excluding capital costs). Various fuels can be used to provide the heat required for the process. In 1995 the most commonly used fuels were pet coke (39%) and coal (36%), followed by different types of waste (10%), fuel oil (7%), lignite (6%) and gas (2%)[80].

Because of the lack of regulatory oversight, it appears that almost anything can be added to the fuel[81] or raw materials mixture to make cement. The amount of mercury in the coal varies

79 Italian Chlorine Producers Funded to Replace Mercury Process, Brussels, Belgium, March 21, 2005 (ENS) http://www.ens-newswire.com/ens/mar2005/2005-03-21-03.asp

80 IPPC Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries, December 2001, Executive summary, page i.

81 Hazardous wastes used by cement kilns include spent and off-specification industrial solvents from paint and coatings, auto and truck assembly, solvent reclamation, ink and printing, cosmetics, toy, medical and electronic industry operations. Paint thinners, waste oils and other petrochemical by-products are also burned.

according to the type and source of the coal. Also, raw materials used to make cement, which include limestone, sand, clay, shale, fly ash and other materials, usually contain a nominal amount of mercury. In some cases, materials such as fly ash and shale contain elevated levels of mercury. This sometimes includes ash from coal-fired power plants with high levels of mercury, which may be one reason why emissions are so high. Kilns that burn hazardous wastes may have additional sources of mercury such as organomercury substances in their waste feed.[82]

At the EU level, large cement producing industries are covered by the IPPC directive. The current BREF on Cement and Lime Manufacturing Industries[83] includes technologies which require consideration of metals and their compounds (section 1.3.3), although they are mainly focusing on co-abatement by technologies primarily designed for other pollutants, particularly dust abatement filters and wet limestone Flue Gas Desulphurisation (FGD). These are less effective for highly volatile metals such as the very toxic mercury and therefore depend more upon their combination of use with Selective Catalytic Reduction (SCR).

Considering that the respective BREF is currently under review to also address issues that have not been fully dealt with in the existing one, a more detailed focus on mercury and its compounds is justified. Sustainable cement factories could go well beyond the current BREF requirements.

In particular, as discussed under section 2.1.1 on Coal Combustion Plants, fuel washing should be considered, as is the case with the use of coal in the LCP BREF (section 3.6.1). Particular attention must be paid to the co-abatement potential of dust abatement technology, wet limestone FGD and SCR. The whole "alternative fuel" issue in cement kilns is the practice of burning tyres, oils, etc. and also needs to be addressed for health implications and sustainability within the EU.

Another very important parameter which is too often overlooked is the exhaust gas temperature. This varies between 110°C and 180°C; however, although at 110°C there is a high chance to capture a large fraction of Hg in dust filters, at 180°C the mercury is virtually lost 100% to the atmosphere. [84]

Mercury emission limits are indicated in the Waste Incineration directive as a special provision for cement kilns co-incinerating waste. Although ELVs exist for co-incineration, the level of mercury emissions released indicates that either these limits are being exceeded or they are too high.

Mercury emissions from the cement manufacturing industry depend upon the quality and type of fuel and the other factors discussed above. With respect to the use of coal, the discus-

82 http://www.in.gov/idem/air/workgroups/mercury/oct04/non_egu.html#cement

83 http://eippcb.jrc.es/pages/FActivities.htm

84 IPPC Reference document on Cement and Lime Manufacturing industries, December 2001, p.28 .

sion on the emissions from power plants can be considered. Attention should be paid to co-incinerated waste and the quality of Solid Recovered Fuels (see relevant section on page 57).

Focus should be given to minimising, as far as possible, the mercury emissions from cement and lime manufacturing industries during the review process of the BREF under the IPPC directive or under a separate legislative instrument.

All types of fuel (apart from coal) and input material used in the production of cement and clinker should be mercury-free; hazardous waste, especially when it contains mercury, such as switches etc. should not be part of the fuel and in any case should be separately collected and treated (see section 2.3.5). Other issues such as fuel washing, exhaust gas temperature and the co-abatement potential of dust abatement technology, wet limestone FGD and SCR should be carefully considered.

Iron and Steel Production

As shown in Table 2, pig iron and steel production account for approximately 8 tonnes of mercury air emissions within the EU each year. It is unclear, however, whether this estimate only applies to primary smelting activities, or whether it is intended to incorporate secondary production processes as well. In either case, we believe this number significantly underestimates mercury emissions from this sector, once emissions from secondary steel production are fully taken into account.

As demonstrated by Norway and Sweden during the Nordic Council of Ministers Mercury Workshop on 29-30 March 2004, and as indicated by comparable experiences in the U.S., mercury emissions from secondary steel smelting is typically ignored or underestimated until stack tests are actually performed. The main sources of mercury at these plants are often the used switches and other mercury products in the scrap metal feed for these facilities, and this linkage between mercury in the feed and potential emissions is a relatively recently understood phenomenon.

In the United States, secondary steel plants are estimated to emit more than 15 tonnes of mercury emissions annually, making them one of the largest mercury emitters in the manufacturing sector of the economy.[85] Due to the emerging importance of this source category, the U.S. EPA recently published a rule requiring the removal of mercury switches before smelting at iron and steel foundries, and is moving forward on a similar requirement for electric arc furnaces.[86]

It has been noted in the IPPC BREF that mercury emissions can vary greatly depending on scrap composition/quality.[87] Based on the experience in Norway and Sweden, and given the

85 See Toxics in Vehicles at www.cleancarcampaign.org/pdfs/toxicsinvehicles_mercury.pdf.

86 See 69 Fed. Reg. 21906, 21918-21919 (April 22, 2004).

87 European Commission Integrated Pollution Prevention and Control (IPPC), Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001, p. 285.

lack of discussion in the Mercury Strategy, it is unclear whether and to what extent the IPPC Directive adequately addresses these significant releases from secondary steel facilities. Although the BREF discusses BAT for minimisation of heavy metal emissions, which includes mercury[88], it is unclear to what extent these are effective in reducing mercury emissions. In a survey of five plants around Europe, mercury emissions to air were found to range between 16-149 mg Hg /tonne of liquid steel.[89] In the case of iron ore, which contains relevant amounts of mercury, emissions are considerable. Emissions of about 15-54 Ìg Hg/Nm3 or 38-136 mg Hg/t sinter[90] are reported when well-designed and operated ESP plus fine wet scrubbing system are applied as abatement techniques. Such releases can lead to significantly higher environmental concentrations in the impact area of a sinter plant.[91]

The EU should take the necessary steps to ensure emissions from this category are adequately estimated in the Member States; review of the IPPC Directive and the actions taken by the Member States regarding this sector should follow in order to determine whether further guidance and/or controls are warranted. Standards must be set for the maximum allowable mercury levels in scrap used in iron and steel production, especially with measures for removal of mercury-containing instruments.

Incineration

As shown in Table 2, emissions to air from waste disposal are estimated to be 11.39 tonnes per year, mostly from incineration. In addition, there are several categories of co-incineration, some of them covered before, which includes cement production and the burning of other materials such as sludge, wood, animal matter and other combustible materials in LCPs.

Sewage sludge (usually produced by urban and industrial wastewater treatment plants) is increasingly being used in LCPs, as it can no longer be disposed of and high levels of mercury and other contaminants make it undesirable for use by farmers. Although during co-combustion only around 5% of the total fuel is sludge, mercury emissions can be significantly higher. This is caused by the higher levels of mercury found in sludge as compared to coal. The LCP BREF found levels of 0.2 - 4.5 mg/kg dry mass in sludge as compared to 0.1 - 0.3 in coal.[92]

88 European Commission Integrated Pollution Prevention and Control (IPPC), Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001. p. iii.

89 European Commission Integrated Pollution Prevention and Control (IPPC), Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001. p. 29.

90 Sinter is defined as the product of an agglomeration process of iron-containing materials, a mass of metal particles bonded and partly fused by the use of pressure and heat below the melting point.

91 European Commission Integrated Pollution Prevention and Control (IPPC), Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001. p. 35.

92 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 509.

The directive on incineration regulates all activities included in the categories of incineration and co-incineration therein, including hazardous waste[93]. Co-incineration during the cement production has been addressed above. The directive also states that "the same emission limit values should apply to the incineration or co-incineration of hazardous and non-hazardous waste but different techniques and conditions of incineration or co-incineration and different monitoring measures upon reception of waste should be retained".[94]

Directive 2000/76/EC on the incineration of waste states:

Articles	Incineration	Co-incineration
Art 7 (Air Emission limit values)	1. Incineration plants shall be designed, equipped, built and operated in such a way that the emission limit values set out in Annex V are not exceeded in the exhaust gas. **Annex V: Air Emission Limit Values** Member States may lay down rules governing the exemptions provided for in this Annex.	3. Co-incineration plants shall be designed, equipped, built and operated in such a way that the emission limit values determined according to or set out in Annex II are not exceeded in the exhaust gas. **Annex II: Determination of Air Emission limit values for the co-incineration of waste** Member States may lay down rules governing the exemptions provided in this Annex
	Daily average values	**II.1 Special provisions for cement kilns co-incinerating waste** Total Emission Values
	Hg 0.05 – 0.1 mg/m3 (30 min – 8 hrs)	Hg 0.05 mg/ m3

The exception is that existing plants for which the permit to operate has been granted before 31 December 1996 and which only incinerate hazardous waste can have emissions of 0.1mg/m³ until 1 January 2007.[95]

Further to that, however, it is noted that the directive requires only a discontinuous monitoring/measurement for mercury emissions (at least 2 per year), whereas some of the Member States have introduced obligations for continuous measurement.

93 Directive 2000/76/EC of the European Parliament and of The Council of 4 December 2000 on the incineration of waste. L 332/94 OJEC 28.12.2000. Article 2, Scope.

94 Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste. L 332/94 OJEC 28.12.2000. General Provisions, (16).

95 Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste. L 332/94 OJEC 28.12.2000. Annex V.

To that end, requirements for continuous measurement of mercury emissions from incinerators should be considered at EU level to ensure more accurate monitoring and control.

Other large sources of mercury emissions are currently medical waste incinerators where mercury is burned from discharged thermometers or sphygmomanometers. In the EU these are regulated under the waste incineration directive. Mercury emissions from medical waste incineration may also come from other products or devices and are also subject to discussions under the Long Range Transboundary Air Pollution Convention, and more explicitly under the Task Force on Heavy Metals.

Further to the relevant directive, waste incineration is also one of the industrial sectors covered under the IPPC directive, where a relevant BREF has been developed. Considering, however, that the BREF on waste incineration does not propose emission limit values, it is necessary that the mercury emission reduction techniques included in this document are taken into account during the revision of the waste incineration directive to also include relevant emission limit values.

Solid Recovered Fuels

Solid Recovered Fuels (SRF)[96] can be derived from household waste, commercial waste, industrial waste and other non-hazardous, combustible waste streams. They are already used to substitute fossil fuels in cement kilns, power stations and industrial boilers.

It is important to note that the environmental and health NGOs' approach to incineration of any wastes, whether by dedicated waste incineration or by SRF users, is that such activities should at no time undermine the drive to the priority activities of source reduction, waste prevention, reuse and material recycling. In other words, such activities should be strictly residual, once all possible efforts have been made to ensure that priority activities are explored to the maximum possible extent. It is important to note in particular that separately collecting different forms of waste is considered to be an essential prerequisite for ensuring this approach and achieving optimum exploitation of the resources' potential.[97]

At CEN (European Standardisation body), following an EC mandate, the Technical Committee (TC 343) on Solid Recovered Fuel was established in 2002 with a view to developing the relevant European Standard for the market for solid recovered fuels. The standard is to be related to waste categorised as "non-hazardous" in the European Waste List, to waste which is not composed exclusively of biomass and to waste which can be considered to be "solid". Work is currently under development. [98]

96 Solid recovered fuel is an alternative fuel which is quality-controlled. (It must fulfil certain requirements and is differentiated in classes.) The other "alternative" fuels are often called "refuse derived fuels - RDF".

97 Position of the Environmental NGOs on the Standardisation of Recovered Fuels, Christian Tebert, Ökopol GmbH – Institute for Environmental Strategies, July 2005.

98 http://www.cenorm.be/CENORM/BusinessDomains/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.asp?param=407430&title=CEN/TC%20343

Considering that the present publication is mainly concerned with mercury, we will only focus on issues relevant to that aspect.[99]

The primary objective in the standardisation of waste used as a fuel is to ensure a guaranteed and precautionary level of waste fuel quality. The fuel quality specified in the standard must take into account environmentally relevant parameters and provide adequate, reliable information on the classification and specification of fuels, thereby enabling both the user and the licensing authority to prevent any increase in the propagation of pollutants. At the moment, the drafts of the standards have only been primarily subjected to internal harmonisation and should be submitted to the national mirror committees for approval. Amongst other issues raised by the NGOs which are not covered by the draft standard, the mercury limitations proposed have upper limits that lie within the region of hazardous waste, although, as indicated above, SRF should be related to non-hazardous ones.

Rather than the stipulated mercury classes being geared towards prevention, they are instead guided by how much can be retained in individual plants using a particular notional air-pollution control system. The classification is based on calculations of the maximum mercury content to be recovered in the waste gas if a given transfer factor is assumed for a given combustion technology. The aim of linking these points is to ensure that particular fuel classes are employed in such a way that the limit values of the waste incineration directive are rightly observed. Calculations were performed under the assumption that 100% recovered fuel is used. [100]

Rather than corresponding to the concept of minimising pollutants, the method merely exploits instead permissible limits in the waste gas to the greatest possible extent. The spectrum of classes covers all conceivable levels of mercury content that can be found in the arena of waste rated as “non-hazardous”. In particular, it is important to take into consideration in particular cases that the transfer factors for mercury and other harmful substances only apply for a defined set of basic conditions. If these change, then the transfer factors will change as well.[101]

Therefore, as work continues, care should be given to ensure that a standard on Solid Recovered Fuel, contributing to high environmental protection, is finally developed.

Electronic waste producers argue that many fuels derived from waste may already feature lower heavy metal concentrations than the raw materials and coal normally used in cement and power plants. However, if anything, this argument serves to demonstrate just how little

99 Full Environment NGOs position on the standardisation of recovered fuels can be found at http://www.ecostandard.org/

100 Position of the Environmental NGOs on the Standardisation of Recovered Fuels, Christian Tebert, Ökopol GmbH – Institute for Environmental Strategies, July 2005.

101 see Stoffflussanalyse als Planungsinstrument für den Einsatz von Ersatzbrennstoffen (Material Flow Analysis as a Planning Instrument for the Use of Solid Recovered Fuels), B.Zeschmer-Lahl, 2004.

attention has been paid so far to heavy metal emissions, such as those stemming from coal combustion, for example. It certainly does not release the waste management industry from their fundamental obligation to strip out harmful substances to the greatest extent possible.

2.1.1.2 Cremation

Mercury emissions from cremation result from dental amalgam fillings contained in people's mouths. The mercury from the fillings is released to the atmosphere at high temperatures during the cremation procedure.

With respect to cremation, no specific action is included in the EU Mercury Strategy. Reference is only made to an OSPAR Recommendation on the basis of which reports on emissions by parties[102] to this Recommendation, due by 30 September 2005, will give an indication of effectiveness and whether further action is required. Already past that date (December 2005), however, such reports have not been published on the OSPAR website. Furthermore, the Commission states that mercury emissions from crematoria are expected to rise due to increasing numbers of people being cremated and an increasing number of fillings per body cremated.[103]

> Mercury emissions from crematoria should be further investigated, including relevant technologies or other effective approach, for eventual control at EU level due to increasing emissions, differing or non-existent regulations in Member States and no mechanism for enforcement of the OSPAR Recommendation. Emission limit values for this source should be proposed by the European Commission by the end of 2006 at the latest.

It has been estimated that there are between 2 and 3.5 tonnes of mercury released annually from crematoria. There is a need for emissions controls from this source and a reduction in use of mercury fillings, as there are an estimated 1,300-2,200 tonnes of mercury in fillings in EU and EFTA states at present[104], a significant portion of which will be released to the environment through cremation.

The relevant OSPAR recommendation only covers 12 out of the 25 Member States and no sanctions are foreseen in case of non-implementation of BAT. Cremations are commonly used

102 Belgium, Denmark, Germany, Finland, France, Ireland, Iceland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and European Union, http://www.ospar.org/fr/html/cp/welcome.html

103 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, p. 55.

104 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, p. 116.

in Austria, the Czech Republic, Estonia, Hungary, Italy, Latvia, Poland, the Slovak Republic and Slovenia, which are not members of OSPAR.[105]

Legislation is already in place in Norway, the Czech Republic, Denmark, the Netherlands, Germany and the UK and should be harmonised as past development of mercury emission limits has led to inconsistent or weak standards in some cases.

In the UK crematoria are responsible for 16% of mercury emissions and will be, without controls, the largest source of mercury pollution by 2020.[106] Sweden and the Netherlands have estimated that without controls on crematoria, their mercury emissions would be expected to increase by around two-thirds in the next 10-30 years, due to an increase in rates of cremation and a higher than average number of fillings per person.[107] In Germany local mercury emissions standards at crematoria were superseded by national regulations for crematoria with no emissions standards and in Denmark in 2004 there were regulations for crematoria, but this did not include limits on mercury emissions.[108] After the industry organisation opposed a plan by the UK Environment Agency to require abatement equipment, a trading scheme was created according to which total mercury emissions will have to be reduced by 50% by 2012. The plan presents a stark contrast between crematoria and other regulated sectors in the UK, which are required to apply BAT. The plan itself has several flaws, including the lack of any agreement on which crematoria will install pollution control[109], in addition to the likelihood of continued localised pollution, as was discussed under Actions 1 and 2 on LCPs.

Emission control technology in Germany, Norway, Switzerland, and Sweden has been demonstrated to be effective in reducing mercury emissions by 95% or more, with the resultant emissions to air below 0.05% mg/Nm3, the limit in a number of countries. In addition, Norway has set a limit of emissions to water at 2.0 _g/litre.[110]

Technology and innovation are always advancing. In relation to cremation, a new method called “promession” by its inventor, Swedish biologist Susanne Wiigh-Masak, has recently

105 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, p. 54.

106 Crematoria warned over mercury, 2005/01/10, BBC News, http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/4160895.stm

107 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 87-88.

108 Health Care Without Harm. Comments on the Consultation Document: Development of an EU Mercury Strategy from 15 March 2004, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/health_care_without_harm.pdf, accessed on 6 July 200.

109 Green light for ‘trading’ in crematoria mercury emissions, ENDS Report 360, January 2005, p 41.

110 Health Care Without Harm. Comments on the Consultation Document: Development of an EU Mercury Strategy from 15 March 2004, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/health_care_without_harm.pdf, accessed on 6 July 2005.

appeared in the media. The dead body is frozen and dried, using liquid nitrogen. A mechanical vibration then causes the body to fall apart within 60 seconds before a vacuum removes the water. Then a metal separator picks out metals such as artificial hips and dental fillings. It is said that this alternative is a much cheaper conversion rather than installing a new gas-cleaning system and furnace to meet new regulations, and a more environmentally friendly procedure.[111]

In the UK, Crewe and Nantwich Borough Council is to discuss the use of this technique, in a bid to reduce harmful mercury emissions caused by cremations.[112] The Scottish Executive said in its current review of burial and cremation legislation that promession could be considered, after councillors in England revealed they were looking at adopting the procedure. A spokesman for the Church of Scotland said: "There do not appear to be any theological implications with this method of disposal, but it sounds like an appropriate thing from an environmental viewpoint." [113]

No further studies with respect to costs and the environmental impacts of such a method are known to us at this stage, therefore this reference should rather be considered as new information, while policy decisions are taken.

Although the alternative presented above might sound like a good solution with respect to mercury emissions from crematoria, under no circumstance should it be considered as an excuse to avoid taking any potential measures towards the minimisation and eventual elimination of mercury use in dental amalgams, and mercury emission control from existing crematoria.

2.1.2. International Limits for air emissions

Developments with regard to mercury emission limit values should be taken on board as soon as they emerge from any EU or international fora, such as the Protocol on Heavy Metals under the Long-Range Transboundary Air Pollution (LRTAP) Convention. A Task Force on Heavy Metals has been created to follow up the progress and eventually the review of the protocol; it already met in April and June 2005.

111 Big Freeze, an alternative to cremation, 3 October 2005, http://www.able2know.com/forums/about60723.html

112 http://news.bbc.co.uk/1/hi/england/staffordshire/4336100.htm, http://www.timesonline.co.uk/article/0,,2-1823234,00.html

113 http://thescotsman.scotsman.com/index.cfm?id=2086492005

2.1.3. Emissions to water

2.1.3.1 Dental amalgam waste

Mercury emissions to water can come from different sources. One major source is mercury from dental tooth filling waste from dental clinics.

To this end, the EU Mercury Strategy proposes:

> Action 4. The Commission will review in 2005 Member States' implementation of Community requirements on the treatment of dental amalgam waste and will take appropriate steps thereafter to ensure correct application.

Dental offices are a well-documented and significant source of mercury discharges to water. The second largest use of mercury in Europe is for dental amalgams. In 2000, 70 tonnes were used in the 15 Member States alone.[114] Through the use of amalgam separators[115] in the wastewater stream from dental offices, removal efficiencies of 99% can theoretically be achieved, although in practice they are generally lower. However, there is evidence that hot foods and liquids, as well as chewing, release mercury vapours from fillings in people's mouths.[116] This mercury is then excreted by the body and enters the waste water systems, the environment, makes its way into fish, and returns to humans in the form of methylmercury. On this basis, a phase-out of mercury amalgam is considered to be very important from an environmental point of view[117]. From a public health perspective, it makes sense to apply a precautionary approach, considering that alternatives exist.[118] (see also section 2.3.1.)

> Concerning dental amalgam waste, a review of the implementation of Community requirements should be carried out as soon as possible and before the end of 2006 at the latest, and appropriate measures should be taken soon thereafter to reduce both the use and release of amalgam. More rigorous installation and monitoring as regards separation, the introduction of devices in the wastewater system of dental offices, good record-keeping and devices that meet a high standard would be needed.

---

114 Maxson, Peter. European Commission. Mercury Flows in Europe and the World: the impact of decommissioned chlor-alkali plants, February 2004, page ES-4.

115 A CEN standard on Dentistry - Amalgam separator is currently (October 2005) under development, http://www.cenorm.be/CENORM/BusinessDomains/TechnicalCommitteesWorkshops/CENTechnicalCommittees/WP.asp?param=6039&title=CEN/TC%2055. The ISO equivalent standard is ISO 11143, which is currently under revision.

116 J. Mutter, J. Naumann, C. Sadaghiani, H. Walacha, G. Drasch, Amalgam Studies: disregarding basic principles of mercury toxicity. Int. J. Hyg. Environ. Health 207 (2004); http://www.elsevier.de/intjhyg p. 391 and Mercury flows in Europe and the world: Final report – February 2004 The impact of decommissioned chlor-alkali plant , Concorde East/West Sprl, European Commission, Brussels, Belgium, DG Environment, p. 36.

117 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban. http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 10.

118 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban. http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 8.

In parallel, an evaluation in order to restrict the use of dental amalgam use should take place at EU level and the Commission should present a proposal by the end of 2006 at the latest.

Limits for mercury levels in wastewater discharged from dental offices could also be set. As a guideline, water quality standards of 1.3 part per trillion for mercury for effluent discharged[119] could be followed.

Dental amalgam waste need to be better controlled in light of their ongoing contribution to mercury emissions. The enforcement of the requirement to install amalgam separators and manage mercury-laden solid wastes from dental offices as hazardous waste is an important first step. However, separators are not entirely effective and mercury from amalgams enters the environment through other pathways. The phase-out of mercury fillings should be pursued in the longer term.

Although mercury-containing dental amalgam waste is considered to be hazardous waste within the European Union[120] and must be disposed of in accordance with applicable laws, enforcement has not been consistent. The Commission has notified the UK that the imposition of amalgam separator requirements is necessary in order to comply with Article 4 of the Waste Framework directive. This followed an investigation in which they found that amalgam was not being treated as a hazardous waste, but rather released into the environment from dental clinics.[121] The Commission's Mercury Strategy consultation document further indicated that other Member States could be similarly recalcitrant in requiring amalgam separators at dental offices.[122]

Those EU Member States which currently lack legislative measures for amalgam separators requirements should provide a timetable for doing so to the Commission in the short term. Those failing to provide this timetable should be identified as priorities for follow-up administrative action by Commission staff.

In addition, the Commission should ensure that mercury-laden pipes and plumbing fixtures (i.e. nearly all wastewater systems serving dental practices) are cleaned and/or

119 Savina, Gail. Mercury in Waste Dental Amalgam: Why Is It Still a Problem? Local Hazardous Waste Management Program in King County, December 2003, SQG-Dental-6(12/03).

http://www.govlink.org/hazwaste/publications/WasteAmalgamProblems_03.pdf

With reference to discharges into the Great Lakes and San Francisco Bay, which are quite stringent.

120 Council Directive 91/689/EEC of 12 December 1991 on hazardous waste, Official Journal L 377 , 31/12/1991 P. 0020-0027 http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:31991L0689:EN:HTML

121http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/52&format=HTML&aged=0&language=EN&guiLanguage=en

122 Council Directive 99/31/EC on the landfill of waste, 26 April 1999.

replaced since they have long accumulated mercury wastes and constitute an ongoing source of mercury release. Other dental-related activities should include: ensuring historic supplies of elemental mercury currently stored at dental offices are appropriately managed, and ensuring that mercury-laden solid wastes from dental offices are handled as hazardous waste, in accordance with law, so that they are removed from the economic cycle rather than improperly disposed of, or combusted in medical or municipal waste incinerators.

In Sweden,[123] Norway[124] and Denmark[125], the use of mercury in fillings has been greatly reduced in consideration of the environment and possible direct effects to health while amalgam separators are used in dental offices. Amalgam separators are also in use in the Netherlands[126], France[127] and Switzerland[128].

Although amalgam separators have been required since 1979 in Sweden[129] and led to significant reductions in mercury emissions to wastewater, there are deficiencies in the effectiveness of amalgam traps. A 1998 study found that one in four traps in Stockholm did not operate correctly, leading to increased discharges. Even if the traps' cleaning capacity was the theoretical 95-99%, the amount of mercury discharged would still correspond to 2-11 % of the total quantity of mercury emissions.[130]

In Sweden, the use of amalgam has been identified as the single largest source of mercury in sewage sludge, with almost half of this released from amalgam fillings while they are in the

123 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 8.

124 A National Clinical Guideline for the Use of Dental Filling Materials, 2003 http://www.shdir.no/vp/multimedia/archive/00001/IS-1136_1661a.pdf, accessed on 22 June 2005, p. 6.

125 UNEP, Global Mercury Assessment, Appendix, Overview of Existing and Future National Actions, including Legislation, Relevant to Mercury as of 1 November 2002, http://www.chem.unep.ch/mercury/Report/Final%20report/final-appendix-1Nov02.pdf, accessed on 13 June 2005 p. 59.

126 Dorgelo, Folke, Chemicals and Environmental Health Division, Ministry of the Environment, the Netherlands, Environmentally Hazardous Substances Act: Decree on Products Containing Mercury, 1998.

127 UNEP, Global Mercury Assessment, Appendix, Overview of Existing and Future National Actions, including Legislation, Relevant to Mercury as of 1 November 2002, http://www.chem.unep.ch/mercury/Report/Final%20report/final-appendix-1Nov02.pdf, accessed on 13 June 2005 p. 49.

128 UNEP, Global Mercury Assessment, Appendix, Overview of Existing and Future National Actions, including Legislation, Relevant to Mercury as of 1 November 2002, http://www.chem.unep.ch/mercury/Report/Final%20report/final-appendix-1Nov02.pdf, accessed on 13 June 2005, p. 68.

129 UNEP, Global Mercury Assessment, Appendix, Overview of Existing and Future National Actions, including Legislation, Relevant to Mercury as of 1 November 2002, http://www.chem.unep.ch/mercury/Report/Final%20report/final-appendix-1Nov02.pdf, accessed on 13 June 2005, p. 51.

130 Letter from Petra Ekblom, Senior Technical Officer, KEMI (Swedish Chemicals Inspectorate) to Ms. Gina McCarthy, Commissioner Connecticut Department of Environmental Protection, 23 May 2005.

mouth, and another large part from incomplete separation of amalgam from dental surgeries, including mercury in wastewater piping system sediment.[131]

The presence of mercury in sewage sludge makes it more difficult to use sludge as an agricultural fertilizer. In 1999 the average mercury content of sludge used in agriculture was 1.5 mg/kg of dry matter, leading to the introduction of 4.3 tonnes of mercury to EU agricultural land.[132] Sludge is regulated by Directive 86/278/EEC of June 1986. Member States must prohibit the application of sewage sludge to soil where the concentration of one or more metals in the soil exceeds the limit values laid down in the first annex. For mercury the soil limit value is 1 to 1.5 mg/kg of dry matter for soils with a pH higher than 6 and lower than 7. Member States must also regulate the use of sludge so that the accumulation of heavy metals in soil does not exceed the limit values, in two ways: a) by laying down the maximum quantities of sludge which may be applied per unit of area per year while observing limit values for heavy metals concentration in sludge set in accordance with a second annex - for mercury this limit value is 16 to 25 mg/kg of dry matter; or b) by observing limit values for the quantities of metals introduced into the soil per unit of area and unit of time as specified in a third annex – for mercury this limit value is 0.1 kg/ha/yr.

Sweden uses another set of standards, for which the level of mercury in sludge must not exceed 2.5 mg/kg of dry matter to be used as a fertiliser on arable land. The Swedish Environmental Protection Agency has proposed reducing the limit to 1.8 mg/kg of dry matter as from 2005.[133]

Revision of the EU directive on sludge, dated from 1986 (86/278), is needed as soon as possible.

The high mercury content in sewage sludge has led treatment facilities to search for other recipients willing to buy it, as mercury removal from sludge is not cost effective and combustion of sludge in waste incineration plants or special incineration plants for sewage sludge is expensive.[134] In some cases, it is sold to combustion plants to be burned in conjunction with coal, but this leads to higher mercury emissions to air, as discussed above, often involving additional pollution control measures.

Furthermore, the Commission adopted a Communication towards a Thematic Strategy for Soil Protection (COM(2002) 179 final) in 2002. Building on this communication, the Thematic

131 Letter from Petra Ekblom, Senior Technical Officer, KEMI (Swedish Chemicals Inspectorate) to Ms. Gina McCarthy, Commissioner Connecticut Department of Environmental Protection, 23 May 2005.

132 EU Legislation and Policy Relating to Mercury and its Compounds. Working Document, June 2004. Prepared to inform the development of an EU strategy on mercury, p. 12/42.

133 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban

http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 19.

134 Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants LF/EIPPCB/LCP_BREF_FINAL, May 2005, p. 507.

Strategy which is now in preparation will comprise a package of measures, including some pertaining to soil contamination and other issues. Sludges and biodegradable waste management, although foreseen to be included in the Soil Thematic strategy, are now expected to be dealt with under the future action points of the Waste Prevention and Recycling Strategy due to be published in the near future (December 2005). These may contain specific provisions relating to mercury.

2.1.3.2 Chlor-alkali plants and other industries

Emissions limits for mercury from chlor-alkali industry to water are set by Council Directive 82/176/EEC of 22 March 1982 on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry[135].

Emission limit values from non-chlor-alkali industries to water are set by Council Directive on limit values and quality objectives for mercury discharges by sectors other than the chlor-alkali electrolysis industry (84/156/EEC).

Mercury emissions to water are also considered under the relevant BREFs of the IPPC directive. Considering the advancement in technologies, it seems that mercury emissions to water can be achieved at lower levels than indicated by the directives.

The Waste Incineration Directive (2000/76) sets emission limit values for discharges of wastewater from the cleaning of exhaust gases. Most waste incineration facilities will also fall under the scope of the IPPC Directive. Where the application of the IPPC Directive would entail stricter requirements than those of Directive 2000/76, then these stricter requirements take precedence.[136]

Article 16(10) of the Water Framework Directive 2000/60/EC (see next section) requires that the Commission reviews, revises and possibly repeals Directives 82/176 and 84/156, including their limit values and quality objectives. Thus, in effect, the controls established by Directives 82/176 and 84/156 under the framework of Directive 76/464 will be superseded by new measures established under the framework of Directive 2000/60. Directive 76/464 will be repealed on 22 December 2013 (thirteen years after the entry into force of Directive 2000/60).[137]

135 Council Directive of 22 March 1982 on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry, (82/176/EEC), http://europa.eu.int/eur-lex/en/consleg/pdf/1982/en_1982L0176_do_001.pdf

136 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, Annex 4, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf

137 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, Annex 4,

2.1.3.3 The Water Framework Directive Priority Substances List

In 2001, mercury and its compounds were designated as one of 33 "priority substances" to be regulated under the Water Framework Directive (WFD). On that basis, the Commission had to propose a daughter directive with respect to the list of substances mentioned above, for which emission limit values (at least for point sources) and quality standards would be set. From the list of 33 substances, some were characterized as "priority hazardous substances".[138] For priority hazardous substances, where mercury is also included, emission controls will include measures for the progressive reduction of discharges, emissions and losses of the substances concerned and in particular the cessation or phasing-out of discharges, emissions and losses of the substances, including an appropriate timetable for doing so, which shall not exceed 20 years after the adoption for these proposals.[139] The date for achieving these environmental quality standards is 22 December 2015, with ongoing implementation cycles thereafter. On the basis of Article 16 of the WFD, however, the Commission should have already proposed the above-mentioned daughter directive and respective measures by 2003!

It is absolutely necessary that the Commission should proceed as soon as possible with their obligations under the Water Framework Directive to propose adequate emission controls and quality standards to phase out discharges, emissions and losses of mercury and its compounds into the aquatic environment.

2.2. Reducing supply

The EU is an extraordinarily important player in the global mercury market because it is home to the world's largest primary mercury mine and it is the dominant exporter of excess mercury to the developing world. There is significant trade within Europe and the net annual export in recent years has been around 1,000 tonnes.[140] The reduction of global trade in mercury is a cornerstone strategic objective that is of the utmost importance. This should be supported through a variety of policy initiatives and activities to reduce both global supply and demand, including the closure of the mine in Spain and storage of surplus stocks, as well as the indefinite storage of mercury from decommissioned chlor-alkali plants and potentially other surplus supplies so that mercury is not placed into commerce.

The price of mercury has fallen dramatically from its peak in the 1960s, standing relatively stably at around $US 4-5/kg for most of the past decade. However, a recent combination of events — primarily reduced mercury mine output and low quantities of mercury becoming

138 http://europa.eu.int/comm/environment/water/water-framework/priority_substances.htm

139 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, Article 16, http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=32000L0060&model=guichett

140 European Commission, Community Strategy on Mercury.

available from the chlor-alkali industry, combined with possible speculatory activities in anticipation of the discussed EU mercury export ban — has sent mercury prices sky-rocketing. Rising rapidly since mid-2004, the market has seen mercury prices upwards of $25 per kilo in mid- to late 2005. While substantial mercury supplies, especially from the chlor-alkali industry, are expected to soon become available, the small size of the market and the propensity of "market-makers" to speculate may lead to considerable future volatility in the world mercury price. At the same time, despite present prices, the economic significance of the mercury trade remains quite small.[141]

Indeed, defenders of the current unfettered trade in mercury argue that the legality of mercury trade is prima facie evidence of its "legitimacy". In effect, some traders already hide behind the existing cloak of legality to avoid the stark reality that much of the global trade in mercury is hardly "legitimate" as a public health or environmental matter, as highlighted by UNIDO[142] representatives at the stakeholder meeting of 31 March 2004 in Brussels. For example, there is substantial evidence presented elsewhere in this paper that up to one third of global mercury demand now goes to artisanal and small-scale gold mining in over 50 different countries. Very little of this mercury commerce could be termed "legitimate" in any of these countries – especially in view of the significant human health and environmental impacts.

The following elements are key to reducing the global supply of mercury in circulation:

- Immediate promotion of mercury trade tracking and transparency in the EU and globally;
- Improved enforcement of EU mercury product restrictions already in place;
- Financial, educational and technical assistance in targeted priority areas of the world where substantial, environmentally harmful, and outmoded uses of mercury are employed;
- Setting meaningful global demand reduction targets that can be pursued bilaterally and multi-laterally by EU nations, and the development of mechanisms within the EU and elsewhere to ensure excess mercury supplies are stored indefinitely instead of entering the global marketplace.

Acknowledging the above, the European Commission has proposed the following action:

> Action 5. As a pro-active contribution to a proposed globally organised effort to phase out primary production of mercury and to stop surpluses re-entering the market as described in section 10, the Commission intends to propose an amendment to Regulation (EC) No. 304/2003 to phase out the export of mercury from the Community by 2011.

141 P. Maxson, Global Mercury Production, Use & Trade, presentation at EEB conference "Towards a Mercury-free World", Madrid, 22 April 2005.

142 United Nations Industrial Development Organisation

2.2.1. An EU mercury export ban is needed by 2008

The proposed ban on EU mercury exports should be implemented as soon as possible, preferably by 2008 as originally proposed in earlier Commission drafts and also by the Luxembourg Presidency[143], but certainly no later than 2011. The decision for such a ban should be taken as soon as possible and no later than September 2006.

1.- The EU is the world's largest mercury exporter, and most of this mercury goes to the developing world.

The EU exports more mercury overall, and more to the developing world, than any other region of the world, and government trade documents clearly show this. From 2001 to 2003, EU countries exported more than 3,000 tonnes of mercury – some 30% of global consumption[144] – to non-OECD countries. Merely to cite a few examples, in 2003 alone, Spain exported 92 tonnes of mercury to Colombia, 53 tonnes to Peru, and 171 tonnes to Iran. Between 2001 and 2003, Spain and Germany exported 464 tonnes to Singapore, from where it was likely to be traded throughout Asia. Between 2001 and 2003, Spain and the UK exported 470 tonnes of mercury to India, accounting for most of that country's imports.[145]

As the world's primary mercury exporting region, EU leadership in dealing with global mercury problems is an economic and moral imperative. Strong EU leadership will not only encourage other countries to reduce mercury consumption, it will also encourage further global trade deliberations needed to significantly reduce the role of mercury as a global pollutant in the international economy.

2.- An EU export ban, coupled with other international actions as specified in the EU strategy document, will significantly reduce the disproportionate impacts of mercury exposure in the developing world caused by abundant mercury supplies, inadequate resources to enforce existing regulations and virtually no incentive to upgrade outdated technologies.

This mercury exported to non-OECD countries is largely consumed in poorly controlled and outmoded or illegal activities. According to the best information available, most of this mercury is destined for either battery production, use at chlor-alkali plants, or small-scale gold mining.[146] All three of these activities, as practised in much of the developing world, result in substantial exposure to workers and their families and pollution of the local and global environments.

143 http://register.consilium.eu.int/pdf/en/05/st07/st07986.en05.pdf

144European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005

145 See UN statistics at http://unstats.un.org/unsd/comtrade/ and Eurostat statistics at http://europa.eu.int/comm/eurostat/, External Trade heading.

146 Maxson, P. (2004). Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants. Report by Concorde East/West Sprl for DG Environment of the European Commission.

Small-scale gold mining is the area of highest global mercury consumption (estimated at 800 tonnes in 2004)[147]. As much as 95% of all the mercury used in small-scale gold mining is released to the environment. Similarly, chlor-alkali plants operating in India and elsewhere in the developing world release typically 10-50 times more mercury on a routine basis than plants operating in EU-15 countries.[148] The use of mercury in battery production appears to stem primarily from the continued manufacture of mercury oxide batteries containing 33-50% mercury,[149] which OECD countries banned many years ago.

3.- This prohibition on mercury exports will contribute to decreasing demand for mercury due to an eventual price rise.

An EU mercury export ban, signalled several years in advance, would have direct effects on global commerce. Decrease in the quantities of mercury readily available to the market would lead to an increase in price. For many low-technology uses such as small-scale gold mining, higher prices have been demonstrated to encourage direct reductions in mercury uses and releases.[150] In fact, the GEF/UNDP/UNIDO Global Mercury Project, which has worked with small-scale gold miners for many years, has strongly advocated an EU export ban as an effective way to reduce mercury demand in small-scale gold mining.[151]

Opponents of an export ban argue that new production of mercury might be triggered to fill in any gap in market demand. Besides ignoring a range of EU initiatives proposed to help curb mercury demand, this argument lacks merit since it ignores the limited ability, for both technical and political reasons, of mercury-producing countries to expand their output. Algeria's capacity has long been limited to about 450 tonnes per year, with 2004 output far below that at around 150 tonnes. An Algerian production rise, even up to present capacity, would not be expected without serious government investments in equipment and management, which seems unlikely in view of competing and generally more profitable alternative investments in Algerian resource development such as hydrocarbons.[152]

---

147 Veiga MM, Maxson PA, Hylander L, Origin of mercury in artisanal gold mining. Paper accepted on 12 August 2004 for publication in 2005 in the Journal of Cleaner Production (Elsevier).

148 There are regular reports of plants releasing even more. For India, for example, ref. R. Agarwal presentation on 22 April 2005 at the EEB conference "Towards a mercury-free world", Madrid. For Russia, ref. ACAP. 2005. Assessment of Mercury Releases from the Russian Federation. Arctic Council Action Plan to Eliminate Pollution of the Arctic (ACAP), Russian Federal Service for Environmental, Technological and Atomic Supervision & Danish Environmental Protection Agency. Danish EPA, Copenhagen.

149 Maxson, P. (2004). Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants. Report by Concorde East/West Sprl for DG Environment of the European Commission.

150 Veiga MM, Maxson PA, Hylander L, Origin of mercury in artisanal gold mining. Paper accepted 12 August 2004 for publication in 2005 in the Journal of Cleaner Production (Elsevier).

151 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p. 26

152 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p. 25 and http://www.mem-algeria.org

Similarly, in recent years, the mining complex in Kyrgyzstan has rarely produced as much as 600 tonnes in one year[153] — although having a nominal capacity of 1,000 tonnes. For varied reported reasons – including recent difficulties with flooding and maintenance, complex mining conditions, potential exhaustion of the higher quality ore reserves and tension over mercury production with neighbouring country Uzbekistan – this country often produces well under 600 tonnes, making any increase above that unlikely. Indeed, an attempt to privatise the Kyrgyzstan complex in August 2003 failed due to lack of interest from investors.[154]

In addition, it is important to keep in mind that China's mercury production, recently reported at 600 -650 tonnes annually, has long been devoted to satisfying booming domestic consumption.[155]

Moreover, any argument against the export ban ignores the political pressure to decrease, not increase, production that has already reached Spain and will face other producing countries once the EU formally endorses the export ban. Indeed, pressure has already begun, since shortly after the release of the EU Strategy, the UNEP Governing Council adopted a resolution in February 2005 calling upon governments and others to curb the primary production of mercury and the introduction into commerce of excess mercury supplies. This same resolution also requests UNEP staff to prepare a report on global trade in mercury so that further options addressing this trade can be considered at the 2007 Governing Council meeting. Consistent with these UNEP Governing Council resolutions and the proposed EU export ban, we urge EU countries to initiate bilateral discussions on this issue with Algeria and Kyrgyzstan as soon as possible.

2.2.1.1 Legal implications

There has been some suggestion in the past that this export prohibition may conflict with WTO rules. However, this is not an issue, considering that such prohibitions have already been put in place for purely environmental reasons in Sweden and Denmark, as well as at EU level in Regulation 304/2003 (export ban on cosmetics containing mercury, POPs). Furthermore, other countries such as Finland, the Netherlands and Austria have supported such a ban.[156]

153 Regional awareness-raising workshop on mercury pollution: A global problem that needs to be addressed, Kiev, Ukraine, 20-23 July 2004. Sponsored by the United Nations Environment Programme within the Inter-Organization Programme for the Sound Management of Chemicals, and organized jointly with the Ministry of Environment and Natural Resources of the Ukraine and the Institute of Occupational Health in Kiev. Proceedings issued by UNEP Chemicals, November 2004. Geneva.

154 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p. 25-26.

155 China Non-Ferrous Industry Yearbook 2004, China Non-Ferrous Industry Association, http://minerals.usgs.gov/minerals/pubs/commodity/mercury/mercumcs05.pdf

156 http://europa.eu.int/comm/environment/chemicals/mercury/consultation_responses.htm

2.2.1.2 Scope of the EU Mercury Export Ban

The proposed export ban must apply to mercury compounds as well as elemental (liquid) mercury, and the compounds covered must include mercuric chloride and mercuric oxide at a minimum.

Mercury compounds must be included in the export ban for several reasons. Firstly, there is a potential for these compounds to be easily created and exported for use in the manufacture of cosmetics, batteries, pharmaceuticals, paints and biocides. Use of these compounds has been promoted through a wide variety of trade names and other descriptions of mercury compounds that sometimes pretend to have no relation to mercury.[157] At a September 2005 meeting of the Commission Sweden, Germany, and Denmark expressed support for the extension of the proposed ban to include these compounds.

Secondly, since a principal purpose of the export ban is to discourage global mercury trading and thus mercury use, it makes little sense to enable EU export of these mercury compounds which are the feedstock for some of the largest global mercury uses. EU traders would simply produce mercury compounds for export, since there is a potential for these compounds to be easily created and exported for use in the manufacture of cosmetics, batteries, pharmaceuticals, paints and biocides. The EU export ban would thus have little or no effect on global mercury trade or consumption.

For example, mercuric oxide would be exported and used to make mercuric oxide batteries in China and elsewhere in the developing world, according to the EU's own trade study.[158] These batteries could return to the EU, in many cases violating EU laws, as well as contributing unnecessarily to the global pollution problem. Similarly, mercuric chloride is used as a catalyst in the manufacture of vinyl chloride monomer in Russia and China, and perhaps elsewhere as well.[159] Global aggregate demand for these two compound uses alone may have exceeded 1,300 tonnes in 2000. While demand for these two compounds may now be somewhat reduced, there remains a ready market for substantial EU exports if they are allowed.

Thirdly, even if there were little market for the mercury compounds themselves, allowing exports of mercury compounds could create a huge loophole for escaping the reach of the export ban applicable to the liquid metal. Our information indicates the conversion of the liquid metal to a mercury compound, and then converting it back to elemental mercury after leaving the EU, would cost about $200/flask. At the current market price of $800/flask or higher, an unscrupulous trader could take advantage of the "mercury compound loophole", convert the mercury into a compound for export, arrange for the conversion back outside of the EU, and still make money (not long ago, the price of mercury was only $200/flask.). Therefore, for the EU export ban to be effective, the proposed export ban must apply to mercury compounds as well.

157 Maxson, Peter. Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, report for the European Commission – DG Environment (Brussels: February 2004). p. 50.

158 P. Maxson, Mercury Flows in Europe and the World:The Impact of Decommissioned Chlor-Alkali Plants, prepared for the European Commission, February 2004, pp. 48-49.

159 Treger, Inventory of Mercury Releases from the Russian Federation – Chemical Industry (Draft Working Paper), prepared for the Arctic Council Action Plan to Eliminate Pollution of the Arctic, pp. 36-39.

Adoption is further needed for an extension of the current (or a separate instrument for a) prohibition on the export of mercury-containing products (Regulation EC 304/2003) to other mercury products, which are or soon will be subject to use and marketing restrictions within the EU.

The fundamental basis for the export ban on mercury (and its compounds) is the recognition that mercury is a global pollutant and that the EU must be aware of the global impacts caused by encouraging mercury uses, particularly in the developing world. The export of large quantities of mercury products that can no longer be sold in the EU raises similar concerns, particularly for products where comparable, non-mercury alternatives are or could be readily available in the developing world.

2.2.1.3 Mercury Imports

To better protect the EU environment and health as well as the EU market, a potential import ban of metallic mercury as well as mercury compounds should be further investigated.[160]

During a consultation meeting (September 8, 2005), the Commission staff expressed reluctance to restrict or otherwise address mercury imports into the EU in the proposed legislation, noting potential obstacles with global trade legislation. We urge the Commission to reconsider this position to ensure that supplies of mercury within the EU are consistent with EU demand, mandatory storage obligations, and policies encouraging mercury recovery from wastes and products.

With respect to the purely legal question of confronting trade obstacles, it is important to note the very recent promulgation of Council Regulation No. 1236/2005, restricting the trade of products used for torture and other inhuman punishment. We also note specifically the import prohibition of equipment that can only be used for capital punishment, torture, or other similar purposes in Article 4 of this regulation. This import prohibition suggests that the EU can undertake well-targeted import prohibitions where it is necessary to implement important EU policies. We suggest that the Commission staff should investigate potential legal obstacles further and how such obstacles may be overcome, as was apparently accomplished for Council Regulation No. 1236/2005.

In the event of the Commission staff continuing to believe that an outright ban on mercury imports would be problematic, we recommend the inclusion of an alternate course of action in the proposed legislation that would not raise these legal objections.

The proposed legislation should recognise the unique concerns about mercury trade and include tracking and reporting to authorities on imports and other cross-border trading of mercury and mercury compounds into and within the EU.

Trade tracking and transparency is the only way to ensure that mercury imports and other transactions are well-documented, made available to the public, and that all developments can be read-

160 With respect to the purely legal question of confronting trade obstacles, we note the very recent promulgation of Council Regulation No. 1236/2005, restricting the trade of products used for torture and other inhuman punishment. We note specifically the import prohibition of equipment that can only be used for capital punishment, torture, or other similar purposes in Article 4 of this regulation. This import prohibition suggests that the EU can undertake well-targeted import prohibitions where it is necessary to implement important EU policies.

ily assessed by Commission staff and other stakeholders as to their magnitude and impact. Further, this may also help ensure that mercury importers and traders are playing on a "level playing field," with all of them taking similar responsibility for their commercial actions with regard to mercury.

As part of our overall recommendation, we envision a tracking system where, prior to importation, mercury import data must be provided by mercury traders to the EU member state's competent authority and where such data should include the identity of the exporting company and nation, the identity of the importing company and location, the quantity of mercury or mercury compounds involved, the purposes for which the imported mercury will be used, etc. We further envision EU Member States providing this information to the Commission annually so that the Commission may regularly summarize the data for the EU as a whole and publish the information in a publicly accessible manner.

> Measures on trade tracking of mercury and mercury compounds to/from and within the EU should not await the export ban date but should take effect as soon as practically possible. Until the export ban takes effect, trade tracking should cover exports from the EU as well.

We note this legislation could build upon the system of customs declarations that is currently used for imports and exports of elemental mercury to and from the Community, but this system should be reviewed to ensure that it effectively tracks mercury flows. In order to ensure proper implementation of the mercury trade ban, a similar system needs to track elemental mercury movements between the Member States, since at present this is frequently overseen only by transportation companies, which are supposed to (but sometimes do not) submit periodic reports of their activities to their governments.

With respect to mercury compounds, the tariff codes currently used for chemical substances are typically quite broad, often not explicitly indicating the transport of mercury compounds such as mercuric oxide/chloride. Considering that the flows of such substances must be known for adequate control, the current tariff code system will also need to be reviewed.

2.2.2. Primary mining

Virgin mercury mining represents the most environmentally harmful source of mercury supply. This is because of the magnitude of releases during the mining process and processing activities and because mercury mining adds to the total pool of mercury circulating in the economy, and eventually reaching the environment. The biggest mercury mine in the world, situated in Almadén, Spain, has recently suspended its mining and production operations but continues to trade mercury on the open market worldwide.

By formally confirming a ban on further virgin mining and processing of ore in Almadén and banning exports, EU leadership in this area will focus global attention on the need for similar action at the other main mercury mines in Algeria and Kyrgyzstan. At the end of October 2006, the announced international conference to be organised by the European Commission on trade, supply and demand of mercury provides an opportunity to bring these two countries into the discussion and NGOs would encourage the Commission to do this.

2.3. Reducing demand

Progress has been made in reducing use of mercury in products and the chlor-alkali industry is beginning to phase out mercury cells in Europe. However, substantial product uses still remain, with dental amalgam being the largest (after batteries). These remaining uses of mercury must be phased out, as there are substitutes for nearly all of them, as discussed in the sections below. For the few remaining specialised categories where alternatives do not exist, research should be pursued.

2.3.1. Dental amalgams

Acknowledging that dental amalgam is one of the biggest uses of mercury, the Commission has proposed the following action:

> Action 6. In the short term the Commission will ask the Medical Devices Expert Group to consider the use of mercury in dental amalgam and will seek an opinion from the Scientific Committee on Health and Environmental Risks, with a view to considering whether additional regulatory measures are appropriate.

Considering the growing interest of the public in this issue and the disparities that exist between Member States on usage of dental amalgams, this action is of critical importance for Community attention. The so-called "silver fillings" used to fill dental cavities contain around 50% mercury and are the largest elemental mercury exposure source in people who have fillings.[161] There is evidence that hot foods and liquids, as well as chewing, release mercury vapours from fillings.[162] In some studies health effects have been observed,[163] and although there is still a debate as regards the effects on humans of exposure from dental amalgams, countries are taking a precautionary approach and reducing the use of mercury in dentistry, as further discussed below. Nevertheless, it is suggested that women should not undergo dental treatment with mercury amalgams during pregnancy since it increases the amount of mercury that passes to the foetus, thereby possibly creating health hazards.[164] In addition to direct health considerations, it should also be noted that the mercury already placed as den-

161 Commission Staff Working Paper, Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury - Extended Impact Assessment, Brussels, 28.1.2005 SEC(2005)101 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, accessed on 13 June 2005 p. 12.

162 J. Mutter, J. Naumann, C. Sadaghiani, H. Walacha, G. Drasch, Amalgam Studies: disregarding basic principles of mercury toxicity. Int. J. Hyg. Environ. Health 207 (2004); http://www.elsevier.de/intjhyg, p. 391.

163 J. Mutter, J. Naumann, C. Sadaghiani, H. Walacha, G. Drasch, Amalgam Studies: disregarding basic principles of mercury toxicity. Int. J. Hyg. Environ. Health 207 (2004); http://www.elsevier.de/intjhyg, p. 391-394.

164 Björnberg, Karolin. 2005. Mercury exposure during early human development. PhD thesis. Karolinska University Press, Stockholm, Sweden, http://diss.kib.ki.se/2005/91-7140-224-1/

tal amalgams, as well as amalgams which will be used in the future, will continue to contribute to environmental contamination, eventually making its way into fish and humans in the form of methylmercury.

The restriction on the use of mercury in dental amalgams should be evaluated and pursued, given that viable non-mercury alternatives exist[165]. The Commission should propose recommendations by the end of 2006 at the latest.

Restrictions on the use and marketing of dental amalgams will have indisputable positive environmental effects and would be prudent in light of potential health concerns. These restrictions should be fostered through technical assistance, voluntary partnerships and mandates to require dentists to offer proven alternatives to amalgam fillings to patients and submit annual reports on dental mercury reduction initiatives, including the quantities of mercury used and recycled. As a first step, an overview of the existing situation in terms of percentage of dental amalgams and substitutes being used across EU Member States should be compiled, with the aim of tailoring reduction approaches based on the prevalence of use of mercury. Such an analysis has already been conducted in Norway, Sweden and Denmark[166] A recent study reveals that dental amalgam has been replaced almost totally by other materials during the last six to seven years in Sweden.[167]

While the Commission has raised the issue that restriction of dental amalgams by Member States might be difficult as they are covered by the Medical Devices Directive, Sweden and Denmark mention the fact that the Directive does not consider effects on the natural environment during production and use of medical devices and state that "A Member State could therefore introduce a national ban on handling mercury by referring to the fact that effects on the natural environment are not regulated by the Directive."[168]

There are other tooth-filling materials available on the market and in use today that represent an increasing percentage of all fillings in Europe and the US. The shares of dental fillings materials, measured by weight, in Sweden, are approximately: composites (78%), glassionomers (13%), amalgam (6%), compomers (3%) and ceramic (1%). Since composites are lighter than amalgam, one kilo of composites will fix many more teeth than one kilo of amalgam. So if measured by the number of restored teeth, the composites' share will increase and amalgam's share will decrease even further. The most commonly used materials in Sweden are reported to be composites, which have replaced more or less all types of restorations where

165 Mercury Amalgam and Other Filling Materials, A patient education/Information brochure. Prepared by the Maine Department of Human Services, Bureau of Health, 2002, http://www.mercurypoisoned.com/hearings/amal_broch_maine.html

166 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on13 June 2005, p. 32.

167 KEMI – Swedish Chemical Inspectorate, Nr.9/05, Mercury-free Dental Fillings – Phase-out of amalgam in Sweden, December 2005.

168 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 118.

amalgam was previously used[169], within ordinary dental care for children and adults. Significant reductions in the use of mercury in amalgams are feasible in the short term with relatively little additional cost.[170]

Member States can also reduce use and make amalgam more cost-neutral against other filling materials by following the example of the Swedish Parliament and eliminate financial support for amalgam fillings provided by the national dental insurance.

The Swedish Chemical Inspectorate has asserted that there are strong grounds for banning amalgams for environmental reasons and that from a health perspective, there is every reason to apply a precautionary approach.[171] In 1991 the government began a phasing-out process in which amalgam would cease to be used in dentistry for children and young people from 1 July 1995 and cease to be used entirely by 1997. Through significant cooperation among the National Board of Health and Welfare, Parliament, city councils and the Swedish Chemical Inspectorate, use was significantly reduced, though not eliminated. To make amalgam more cost-neutral against other filling materials, the Swedish Parliament decided in 1999 that no financial support should be provided for amalgam fillings by the national dental insurance[172] and it is estimated that less than 5% of all new fillings in Sweden contain mercury.[173]

In Denmark, dental amalgam is only allowed in molar teeth, where the filling is already in place, with the aim of significantly reducing both mercury use and releases. Denmark is ready to ban the remaining use of dental amalgam, as soon as the Danish National Board of Health is satisfied that non-mercury alternatives have full substitution capabilities.[174]

Since 2003, Norway has recommended that the use of amalgam should not normally be the first choice for any dental filling and that use should be limited as much as possible in consideration of the environment and possible adverse health effects. In addition, the use of mercury in dental filling therapy should be avoided during pregnancy.[175]

---

169 KEMI – Swedish Chemical Inspectorate, Nr.9/05, Mercury-free Dental Fillings – Phase-out of amalgam in Sweden, December 2005.

170 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 34.

171 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 8.

172 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 31.

173 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 33.

174 UNEP, Global Mercury Assessment, Appendix, Overview of Existing and Future National Actions, including Legislation, Relevant to Mercury as of 1 November 2002 http://www.chem.unep.ch/mercury/Report/Final%20report/final-appendix-1Nov02.pdf, accessed on 13 June 2005, p. 59.

175 A National Clinical Guideline for the Use of Dental Filling Materials, 2003, http://www.shdir.no/vp/multimedia/archive/00001/IS-1136_1661a.pdf, accessed on 22 June 2005, p. 6.

Furthermore, the discussion under section 2.1.3. should also be considered with respect to the environmental effects of dental amalgam waste.

In addition to the above, mercury in dental fillings of the population is the second largest stock of Hg (about 40,000 kg) in Sweden. Besides these stocks, large amounts of Hg are in use in measuring and electrical equipments and in laboratory chemicals in most industrialized countries. Ongoing and potential pollution from these stocks are large in quantitative terms and manifested as many small emission sources over large geographic areas. This is perhaps most evident when looking at dental amalgam, which is carried by 74% of the grown-up population in Sweden and results in a continuous release of about 100 kg Hg per year to the waste water via every day chewing (Skare and Engqvist, 1994; KemI, 2004). This demonstrates that it is not possible to stop pollution from this Hg stock. In addition, technologies to reduce the emissions are costly and more difficult than replacing Hg as a dental filling material.[176]

Mercury emissions from earlier dental amalgam fillings will continue for several decades after a change to Hg-free filling materials. As we mentioned earlier, installing amalgam separators at dental clinics and advanced flue gas cleaning at crematories will reduce the major part of the emissions from these sources. The related investment and running costs for these installations, however, should be included in the cost for using dental amalgam. This is not the case in any country worldwide. As a consequence, amalgam fillings are considered to be economic while they are de facto more expensive than most, possibly all, other fillings when including environmental costs.[177]

2.3.2. Non-electrical or electronic measuring and control equipment

EU legislation on various hazardous substances including mercury already exists for electrical and electronic equipment. However, medical devices are the only major product category that is yet unregulated under the restriction of hazardous substances directive with respect to their content of dangerous chemical substances. To close the gap, the Commission has been proposing the following action in relation to non-electrical and non-electronic measuring devices:

> Action 7. The Commission intends to propose in 2005 an amendment to Directive 76/769/EEC[178] to restrict the marketing for consumer use and healthcare of non-electrical or electronic measuring and control equipment containing mercury.

176 Hylander, L. D. & Goodsite, M. E. 2005. Environmental costs of mercury pollution. Sci. Total Environ. In press.

177 Hylander, L. D. & Goodsite, M. E. 2005. Environmental costs of mercury pollution. Sci. Total Environ., Table 2, In press.

178 Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations, OJ L 262, 27.9.76.

In the existing legislation covering electrical and electronic devices, medical equipment is not covered at the moment by imposed restrictions on the use of mercury and certain other hazardous substances in new equipment from 1 July 2006.

Further to the above, the Commission proceeded with this action in May 2005 and proposed an amendment to directive 76/769 which states:

"Mercury may not be placed on the market:

(1) in fever thermometers

(2) in other measuring devices intended for consumer use (e.g. manometers, barometers, sphygmomanometers)".

This proposal was circulated (May 2005) among the Member States and the different Directorates General concerned at the European Commission. In a probably slightly modified form, it is about to be adopted by the European Commission.

The proposal's scope it too limited, particularly in relation to the respective Commission's proposed action.

> The marketing and use of mercury in all measuring and control equipment for both consumer and professional uses (especially in households, healthcare facilities and schools) should be restricted, only allowing exemptions for a limited time and subject to an ongoing review, where adequate alternatives are not yet available.

These devices can pose a risk to human health and the environment during usage because they are easily broken, and after usage because they end up in the waste stream and ultimately are released into the environment. Fever thermometers and other measuring devices found in residential settings, healthcare facilities, laboratories and schools are of particular concern because of the potential exposure to young children, women of childbearing age and babies in the womb, especially in specific work environments (e.g. nurses in hospitals, laboratory workers, dental assistants). There is increasing evidence that inhalation can be a source of significant mercury exposure[179]. This potential for exposure often results in substantial clean-up expenditures and disruptions from temporary school closures when product breakage occurs. In addition, mercury-containing devices are often improperly disposed of at the end of their life, resulting in mercury emissions from trash and medical waste incinerators and landfills.

The NGOs fully agree with the Commission that substituting mercury in these product categories and moreover in an expanded list of product categories is the only effective way of addressing inevitable emissions from their use and disposal. Earlier NGOs comments in May 2004 also referred to this issue. However, several aspects still need to be addressed concerning how we believe these issues should be tackled.

179 A. Carpi and YF Chen. Gaseous Elemental Mercury as an Indoor Air Pollutant. Environ. Sci. Technol., Vol 35:4170-4173 (2001).

2.3.2.1 Legal approach

The proposed directive should be based on Article 175 of the Treaty with the object of protecting the environment.

Mandatory measures are essential to offer the greatest protection and have been widely used by the Commission in a number of instances to address the marketing and use of hazardous chemicals in products. Until now, restrictions on the use of hazardous substances in products are based on Article 95 of the Treaty establishing the European Community, having as their objective the establishment and functioning of the internal market (e.g. 76/769[180], RoHS 2002/95[181]). However, restrictions in products have also been addressed on the basis of Article 175 of the Treaty with the object of protecting the environment (e.g. 2000/53[182]).

In the above-mentioned directives, 2002/95 and 2000/53, the restriction of use of certain hazardous substances in products is conducted via a general restriction, with some exemptions where no alternatives exist. This model has already been used and can be significantly more effective than the one currently proposed by the working document, proposing that new fever thermometers and other mercury-containing measuring devices intended solely for consumer use (e.g. manometers, barometers, sphygmomanometers) should not be placed on the market.

For all intended uses of mercury in products, including measuring devices and control instruments, the EU would be better served by identifying those mercury uses in products it intends to allow instead of attempting to identify and restrict all potentially unnecessary and/or harmful product uses.

In fact, it can be argued that all mercury uses are likely to be harmful, because once it is placed into commerce this toxic material is eventually released into the environment, either through haphazard release or recycled into another product where mercury is then released.

Manufacturers have been extraordinarily creative in finding unsuitable mercury applications; therefore the EU should not place itself in the position of trying to anticipate every possible use and then undertaking regulatory action to restrict that use. Instead, the EU should start with the proposition that mercury use in products is generally unsafe and unnecessary. Any manufacturer who still wants to use the toxic chemical – in cases where there is no alternative – should then be required to apply for special permission. The burden of proof should rest with manufacturers. They should be obliged to show that their proposed use of mercury is controlled, effective and necessary because of the lack of available alternatives and that they have provided for an effective programme for collection of the product at end-of-life.

180 Council Directive of 27 July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (76/769/EEC)(OJ L 262, 27.9.1976, p. 201).

181 Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

182 Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles (OJ L 269, 21.10.2000), p. 34.

Given how long the mercury problem has been known, particularly in Europe, we are hard pressed to believe that manufacturers which would undertake actions voluntarily to remove mercury from their products have not already done so. Accordingly, we believe that regulation will be required to purge the remaining mercury-measuring instruments and devices from the market place, in a similar manner to recent actions on electronic products under the Waste Electrical and Electronic directive[183].

There are several reasons why such an approach should be followed:

1. This model of legislation has been used in the recent past and is now effectively in operation.

2. The explanatory memorandum of the proposed directive suggests that products should be divided into those for consumer use and those for professional use. As mentioned in the Extended Impact Assessment (ExIA), with reference to professionally used equipment, while the mercury content per item can be quite high, numbers are rather limited[184]. Therefore these applications should be relatively easy to identify, list and if no alternatives exist, exempt for a limited period.

3. Furthermore, it is clearly mentioned in the ExIA that individual Member States have already taken action in banning or restricting the use of such products containing mercury. Countries such as Denmark, France, the Netherlands, Sweden and Norway have done so with several exemptions for specialized professional uses where adequate alternatives do not yet exist. As a result, if a model like the RoHS directive is embraced, the potential exemptions to be addressed at European level are mostly identified and would not cause a further delay in the process.

4. The experiences of Sweden and Denmark where such restrictions have been in place for many years; the experience of the United States where mercury fever thermometers are essentially unavailable due to voluntary phase-outs by most pharmacies and laws prohibiting sales by many states and local governments[185]; and detailed studies comparing the cost and functionality of mercury and non-mercury products all demonstrate the feasibility and

183 http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00240038.pdf

184 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p.35

185 See www.noharm.org/mercury/mercuryFree for a list of pharmacies no longer selling mercury fever thermometers and www.noharm.org/mercury/ordinances for a list of laws prohibiting mercury fever thermometer sales in the United States.

186 See a detailed comparison of mercury and non-mercury measuring devices and instruments performed for the Maine Department of Environmental Protection at www.maine.gov/dep/mercury/lcspfinal.pdf and the proposed strategy based on that report at www.maine.gov/dep/mercury/productsweb.pdf Following the submission of this strategy, the Maine Legislature enacted a prohibition on the sale of most mercury measuring devices and instruments effective July 2006. Appendix B to the report contains some examples of substantial clean-up expenditures resulting from measuring instrument breakage.

the wisdom of halting the sales of most mercury-containing measuring devices and instruments[186]. The scope of the restrictions should be dictated by the availability of alternatives, as documented in these studies, and would also contribute to fulfilling another of the Mercury Strategy goals to reduce the overall demand for mercury.

Since some measuring devices and instruments are employed for medical purposes, such as blood pressure cuffs, we fully understand and appreciate the need to proceed carefully in public health matters. However, we submit the track record of medical institutions which have made the transition to non-mercury equipment. We also submit the detailed "how-to" instructions readily available in the public domain which indicate that the obstacles to this transition are more a matter of education and training than the availability and functionality of non-mercury equipment[187].

5. During the consultation process, several of the Member states and other representatives actually requested a general ban with exemptions, such as Denmark, Sweden, France, the Netherlands, Flemish Community, and OVAM (Public Waste Agency of Flanders).

6. The requests for exemptions to a general ban will also serve to better identify the uses of mercury, even in highly specialized applications, and considering that the dangers have already been identified, could trigger further research and development for their replacement with adequate alternatives.

7. Furthermore, this approach would fall in line with the European Parliament resolution on the European Environment & Health Action Plan 2004-2010 (2004/2132(INI))[188] - Article 6, which considers that, without prejudice to existing Community legislation and following the opinion of the relevant Scientific Committee, urgent consideration should be given to restricting the marketing and/or the use of mercury used in dental amalgams and in non-electrical or non-electronic measuring and monitoring devices, amongst other substances listed, to which newborn babies, children, pregnant women, elderly persons, workers and other high-risk sections of the population are heavily exposed, as safer alternatives become available.

2.3.2.2 Scope

The scope proposed in the working document is too narrow and much more limited than the one proposed in action 7 of the EU Strategy on mercury –"The Commission intends to propose in 2005 an amendment to Directive 76/769/EEC[189] to restrict the marketing for consumer use and healthcare of non-electrical or electronic measuring and control equipment containing mercury."

187 See www.sustainablehospitals.org, www.noharm.org, and www.h2e-online.org for detailed information regarding non-mercury alternatives in the health-care setting.

188http://www2.europarl.eu.int/omk/sipade2?PUBREF=-//EP//TEXT+TA+P6-TA-2005-0045+0+DOC+XML+V0//EN&LEVEL=3&NAV=X

189 Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations, OJ L 262, 27.9.76.

Clearly, this proposed action does not restrict its scope to only those measuring and control devices intended for consumer use, as primarily proposed in the working document. As a result, the scope proposed in the working document will not achieve the possible reductions in mercury contamination from measuring and control devices that are both necessary and achievable. Therefore, the following observations need to be taken on board:

A. The proposed directive is only focused on fever thermometers and manometers, barometers and sphygmomanometers for consumer use only. However, other categories of products exist, some for consumer uses and others for professional uses, which are not currently covered by the proposed directive (or any existing Directive), but for which alternatives exist. To name a few:

1. Temperature Measurement and Sensing Devices (which includes, for instance, non-fever thermometers; hygrometers and psychrometers)

2. Gastrointestinal Tubes (such as Oesophageal Dilators – Bougie tubes)

3. Pressure Gauges and Flow Rate Devices (which include not only barometers, but also mercury devices in flow meters, mercury diffusion pumps, and fume exhaust ventilation hoods)

The list above as well as the longer list attached are not exhaustive but provide an indication of the wide range of products which should be further considered for inclusion (see Annex).[190]

Devices in the above-mentioned categories have been extensively analysed, alternatives have been identified and costs have been examined and shown to be comparable.[191,192] There are non-mercury alternatives which are commercially available for practically all subcategories of all common applications[193,194,195]. This has enabled a near phase-out of mercury use in measuring and control equipment in some countries. When the costs of alternatives are not comparable, the alternatives often outperform the mercury-containing

190 A longer list can be found in the annex to the document submitted to the European Commission on 3 June 2005, http://www.zeromercury.org/EU_developments/050603_NGOs_comments_WD_measuring_equipment_directive.pdf

191 An Investigation of Alternatives to Mercury-Containing Products, Lowell Centre for Sustainable Production, 22 January 2003, available at http://mainegov-images.informe.org/dep/mercury/lcspfinal.pdf (see footnote 5).

192 Mercury Products Guide: The Hidden Dangers of Mercury - A Resource Guide for Procurement Officers and Consumers about Mercury in Products and their Alternatives, Todd Kuiken and Felice Stadler, National Wildlife Federation, Ann Arbor, Michigan, August 2002.

193 Nordic Council of Ministers, Mercury – a global pollutant requiring global initiatives, Copenhagen 2002.

194 Global Mercury Assessment, UNEP, December 2002, p.141.

195 http://www.informinc.org/fsmercalts.pdf and http://www.informinc.org/fsmerchealth.pdf

devices in terms of longevity and faster performance (e.g. digital electronic thermometers). Moreover, the costs for alternatives decrease once the alternatives become commonly used.

B. Furthermore, apart from the product categories as such, the scope should be widened to cover both consumer and professional products. The feasibility of including professional devices is proved by such countries as Norway[196], Sweden[197,198], Denmark, the Netherlands and France[199], which have national restrictions on mercury use in measuring devices. Additional restrictions exist in individual cities such as the Vienna Hospital Association and Styrian Hospital Association[200] in Austria, which do not use thermometers and sphygmometers containing mercury. The UK Department of Health also recommends considering mercury-free products for certain applications used in health care facilities.[201]

The phase-out in Sweden should also be considered:[202]

"Since 1 January 1992 thermometers and other measuring instruments containing mercury may not be manufactured, sold, imported from third countries or exported from Sweden. When the ban was introduced, only a few exemptions were needed for industry and healthcare. The Swedish experience is that the change-over to mercury-free alternatives have not met any significant problems but have been relatively easy, technically as well as economically. This experience applies also to other mercury-containing products, which are already restricted on a national level. This has resulted in a reduction of total mercury supply to the Swedish society from over 9 tonnes in 1991 to 340 kg in 2003.

In healthcare, a switch to mercury-free pressure instruments was noted in 1991. Today there is only one exemption (time-limited) in Sweden, namely the strain-gauges which are used for specific blood vessel examinations and in research. Testing of mercury-free alternatives is ongoing and seems to be able to substitute the major part of the use in the near future. For blood pressure gauges (sphygmomanometers), used in ordinary blood pressure examinations, there is no need for exemptions.

196 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/norway.pdf

197 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/sweden.pdf

198http://www.eeb.org/activities/mercury/Petra%20Hagstrom%20presentation%20Hg%20Madrid%20042205.pdf

199 French response to Consultation document Development of an EU Mercury Strategy, Invitation to Comment, http://europa.eu.int/comm/environment/chemicals/mercury/pdf/france_en.pdf

200 http://www.cleanmed.org/europe/2004/english/docs/press/press_vienna_declaration.pdf

201 Blood Pressure Measurement Devices – Mercury and Non-mercury, Medical Devices Agency, July 2000, UK

202 Extracts from the Swedish Comments on the draft proposal for restrictions on the marketing of certain measuring devices containing mercury (amendment of Council directive 76/769), 2 June 2005.

In industry and research, the need for exemptions for measuring instruments and devices is limited and could relatively easily be identified on the basis of the national legislations already in place and experiences in these countries. In Sweden there are only a few valid exemptions for spare parts left and four dispensations in individual cases corresponding to approximately 22 kg mercury per year.

In response to a Government commission, the Swedish Chemicals Inspectorate last year proposed a general national ban for the handling, import and export of mercury, including for example dental amalgam and analytical chemicals.

C. The existing situation, in which some EU countries and cities have adopted restrictions and others have not, and where some have included professional devices and others not, has created a patchwork of regulations that disrupts the smooth functioning of the economy and begs for a harmonised regulatory approach.

D. Moreover, professional uses of mercury devices still release quantities of mercury erroneously into global circulation, despite established safety control and waste management procedures. For example, a hospital in the Czech Republic purchased approximately 1,500 new mercury thermometers to replace lost and broken ones, but declared no mercury waste in their annual waste report. This indicates that the mercury from those broken thermometers ended up in other waste streams.[203]

E. Not only newly sold thermometers and other measuring devices should be covered, but provision should be made for those in use and sold second-hand. The success of collecting mercury fever thermometers through voluntary exchanges in the United States points to the potential advantages to public health and the environment through hosting mercury collections.

F. In a similar way, and within the same framework, a restriction of the use of mercury in dental amalgams should be considered, given that viable non-mercury alternatives exist.

G. Mercury use in laboratories and in schools should also be banned, considering the many accidents which occur, ending up in many persons being exposed, lengthy schools closures[204] and high clean-up costs.[205,206]

H. Export of such products from the EU should also be forbidden, otherwise the EU will just be transporting the problem elsewhere, contributing to global pollution from mercury.

203 Comments on the Consultation Document: Development of an EU Mercury Strategy from 15 March 2004. Health Care Without Harm Europe

204 http://www.woodtv.com/Global/story.asp?S=3388007&nav=0RceaFrn

205 http://sustainableproduction.org/downloads/Mercury%20Spills.pdf

206 http://www.mercuryinschools.uwex.edu/schools/why.htm

I. A proposal for a directive covering non-electrical and non-electronic devices should also pave the ground, in principle, for the gradual collection and safe storage of the existing supply of mercury devices in households, healthcare and other professional facilities. Mercury waste should be temporarily stored, awaiting final decisions about environmentally sound deposition. The entities responsible for the collection should be clearly identified.

Finally, actions related to mercury-measuring devices and instruments are necessary because of their significant use within the EU and worldwide. The estimated 166 tonnes of annual mercury consumption in measuring and control devices represents a tremendous opportunity for lowering worldwide mercury demand. Most of this mercury is eventually released and becomes part of the global mercury burden, given the propensity for this equipment to break and the mercury to be released in waste storage, landfills and incinerators. Moreover, the manufacturing of these products, such as fever thermometers in India, is a known source of substantial local mercury contamination.[207]

In conclusion, we fully agree that, as the presented working document states, "the negative impact on producers has to be balanced against the avoided costs of removing mercury in waste management and of dealing with the [negative health] impact of emissions". Recent studies indicate that adverse effects of mercury pollution occur at all levels and there is no threshold below which adverse effects of mercury pollution do not occur. Moreover, all mercury-containing measuring and control devices constitute a risk in terms of mercury release. Given these realities, the economic impact of a directive ordering a general ban, with wider scope and more comprehensive provisions, will still be economically preferable to that which would result under the Working Document's current proposal.

2.3.3. Mercury in schools

Mercury use in laboratories and in schools should also be prohibited, considering the many accidents that occur and lead to human exposures, lengthy schools closures[208] and high clean-up costs[209].

2.3.4. Existing directives regulating mercury use in products

Existing directives dealing with mercury-containing products, such as the one on Batteries, the one on Restriction of Certain Hazardous Substances from Electrical and Electronic Equipment, and the one on End-of-life Vehicles, should be revised to eliminate exemptions for mercury uses, as soon as alternatives are available.

207 Mercury in India: Toxic Pathways, Toxics Link, September 2003, p. 25.

208 http://www.woodtv.com/Global/story.asp?S=3388007&nav=0RceaFrn

209 http://sustainableproduction.org/downloads/Mercury%20Spills.pdf and http://www.mercuryinschools.uwex.edu/schools/why.htm

We will mainly focus on the directive covering electrical and electronic equipment, given that the use of mercury in such equipment remains extensive and is expected to continue to be a problem that requires some vigilance, even after the entry into force of the directive.

With reference to other EU directives on mercury in products (batteries, end-of-life vehicles, paints, pesticides, etc.), restrictions on the use of mercury are already in place and seem to be adequate for the time being. As a result, no further comments on legislation restricting mercury in products are provided under this section.

2.3.4.1 Electrical and electronic equipment

As mentioned in the introduction of this paper, electrical and electronic equipment are regulated by two directives: Directive 2002/96/EC (WEEE), mainly targeting separate collection and recycling, and Directive 2002/95/EC(RoHS), restricting the use of certain hazardous chemicals – including mercury – in the production of new equipment from 1 July 2006. The equipment covered under the RoHS directive currently includes large household appliances, small household appliances, IT and telecommunications equipment, consumer equipment, lighting equipment, electrical and electronic tools (with the exception of large-scale stationary industrial tools), toys, leisure and sports equipment and automatic dispensers.

On the basis of the amended directive (by Commission decision 2005/618/EC), "a maximum concentration value of 0.1% by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and of 0.01% by weight of homogeneous materials for cadmium shall be tolerated". The term homogeneous (uniform material throughout) means a material which cannot be mechanically separated into different materials[210].

Instead of banning the hazardous chemicals outright, as was originally proposed and adopted in 2003, this amendment has now been adopted.

> With regard to the exemption permitting substances, covered by RoHS, in homogeneous materials, the necessity of this exemption should be re-evaluated (for mercury), with specific identification of any electrical and electronic products that may contain more than 0.1% mercury by weight as a homogeneous material. If there are no such products, we should suggest that the reference to Hg should be removed from the amendment.

Categories 'Medical devices (with the exception of all implanted and infected products)' and 'Monitoring and control instruments' are excluded from the requirements of substitution of the RoHS directive. This cannot be supported, given the wide variety of functionally equivalent or superior non-mercury alternatives available for products in these categories[211], which includes mercury thermostats.

210 Frequently asked questions on directives 2002/95 and 2002/96, p.14, http://europa.eu.int/comm/environment/waste/pdf/faq_weee.pdf

211 http://www.zeromercury.org/EU_developments/051027FINALNGOResponse3rdConsultationROHS.pdf, p. 6.

With respect to mercury contained in the products covered by the directive, the only exemptions in the adopted directive[212] are:

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp,
2. Mercury in straight fluorescent lamps for general purposes not exceeding: 10 mg for halophosphate, 5 mg for triphosphate with normal lifetime, 8 mg for triphosphate with long lifetime,
3. Mercury in straight fluorescent lamps for special purposes and
4. Mercury in other lamps not specifically mentioned in the Annex to the directive.

In addition to existing exemptions in the RoHS Directive, the Commission has solicited consultation on further exemptions for various uses of mercury beginning in 2004. All the requests for new exemptions have been made by industry and range from mercury in switches to broad request from the aeronautic and aerospace sector on exemptions for applications of lead, mercury, cadmium, hexavalent chromium, PBBs and PBDEs in electrical and electronic equipment "required to have high safety and reliability levels"[213].

The NGOs are deeply concerned that the RoHS directive be weakened by exemptions on the basis of article 5(1) without the necessary justification. The Commission's criteria for granting exemptions are based upon the following:

"Article 5(1)(b) of the Directive 2002/95/EC provides that materials and components can be exempted from the substance restrictions contained in Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health, and/or consumer safety impacts caused by the substitution outweigh the environmental, health and/or consumer safety benefits thereof."

It should be noted that most of the applications[214] for exemptions are not at all justified and the necessary forms (provided and requested by the EC) are not correctly filled in, or are incomplete or not filled in at all. Industry must be required to demonstrate for each application that their continued use of mercury is safer than the alternatives, and each application should then be the basis for an exemption request.[215]. It must be kept in mind that in drafting

212 Annex to the Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS).

213 United Technologies submission to Stakeholder consultation on adaptation to scientific and technical progress under Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment for the purpose of a possible amendment of the annex, Brussels, 11 Feb 2005.

214 See http://europa.eu.int/comm./environment/waste/weee_index.htm#contributions for contributions to the three stakeholder consultations.

215 Maxson, P., Comment to the exemption request below, email sent to Commission on RoHS Consultation. 6 January 2005.

the RoHS Directive, the Commission fully intended that the burden of proof would explicitly rest on industry to demonstrate why any specific application should be exempted. Therefore, unless and until the applicants provide the detailed supporting data to demonstrate that an exemption for a specific application may be warranted, all other requests should be denied as a matter of course.

Apart from lamps, where viable substitutes for mercury are currently available for only limited applications, with respect to the rest of the product categories, mercury-free alternatives exist and there is therefore no reason to extend the range of exemptions.[216] More detailed arguments have been provided to the European Commission by NGOs where it is clearly shown that alternatives exist in Europe and the USA with similar costs and are currently available on the market.[217]

Additional exemptions to existing and draft legislation should not be introduced. Wherever derogations apply, these should be for a limited period in order to provide incentives for research and development and encourage industries to shift to alternative substances and techniques.

2.3.4.2 Enforcing EU Hg Product Restrictions

The EU has a number of mercury product limitations currently in place or pending. Among these restrictions are Directives 91/157 and 98/101 setting maximum mercury limits for alkaline and button cell batteries. However, the trade report prepared in support of the EU Mercury Strategy Consultation Document suggests that batteries exceeding those standards continue to be imported into the EU in large quantities[218]. If these imported batteries were to remain in the EU, they would constitute a serious breach of EU environmental standards and warrant priority enforcement attention by EU member nations. If these batteries are re-exported from the EU, as seems likely, pressure should be put on those EU companies which trade in products that are banned from marketing and use in the EU.

The EU should request that Member States identify companies importing significant quantities of batteries from Asia, in various products or as stand-alone items, to ensure that suppliers and distributors are complying with the EU standards.

These efforts would encourage Asian manufacturers to join their more progressive competitors in shifting away from mercury oxide battery production, while enhancing the competitive position of EU manufacturers – both in the EU and in Asia.

216 An Investigation of Alternatives to Mercury Containing Products, Lowell centre for Sustainable Production, January 2003, p. 31-65, http://mainegov-images.informe.org/dep/mercury/lcspfinal.pdf

217 http://www.zeromercury.org/EU_developments/051027FINALNGOResponse3rdConsultationROHS.pdf

218 Maxson, Mercury Flows in Europe and the World, 2004, p. 49.

Similarly to the above, attention should be paid to the compliance with directive on Restriction of certain Hazardous Substances in electrical and electronic equipment, from 1 July 2006, as well as with other relevant directives which will restrict the use of mercury in certain products in the future.

2.3.5. Remaining uses of mercury in products

With respect to uses of mercury in products that have not been explicitly discussed, the European Commission proposed:

> Action 8. The Commission will further study in the short term the few remaining products and applications in the EU that use small amounts of mercury. In the medium to longer term, any remaining uses may be subject to authorisation and consideration of substitution under the proposed REACH Regulation[219], once adopted.

For remaining products where mercury is still in use, in the long to medium term, the applicability of REACH is appropriate. To that end, the NGOs would like to draw the reader's attention to the fact that for the above measure to be valid, metals (and especially heavy metals) will have to be included in the scope of REACH.

> We need to ensure that mercury falls within the scope of REACH. Furthermore, the currently proposed provision to grant authorisation for "adequately controlled" substances, even if safer alternatives are available, should be eliminated. In addition, the Commission should clarify, in the Technical Guidance Documents for REACH, how the substitution principle will provide the impetus to create safer alternatives for all uses of mercury.

2.3.5.1 Mercury in vaccines

> An expert assessment should be undertaken to determine the extent to which mercury can be appropriately eliminated from vaccines to better protect public health.

Vaccines are not addressed by the EU Mercury Strategy. The Council Conclusions (June 2005) on the Commission's Mercury Strategy highlighted the fact that during further development and implementation of the strategy it will be essential to reduce residual uses of mercury, such as in dental amalgam and vaccines[220].

219 Proposal for a Regulation of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency and amending Directive 1999/45/EC and Regulation (EC) {on Persistent Organic Pollutants}, COM (2003) 644 final, 29.10.2003.

220 Council Conclusions on the Community strategy concerning mercury, 2670th Environment Council meeting, Luxembourg, 24 June 2005.

Vaccines may contain mercury in the form of thimerosal. Thimerosal, also known as thiomersal or thiomerosal, is a preservative used in a number of biological and drug products, including some vaccines. Thimerosal is approximately 50% mercury by weight, in the organic form of ethylmercury. Since the 1930s, it has been added to products to help prevent the growth of microbes. While there were no toxic effects reported in the first study of thimerosal use in humans, published in 1931, the study was not specifically designed to examine toxicity and was flawed in a number of other ways.[221] As more has become known about the effects of mercury on human health, the use of thimerosal in vaccines has become an issue of increasing concern. Over the years, more and more vaccinations have become recommended or required for younger children and infants, which significantly increased the amount of mercury they were being exposed to.

Studies on whether and what effects exposure to thimerosal causes in humans are ongoing. In a 2004 statement the European Agency for the Evaluation of Medicinal Products (EMEA) said that on the basis of new toxicity studies, ethylmercury is less toxic than methylmercury, which is the form found in fish.[222] In addition, the US Institute of Medicine's Immunisation Safety Review Committee found that the evidence they reviewed "favours a rejection of a causal relationship between thimerosal-containing vaccines and autism."[223] Other studies have indicated that there could be a plausible connection between thimerosal and certain health effects in animals and humans.

While at this point there is still significant controversy over whether or not thimerosal in vaccines causes health effects in humans, it is important to note that in 1991 the World Health Organization (WHO) concluded that a safe level of mercury exposure below which no adverse effects occur had never been established.[224]

None of the "live" vaccines, including, measles, MMR (measles-mumps-rubella), oral polio, yellow fever and BCG (Calmette-Guerin bacillus against tuberculosis), have ever contained thimerosal. However, thimerosal is used in many Hepatitis B, DTP (diphtheria, tetanus, and pertussis - triple vaccine), diphtheria and tetanus toxoids (DT and Td), tetanus toxoid (TT), influenza, and other vaccines. Based on the precautionary principle and the goal of reducing human exposure to mercury, countries are taking steps to reduce mercury in vaccines.

---

221 United States Food and Drug Administration. Thimerosal in Vaccines, http://www.fda.gov/cber/vaccine/thimerosal.htm, accessed on 11 August 2005.

222 European Agency for the Evaluation of Medicinal Products, EMEA Public Statement on Thimerosal in Vaccines for Human Use – Recent Evidence Supports Safety of Thiomersal-Containing Vaccines, London, 24 March 2004, Doc. Ref: EMEA/CPMP/Veg/1194/04/Adopted

223 United States Food and Drug Administration. Thimerosal in Vaccines, http://www.fda.gov/cber/vaccine/thimerosal.htm, accessed on 11 August 2005.

224 International Programme on Chemical Safety Environmental Health Criteria 118 Inorganic Mercury, World Health Organization, Geneva, 1991, http://www.inchem.org/documents/ehc/ehc/ehc118.htm, accessed on 11 August 2005.

Example phase-out (solution): USA

In 1999 the United States Food and Drug Administration (FDA) undertook what they considered to be a comprehensive review of the use of thimerosal in childhood vaccines. Although they found no evidence of harm, they did find that some infants could be exposed to cumulative levels of mercury that exceeded the Environmental Protection Agency's (EPA) guidelines for safe intake of methylmercury. As a precautionary measure, the Public Health Service (which includes the FDA, National Institutes of Health, Centre for Disease Control and Prevention, and Health Resources and Services Administration) and the American Academy of Paediatrics issued two joint statements, which recommended that thimerosal be phased out of all vaccines administered to infants and children as soon as possible.

While significant progress has been made since 1999 and all vaccines routinely recommended for children under six are now thimerosal-free or only contain trace amounts (defined as 1 microgram of mercury per gram or less), some flu vaccinations still contain thimerosal. However, the FDA has been working with manufacturers to increase supplies of thimerosal-free flu vaccines as well as other vaccines, which are most often used for adults but may also be given to children.[225]

Relevant EU policy

The EMEA completed an 18-month inquiry into the risks and benefits of using thimerosal in vaccines in June 1999. The EMEA concluded: "Although there is no evidence of harm caused by the level of exposure from vaccines, it would be prudent to promote the general use of vaccines without thimerosal within the shortest possible time-frame."[226]

The EMEA updated its advice on use of thimerosal in vaccines in March 2004. While it rejects any possible connection between thimerosal and "specific neurodevelopmental disorders" , it continues to promote the development of vaccines without thimerosal, or with the lowest possible levels of thimerosal. A labelling requirement for thimerosal-containing vaccines was also included, containing a warning with regard to sensitisation to thimerosal[227], which was first outlined in 1999.[228]

---

225 United States Food and Drug Administration. Thimerosal in Vaccines, http://www.fda.gov/cber/vaccine/thimerosal.htm, accessed on 11 August 200.

226 European Agency for the Evaluation of Medicinal Products, EMEA Public Statement on Thimerosal-Containing Medicinal Products, London, 8 July 1999, Doc. Ref: EMEA/20962/99, http://www.emea.eu.int/pdfs/human/press/pus/2096299EN.pdf, accessed on n17 June 2005.

227 European Agency for the Evaluation of Medicinal Products, EMEA Public Statement on Thimerosal in Vaccines for Human Use – Recent Evidence Supports Safety of Thiomersal-Containing Vaccines, London, 24 March 2004, Doc. Ref: EMEA/CPMP/Veg/1194/04/Adopted, http://www.emea.eu.int/pdfs/human/press/pus/119404en.pdf, accessed on 17 June 2005.

228 European Agency for the Evaluation of Medicinal Products, CPMP Position Paper on Thimerosal Implementation of the Warning Statement Relating to Sensitisation, http://www.fda.gov/cber/vaccine/thimerosal.htm, accessed on 11 August 2005.

In their June 2005 endorsement of the European Commission's Mercury Strategy, the European Council underlined the importance of addressing residual uses of mercury, including in vaccines.[229]

Measures at National level

United Kingdom

The Committee on Safety of Medicines (CSM) and the Joint Committee on Vaccination and Immunisation endorsed the March 2004 EMEA position. In line with this recommendation, levels of thimerosal in a number of UK-licensed vaccines were reduced or removed completely from the manufacture of the component antigens or from the final vaccine.[230]

In August 2004 the Department of Health announced it would no longer use thimerosal in infant vaccines. Dr. David Salisbury, the head of immunizations for the UK Department of Health, said that the UK agreed with the US and Europe that thimerosal should be phased out. "The reality is that the effects of the preservative are not fully understood," said Salisbury.[231]

In efforts to eliminate mercury in infant vaccines, a new combined vaccine for diphtheria, tetanus, pertussis, Hib (Haemophilus influenza type b) and polio without thimerosal was released in September 2004.[232]

Denmark

In Denmark, the National Central Laboratory of the Danish Health System has not used thimerosal in vaccines for children since 1992.[233]

In general, while it is relatively easy to replace, reduce, or eliminate thimerosal as a preservative in single-dose vaccines, it is unclear to what extent thimerosal-containing vaccines are used in Europe. Beyond the examples mentioned above, the situation in other Member States is not well known.

Multi-dose vaccines

Multi-dose vials, used for vaccinations in many developing countries, must contain a preservative, commonly thimerosal, to prevent contamination and subsequent infection or death in

229 Council Conclusions on the Community strategy concerning mercury, 2670th Environment Council meeting, Luxembourg, 24 June 2005, p. 2.

230 The United Kingdom Parliament. http://www.publications.parliament.uk/pa/ld199900/ldhansrd/pdvn/lds04/text/40707w04.htm, accessed on 20 June 2005.

231 Manning, B. Lawmakers get mercury out of vaccines, Mothering, Nov-Dec 2004 http://www.findarticles.com/p/articles/mi_m0838/is_127/ai_n6366770, accessed 17 June 2005.

232 NHS press release 9 August 2004: Improvements to childhood immunisation programme http://www.immunisation.org.uk/newsitem.php?id=21, accessed on 17 June 2005.

233 Indikation, 14 July 2004, http://www.dkma.dk/1024/visUKLSArtikel.asp?artikelID=3551

recipients.[234] The World Health Organization states that at present thimerosal-containing multi-dose vaccines are necessary to meet vaccination demands in developing countries, as single-dose vaccines are more expensive and often require refrigeration.[235]

To that end, the Commission should fund research into alternatives and coordinate with manufacturers and the WHO to avoid exports which amount to complicity in forcing developing countries to use vaccines that do not meet the standards of vaccines used in Europe, particularly in light of increasing controversies over safety.[236]

Conclusion on vaccines

The Commission should undertake a review of vaccines, to ensure that thimerosal-containing vaccines are not in use in Europe, where alternatives are available. An agreement with manufactures should be sought to eliminate the use of thimerosal in vaccines where not necessary. Wherever needed, vaccines should be labelled to declare mercury contents. Furthermore, the EMEA should publish a comprehensive list of all vaccines licensed in Europe and their thimerosal content, as the FDA does in the United States. Further, the Commission should issue guidelines calling on the EMEA and other health organizations to work with manufacturers to reduce and/or eliminate mercury in vaccines. To that end, priority should be given on research and development of safe, mercury-free, multi-dose vaccines.

2.4. Addressing surpluses and reservoirs

Addressing surpluses and reservoirs and complementary to action 5 of the EU Mercury Strategy, the Commission proposed the following:

> Action 9. The Commission will take action to pursue the storage of mercury from the chlor-alkali industry, according to a timetable consistent with the intended phase out of mercury exports by 2011. In the first instance the Commission will explore the scope for an agreement with the industry.

In its June 2005 Conclusions, the Council, reinforcing the above-mentioned action, invited the Commission to present a proposal as soon as possible on the phasing-out of the export of mercury from the Community and action to pursue the safe storage or disposal of mercury from the chlor-alkali industry, according to a timescale consistent with the intended phase-out of mercury exports while supporting the reduction of supply, demand and emission on a global scale[237].

234 United States Food and Drug Administration. Thimerosal in Vaccines, http://www.fda.gov/cber/vaccine/thimerosal.htm, accessed on 11 August 2005.

235 World Health Organization, Thiomersal and vaccines: questions and answers http://www.who.int/vaccine_safety/topics/thiomersal/questions/en/, accessed on 23 August 2005.

236 Piden acabar uso de vacunas con mercurio. La Republica, Lima, Peru. 1/9/2005, p. 22.

237 Council Conclusions on the Community strategy concerning mercury, 2670th Environment Council meeting, Luxembourg, 24 June 2005.

Temporary storage of decommissioned mercury from the chlor-alkali industry should be pursued and the Commission should take relevant action as soon as possible, in storage areas which are secure sites, continuously monitored and located where intervention can take place immediately if necessary.

2.4.1. Storage of surplus mercury

2.4.1.1 Scope of the Mandatory Storage Obligation

To ascertain the appropriate scope of the mandatory storage obligation, the Commission must first determine which sources of mercury should be used first to satisfy estimated EU demand when the export ban takes effect, then estimate mercury demand when the mercury export ban takes effect, and finally determine which of the preferred sources will be needed to satisfy this demand. Supply sources that are not needed should be subject to a mandatory storage obligation to avoid excess supplies within the EU community.

EU mercury supplies currently come from four primary sources. These sources, in order of least to most environmentally problematic, are:

- by-product mercury (generated as an unintentional by-product from the mining of other metals such as gold and zinc),
- mercury recovered/recycled from waste and products (such as those collected from pollution control devices or contaminated sites and mercury switches in cars and appliances),
- mercury from decommissioned chlor-alkali plants, and
- primary virgin mined mercury.

Once the export ban becomes effective, it is virtually certain that primary mining within the EU will cease (indeed, extraction and processing of virgin ore at the Almadén facility has stopped already) due to the inability to sell the mined product globally, leaving the remaining three sources. Of the three remaining sources, by-product mercury and mercury recovered from waste and products are preferred sources for use because they are, at least for the moment, inadvertent outputs that are impossible to avoid. Without collection, much of this mercury would be released into the environment, thus recovery is an activity warranting encouragement. Moreover, chlor-alkali industry surpluses are the most readily captured and stored before reintroduction into commerce of the remaining three sources.[238]

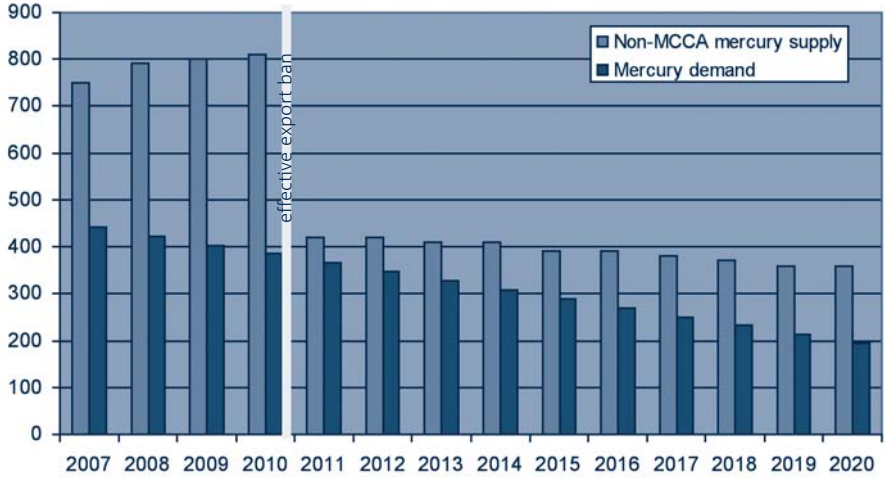
238 European Commission. Commission Staff Working Paper. Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment {COM(2005)20 final}, Brussels 28.1.2005, p. 23.

To estimate the EU's future mercury supply and demand outlook, we retained the services of Peter Maxson, author of Mercury Flows in Europe and the World (2004), one of the principal background reports prepared for the Commission in support of its Mercury Strategy development in 2004. Mr. Maxson's principal findings are summarised in Figure 3 below. Based upon a current mercury demand estimate of 480 tons/yr for the EU-25 and the 2 Accession countries (Romania and Bulgaria), and assuming a straight-line phase-out of mercury cell chlor-alkali plants through 2020 and a straight-line reduction of demand by 50% from now through 2020 for other uses (except dental and lighting), Mr. Maxson projects mercury from decommissioned chlor-alkali plants will not be needed to meet EU mercury demand.

Accordingly, the Commission's proposed legislation can and must impose a mandatory storage obligation on the decommissioned chlor-alkali mercury. Failure to include this mandatory storage obligation in the proposed legislation will result in substantial mercury surpluses within the EU, resulting in falling mercury prices, and severe economic disincentives against environmentally beneficial by-product and waste mercury recovery. This, in turn, could jeopardise the future of the recycling industry, making it much more difficult and expensive for governments to promote collection programs for discarded mercury products.

FIGURE 3 (MAXSON, 2005)

EU25+2 Hg supply & demand through the 2011 ban (best estimates)



MCCA: Mercury-Cell Chlor-Alkali (process)

Mr. Maxson's analysis also indicates that the issue of whether at least some of the mercury recovered from waste/products should be stored is a more difficult question to resolve at this juncture, given the relative proximity of supply and demand projections once the decommissioned chlor-alkali mercury has been removed from commerce and the primary mine has been closed. The question becomes one of optimal timing since demand will continually be reduced for the next several decades as chlor-alkali plants close/convert, the already issued and anticipated product directives have their intended effect, and global markets shrink generally.

Instead of making a final decision now, the Commission should instead propose legislation that authorises the extension of the mandatory storage obligation beyond the chlor-alkali mercury to other mercury supply sources as well, and put in place a review process for determining whether to exercise that authority periodically, taking into account the best supply and demand data available at the time of each review.

Such a process would enable the Commission to anticipate the issue several years before the export ban is in place, and again several years after the ban has become effective, to match supply and demand based on then-current data instead of assumptions projected over 5 years or more. This opportunity to look at real-world demand is especially critical over the next five years as industry and national governments implement the IPPC directive for the chlor-alkali sector and determine the pace of closures and conversions (and thus demand reduction) for this sector. The chlor-alkali industry alone accounts for one-third or more of EU mercury demand over the relevant time frame.

Better information needs to be collected on the quantities of mercury recovered as a by-product during the refining of various ores (zinc, etc.), as well as quantities of mercury recovered during natural gas cleaning operations.

2.4.1.2 Recovery of mercury from wastes/products

As indicated above, the recovery of mercury from wastes and products is a necessary component of the EU strategy at the present time for at least several reasons.[239] First and foremost, there are substantial quantities of mercury in discarded products and wastes that will be generated for years to come, and the collection and recovery of this mercury avoids the otherwise inevitable releases that would occur if mercury products and wastes were not properly segregated and managed appropriately. Facilitating the recovery of mercury from these products and wastes will help maintain the collection, segregation, and recycling infrastructure necessary to minimise future mercury releases.[240]

Secondly, it appears that at least some of this mercury will be needed to satisfy EU demand, at least in the short-term. This source of mercury is preferred over primary mining because primary mining creates "new mercury" for the global pool, and the mining itself releases significant quantities of mercury. This source is also preferred for use over chlor-alkali mercury because of the relative ease with which the chlor-alkali mercury can be captured and stored, given the one-time nature of mercury availability at closing or converting chlor-alkali plants and the relative simplicity of institutional arrangements and cost allocation for storage that serves only one industry.

239 Note, however, that in most countries wastes containing an extremely low level of mercury may be landfilled without further treatment.

240 We note that the U.S. Environmental Protection Agency recently examined whether to revise its current treatment standard for mercury wastes requiring recovery of the mercury and concluded that other treatment and disposal alternatives currently available were not adequately protective or sufficient. See 68 FR 4481-4489 (January 29, 2003).

At some point in the near future, this mercury will not be needed to meet internal EU demand. However, we are not yet in such a situation, which is why we have recommended that the proposed legislation should include a process for addressing these issues in the future.

Unless and until such a situation occurs, the Commission must be vigilant in utilising its legal authorities in its product and waste directives to encourage mercury recovery from wastes and products so that this mercury is not released into the environment. To this end, the Commission should consider the proposed legislation as an opportunity to clarify that it may amend existing relevant waste and product directives and regulations as needed to implement the policies embodied in the Mercury Strategy, including but not limited to the export ban and the mandatory storage obligations.

2.4.1.3 Other issues on storage

The NGOs believe that storage areas must be secure sites, continuously monitored and located where intervention can take place immediately if necessary.

We anticipate that the location and the number of the storage facilities in Europe, including whether the mercury will be stored on existing sites (e.g. storage areas of a chlor-alkali plant) or in new certified storage facilities, will be resolved in the short term.

Financing of storage should be the responsibility of those who own the mercury, in line with the Polluter Pays Principle. The responsibility of the chlor-alkali industry for storing their own mercury after the date of the export ban has been set, will encourage them to phase out their use of mercury prior to that date, which will have a beneficial effect. On the other hand, an approaching export ban may encourage those with marketable mercury supplies to simply move them outside the EU. Therefore, the European Commission should consider how to avoid this possibility and should at least oblige Member States to have a tracking system that monitors and records all movements of Hg from at least 2007.

At a September 2005 Commission meeting on the EU Mercury Strategy, a workgroup on storage was created to collect information and consider possibilities for temporary and long-term storage, given that some Member States have undertaken research into storage or disposal of mercury and are already developing policies in this area241. Several Member States expressed interest, along with Euro Chlor and Minas de Almadén y Arrayanes, S.A MAYASA, the company that owns the mercury mines in Almadén. The environment and health NGOs will follow developments to ensure the highest level of protection for the environment and human health.

241 For example, Sweden has introduced a requirement for stabilisation and storage of mercury in deep bedrock, while Germany is examining the idea of storing metallic mercury in disused salt mines.

2.4.2. Mercury reservoirs

With regard to other products containing mercury circulating in society, not covered by the actions above, the European Commission proposed in the strategy:

> Action 10. The Commission will undertake further study in the short to medium term of the fate of mercury in products already circulating in society.

The estimated quantity of mercury contained in goods and products in Europe, not including mercury cell chlor-alkali plant inventories, is 2-5,000 tonnes in Western Europe, with another 4-8,000 tonnes in Central & Eastern Europe (excluding former Soviet states).[242]

> Separate collection and treatment measures for all mercury containing products already circulating in society should be improved or introduced where none exists.

In this way, there will be more knowledge on the cycle of mercury in products where mercury ends up, and the supply will decrease at the same time.

There is already broad waste legislation in the EU for addressing landfilling, incineration, and spreading of sewage sludge, as well as specific product-related legislation (e.g. for batteries, vehicles and electric and electronic equipment).[243] However, the effectiveness of these policies in reducing mercury emissions is questionable. In fact, the Commission states that "present Community policy generally encourages recovery over disposal"[244], though the extent to which it is effective in keeping mercury out of the waste stream is unknown.

Additionally, Thematic Strategies on waste prevention and recycling, as well as sustainable use of resources are not specifically concerned with mercury, but form part of the context in which future EU measures concerning the prevention or treatment of mercury waste, use of mercury as a resource, or control of mercury-containing products could be considered.[245]

242 Peter Maxson, Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants, p. 10, report for the European Commission – DG Environment (Brussels: February 2004).

243 Commission Staff Working Paper, Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment, Brussels, 28.1.2005 SEC(2005)101 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, accessed on 13 June 2005, p. 117.

244 Communication from the Commission to the Council and the European Parliament, Community Strategy Concerning Mercury. Brussels, 28.01.2005 COM(2005) 20 final {SEC(2005) 101}.

245 EU Legislation and Policy Relating to Mercury and its Compounds. Working Document, June 2004. Prepared to inform the development of an EU strategy on mercury, p. 42/42.

2.4.2.1. Existing instruments related to mercury already circulating in society

The Directive on batteries and accumulators containing dangerous substances[246] will be repealed and replaced by a Directive of the European Parliament and the Council on batteries and accumulators and spent batteries and accumulators. This new Directive has not yet been adopted (December 2005), but aims to create a closed loop system whereby batteries will not be incinerated or landfilled, but rather collected and recycled. Member States will be required to set up collection programs for consumers to return batteries free of charge.[247] For this and other collection programmes, high collection targets need to be established and met.

One of the aims of the Directive on End-of-Life Vehicles[248] is to reduce waste from vehicles through the prevention of waste and the reuse, recycling and other forms of recovery of end-of-life vehicles and their components. Under Article 4, mercury is prohibited in materials in components of vehicles, other than in bulbs and instrument display panels and Article 6 requires that these mercury-containing components should be removed as far as possible. End-of-life vehicles have to be separately collected and treated accordingly in order to meet fixed reuse and recovery targets.

The Waste electrical and electronic equipment Directive aims to prevent generation of this type of waste and to support its reuse, recycling and other forms of recovery. Producers, or third parties acting on their behalf, are required to treat WEEE according to BAT for treatment, recovery and recycling. Member States must recover a substantial percentage of WEEE and remove mercury-containing components.[249]

Better labelling of products containing mercury will also facilitate separate collection. Labelling of mercury and mercury-containing products and preparations are covered currently by two directives[250] and their amendments.

It is imperative that existing separate collection and recycling targets for batteries, end-of-life vehicles and waste electrical and electronic equipment are met.

---

246 Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing dangerous substances, OJ L 78, 26.3.91.

247 Commission Staff Working Paper, Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment, Brussels, 28.1.2005 SEC(2005)101 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, accessed on 13 June 2005, p. 124.

248 Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles, OJ L 269, 21.10.2000.

249 Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE), OJ L 37, 13.2.2003.

250 Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging, and labelling of dangerous substances and Directive 88/379/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations.

2.4.2.2. Future measures related to mercury already circulating in society

The proposal for a directive covering non-electrical and non-electronic measurement and control devices or a separate instrument should also in principle lay the ground for the gradual collection and safe storage of the existing supply of mercury devices in households, healthcare and other professional facilities. The entities responsible for the collection should be clearly identified. Different measures should also be put in place to ensure (and even encourage) that collection can take place to the widest extent and that such devices which become waste do not end up in the municipal waste stream. Such measures could include buy-back or exchange schemes, for example for thermometers etc.

For specialist measuring and control equipment, the European Commission Extended Impact Assessment states that "collection and recovery of the mercury discarded from this area can be assumed to be much cheaper as the sources are limited in number and should have suitable waste management systems in place."[251] The Commission and Member States should create and enforce collection programmes and policies for all existing measuring and control equipment containing mercury. Successful hospital collection programmes for mercury undertaken in the United States should be consulted in the design of new programmes in Europe.

Collection and recycling programmes are imperative to avoid the contribution of mercury in products to the waste stream and ultimately the environment, but collection rates will never reach 100 percent. Therefore a policy of source reduction must also be pursued to eliminate the possibility of mercury from products being released. Efforts to eliminate the use of mercury in products are ultimately far less costly, easier, less hazardous and more effective than separation and collection programmes.[252]

Data and all relevant information should be gathered with respect to the quantities of mercury already in circulation in the following products and uses:

- Different mercury compounds
- Dental amalgam
- Vaccines
- Soaps and cosmetics
- Biocides in paper industry, paints and on seed grain

251 Commission Staff Working Paper, Annex to the Communication from the Commission to the Council and the European Parliament on Community Strategy Concerning Mercury – Extended Impact Assessment, Brussels, 28.1.2005 SEC(2005)101 http://europa.eu.int/comm/environment/chemicals/mercury/pdf/extended_impact_assessment.pdf, accessed on 13 June 2005, p. 38.

252 Hylander, L. D. & Goodsite, M. E. 2005. Environmental costs of mercury pollution. Sci. Total Environ. In press.

- Pharmaceutical antiseptics
- Laboratory and school uses as a reactant.
- Catalysts
- Pigment and dyes (if any)
- Detergents (if any)
- Explosives
- Military uses
- Gold-mining in European territory
- Homeopathic medicines
- Spiritual, traditional medicine or cultural uses by various cultural groups living in the EU.
- Etc.

2.4.2.3. Mercury from contaminated sites clean-up

The EU Mercury Strategy did not address some key issues related to mercury contaminated/polluted sites due to past mercury mining (or other). To that respect, we would support suggestions made also by Slovenian researchers,[253] as further actions in the framework of the EU Mercury Strategy. This issue was also acknowledged by the Council of Environment Ministers (June 2005) in their conclusions on the EU Mercury Strategy, where they invited the Commission to examine potential initiatives in relation to the rehabilitation and monitoring of contaminated former mining sites, including the proper handling of the mining waste while respecting the polluter-pays principle. The awaited EU Thematic Strategy on Soil is expected to touch upon the contaminated sites issue, and should therefore be followed up closely.

Furthermore, Directive 2004/35/EC[254] with its objective of establishing a framework for environmental liability based on the 'polluter-pays' principle to prevent and remedy environmental damage could be considered. The directive only applies to future cases of pollution (which occurred after the entry into force of the directive) and it leaves the management of preceding or historical pollution cases up to Member States.[255] Member States shall comply with the directive by 30 April 2007. "Environmental damage" covered by the liability regime is defined

253 Milena Horvat, Branko Konti_, Jo_e Kotnik, Alfred B. Kobal, Tatjana Dizdarevi_, Bojan Er_un, Rudolf Rajar, Du_an _agar, Boris Kompare, Alexix Zrimec, Jo_ko Osredkar, Damjana Drobne, Mihael Toman.

254 EU Environmental Policy Handbook, European Environmental Bureau (September 2005), p.199.

255 Directive 2004/35/EC, Article 2 paragraph 1c.

with reference to: species and habitats protected by Community legislation and national legislation, waters covered by the Water Framework Directive and the dangers for human health deriving from contamination of soil and underground. Therefore land contamination acquires relevance for the purposes of the directive insofar as it creates a significant risk for human health. It refers to "any land contamination that creates a significant risk of human health being adversely affected as a result of the direct of indirect introduction, in, on or under land of substances, organisms or micro-organisms".[256] The damage threshold to be met in order for land damage to fall under the scope of the directive could pose problems. The criteria included in the directive for determining whether land contamination is of such an extent as to exceed the damage threshold are imprecise and open-ended. [257]

Contaminated sites (former mining sites and others) should be identified and classified according to the degree of contamination and urgency of remediation.

Reduction of emissions

In Europe a large number of environments are contaminated/polluted by mercury due to past mercury mining (Idrija Mercury Mine - Slovenia, Almadén - Spain, Mt. Amiata - Italy, Nikitovka – Ukraine, and others) as well as from releases of mercury from industries using mercury in their processes. These heavily contaminated sites also serve as a continuous source of mercury to the atmosphere, due to evaporation/volatilisation and due to the surface waters (rivers and lakes) as well as coastal areas. Due to a large spread of mercury contamination, these areas may represent either point or diffuse sources of pollution. In addition, in a number of areas, high levels of mercury are expected due to its natural presence (native Hg or as cinnabar). These areas are potentially a very important source of mercury if mobilised due to change in land use.

In order to obtain comparable data, harmonised and standardised protocols for estimation of emissions should also be considered – they are not currently available. This should include emissions to air, water and soil. Unless harmonisation on a European-wide basis is achieved, comparison of emission inventories among areas, as well as trends, is not possible. Also the efficiency of removal technologies of mercury from main sources (such as stack gases, etc.) also need standardised measurement approach.

The contribution of mercury emissions from contaminated sites to the overall emissions should be calculated.

Standards and methodologies should be developed and agreed upon on a European-wide basis and harmonised with those under development in other parts of the world.

Harmonised and standardised protocols for estimation of emissions should also be considered in order to obtain comparable data.

256 EU Environmental Policy Handbook, European Environmental Bureau (September 2005), p.203.

257 Report from the International conference "Towards a mercury-free world", April 2005, Madrid, p. 117.

Improving understanding

Integrated tools for the remediation of mercury-contaminated sites should be developed.

It is generally accepted that the formation and bioaccumulation of methylmercury is the most critical point of environmental quality in mercury-contaminated sites. The reduction of methylmercury in food (particularly fish) can therefore be defined as the priority objective with regard to the mercury contamination problem. To reach this target, two principal strategies exist:

- reducing the input of mercury to the system,
- changing the conditions to reduce the formation of methylmercury.

Due to the highly complex bio-geochemistry of mercury, measurement campaigns and models which address the mentioned subjects (riverine, atmospheric and marine transport, species transformation and so on) are required. The development of an integrated model approach which will combine all these individual subjects is required. To fulfil this, well-tested and approved models for single compartments should be adapted and linked to an integrated natural science-based model of mercury transport or fate in various environmental compartments.

Mixed exposure of humans and wildlife to inorganic mercury and organomercury (MeHg) in mercury polluted sites should further be addressed and studied, due to possible combined effects.

In Idrija, Slovenia (second biggest mercury mine in the world, closed for more than a decade), no research was conducted during the operational phase of mercury use and mining. There was only one concern: to prevent the mercury exposure of miners and people working in the mine and those in the smelting facilities. The rest was not investigated at all until the closure of the mine. Elevated concentrations in the environment were then observed, with some effects that can be shown in wildlife and the inhabitants. Fish and vegetables in the area are now contaminated and consumption of food grown in this area is decreasing.[258]

Areas contaminated by mercury (former mining sites and others) need to be further restored and brought to a reasonable condition.

2.5. Protecting against exposure

The European Commission in its Extended Impact Assessment (ExIA) has stated that most people in coastal areas of Mediterranean countries, and around 1-5% of the population in central and northern Europe (i.e. around 3-15 million people in the EU) are around the health refer-

258 Report from the International conference "Towards a mercury-free world", April 2005, Madrid, p. 117.

ence dose for mercury. In addition, large numbers of the Arctic population and Mediterranean fishing communities are above the US "Benchmark Dose Limit" (BMDL) of 10 times the health reference dose – the level at which there are clear neurological effects.

The disparities between the US BMDL and the EU reference dose, as highlighted by the European Food Safety Authority (EFSA), need particular attention to ensure the highest possible level of health protection for European citizens. The EFSA's current guidance on fish consumption for the European population is based on the application of international JEFCA (Joint FAO/WHO Committee on Food Additives) standards, which are less than half as stringent as those used in the United States.

It is also apparent from the EFSA dietary recommendations[259] and European Commission Extended Impact Assessment that population data on exposures to methylmercury, particularly data on vulnerable groups (women and children), are not available. More worryingly, there is no Community institution actively seeking these population-based data. Nor is there any obligation on the part of national public authorities to provide such information. This means that the EU does not have, nor will it obtain in the foreseeable future, an accurate representation of the potential public health impacts and economic costs to society caused by mercury exposures. Therefore, it will be unable to promote and implement remedial actions in an efficient and responsible manner.

The European Commission proposed:

Action 11. In the short term, EFSA will investigate further specific dietary intakes of different types of fish and seafood among vulnerable subpopulations (e.g. pregnant women, children).

Although some data from Member States were submitted to the EFSA for assessing mercury exposure, there is still a need for national intake data on amounts of fish and seafood consumed per meal and per week; preferred fish/seafood species, including details of fresh and canned fish; and consumer details such as gender, age, pregnant women,[260] to get a better sense of just how many people in Europe are at risk.

EU commitment to funding and resources is imperative to investigate dietary intake and ensure awareness-raising on the health problems associated with mercury and a healthy diet, highlighting in particular the concerns for vulnerable populations.

The EU pilot human biomonitoring programme to be launched in 2006 should also prioritise work on methylmercury to contribute to a better picture of actual exposure, particularly in vulnerable groups.

Most importantly, this dietary intake guidance for methylmercury should take into account mercury concentrations in fish, the amount of fish consumed and the weight of the persons consuming fish, similar to the "health reference dose" approach used in the United States. The EU should take the lead in promoting a revision of the JEFCA standards to ones that afford similar protection to those of the US EPA.

259 EFSA. EFSA opinion on mercury and methylmercury in food: need for intake data, AF 06.04.2004 – 4.

260 EFSA. EFSA opinion on mercury and methylmercury in food: need for intake data, AF 06.04.2004 – 4.

The EFSA dietary recommendations were based on only 12 Member States and Norway's submissions of comprehensive information with regard to mercury levels in fish and humans. In analysing submissions from Member States, they found that the average intake estimates of methylmercury for European consumers were below, but at times rather close to, the Provisional Tolerable Weekly Intake (PTWI) established by the JECFA (1.6 Ìg/kg body weight) and some intake estimates exceeded the limit established by the US – National Research Council (NRC) (0.7 Ìg/kg body weight per week).

European limits for allowable levels of mercury in fish (0.5 mg/kg for fish in general, but 1.0 for certain larger predatory species including shark, swordfish, marlin, tuna, and orange roughy)[261] are based on the guideline levels established by Codex Alimentarius in 1991[262], but it is not presently known what percentage of fish exceeds this level. Due to the absence of complete information and the fact that mercury levels cannot be reduced in the immediate future, it is essential that fish consumption guidelines protective of sensitive populations should be updated and publicised throughout the EU.

In line with recommendations from the EFSA CONTAM (Panel on Contaminants in the food chain), the Commission, under the Environment and Health Action Plan 2004-2010, should ensure that mercury be considered as part of a wider environment and health monitoring system that includes a biomonitoring programme across Europe specifically considering vulnerable populations. It is essential in this respect to have formal coordination processes between DG Environment, DG Health and Consumer Protection and DG Research and relevant EU agencies (JRC, ECB and EFSA), to consider combined exposures to mercury.

The European Commission further proposed:

> Action 12. The Commission will provide additional information concerning mercury in food as new data become available. National authorities will be encouraged to give advice in the light of local specificities.

While EFSA recommends that women of childbearing age (in particular, those intending to become pregnant), pregnant and breastfeeding women as well as young children select fish from a wide range of species, without giving undue preference to large predatory fish such as swordfish and tuna,[263] the warning is vague and not sufficiently protective of vulnerable populations.

261 EC Regulation 221/2002, http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:32002R0221:EN:-HTML amending Commission Regulation (EC) No 466/2001 of 8 March 2001 setting maximum levels for certain contaminants in foodstuffs, http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_077/l_07720010316en00010013.pdf

262 Guideline Levels for Methylmercury in Fish, CAC/GL 7-1991, http://www.codexalimentarius.net/download/standards/21/CXG_007e.pdf

263 European Food Safety Authority. Press Release: EFSA provides risk assessment on mercury in fish: Precautionary advice given to vulnerable groups. 18 March 2004. http://www.efsa.eu.int/press_room/press_release/258_en.html, accessed on 8 June 2005.

Following EFSA's recommendation, the European Commission released an "Information Note" based on the need to give more specific advice to vulnerable groups and to provide them with concrete information. The Commission made a rough calculation, based upon levels of methylmercury in fish compared with the PTWI, to make recommendations more tangible to the public. They suggested that women who might become pregnant, women who are pregnant or women who are breastfeeding should not eat more than one small portion (<100g) per week of large predatory fish, such as swordfish, shark, marlin and pike. If they eat this portion, they should not eat any other fish during this period. Also, they should not eat tuna more than twice a week. The advice also applies to young children.[264]

Member States' Fish Consumption Guidelines

Denmark

The Ministry of Family and Consumer Affairs warns that women who are considering pregnancy, are pregnant or breastfeeding, and children below 14 years should limit their intake of tuna, skate/ray, halibut, escolar, swordfish, shark, pike, perch and zander. As a guideline, they state that persons in these groups should not eat more than 100 g per week of large predatory fish species. However, canned tuna generally has a lower mercury content[265] and consumption does not need to be restricted to the same extent.

Finland

The National Food Agency states that children, young people and people of fertile age can eat salmon caught in the Baltic Sea, large herring, pike caught in the sea or inland waters, and predatory fish from inland waters once or twice a month. However, they warn pregnant women and nursing mothers against eating pike due to the mercury risk.

In addition, they state that consumers who eat fish from inland waters on an almost daily basis should also reduce their consumption of the following predatory fish that accumulate mercury: large perch, pike perch and turbot.[266]

Ireland

On 18 March 2004, the Food Safety Authority of Ireland (FSAI) recommended that pregnant and breastfeeding women, women of childbearing age and young children select fish from a wide range of species but not to eat swordfish, marlin and shark, and to limit consumption of tuna to 1 fresh tuna steak (approximately 8 oz) or 2 medium cans (8 oz) per week.[267] Ireland

264 European Commission. Information Note, Methylmercury in fish and fishery products, 12 May 2004, http://europa.eu.int/comm/food/food/chemicalsafety/contaminants/information_note_mercury-fish_12-05-04.pdf, accessed on 17 June 2005.

265 Kviksølv, http://www.altomkost.dk/madtildig/Hvad_er_der_i_maden/Uoenskede_stoffer/Kviksoelv.htm

266 National Food Agency of Finland, Dietary advice on fish consumption, http://www.elintarvikevirasto.fi/english/index.html?page=5923

267 Food Safety Authority of Ireland. FSAI Issues Guidelines on Consumption of Shark, Swordfish, Marlin and Tuna. 18 March 2004. http://www.fsai.ie/news/press/pr_04/pr20040318.asp accessed 20 June 2005.

currently monitors "fish landed at major Irish fishing ports" and reports low levels of mercury, between 0.02 and 0.27 mg/kg, though indicating that catches do not normally include shark, swordfish, marlin and tuna.[268] To fill in this data gap, the FSAI is planning a survey on total and methylmercury levels in tuna, marlin, shark, and swordfish.[269]

Sweden

Sweden's National Food Administration makes a number of recommendations on limiting fish consumption, based on a variety of contaminants. Women who are pregnant or thinking of becoming pregnant and breastfeeding women should never eat large halibut, cod liver, eel, shark, swordfish, or tuna, fresh or frozen.[270]

United Kingdom

The UK advises that pregnant and breast-feeding women, and women who intend to become pregnant should limit their consumption of tuna to no more than two medium-size cans or one fresh tuna steak per week. These women are also advised to avoid eating shark, swordfish and marlin. Children under 16 are also advised to avoid eating shark, swordfish and marlin. Other consumers should eat no more than one portion of shark, swordfish or marlin per week, but do not need to limit consumption of tuna.[271]

EFSA and Member States that have not yet done so should issue and publicise more protective recommendations for women of childbearing age, pregnant women, breast feeding women, and children. These vulnerable groups should not consume large predatory fish, including shark, swordfish, marlin, king mackerel, orange roughy, grouper, or albacore tuna. Fish with medium mercury content should be consumed in limited amounts and frequencies.

It should also be made clear to the general public that just one serving of fish high in mercury will fill up the mercury quota for several days or even weeks, thus going against other advice on consumption allowances for the week. Most high-mercury fish are not particularly good sources of fish oil. It is therefore better to eat other types of fish that are lower on the food chain and of a smaller size.

In the EU Strategy on Mercury, the European Commission did not specifically propose actions regarding awareness-raising of the health problems associated with mercury pollution.

---

268 Food Safety Authority of Ireland. FSAI Issues Guidelines on Consumption of Shark, Swordfish, Marlin and Tuna. 18 March 2004. http://www.fsai.ie/news/press/pr_04/pr20040318.asp, accessed on 20 June 2005.

269 Food Safety Authority of Ireland. Call for Tender - Methylmercury in certain fish species. April 2005. http://www.fsai.ie/about/tenders/call_tender_0405_4.asp, accessed on 20 June 2005.

270 National Food Administration. Food for two, Good advice for pregnant or breast-feeding women. Updated on 17 September 2004. http://www.slv.se/templates/SLV_Page.aspx?id=703, accessed on 20 June 2005.

271 Food Standards Agency. Mercury in imported fish and shellfish, UK farmed fish and their products (40/03). Thursday, 24 July 2003 http://www.food.gov.uk/science/surveillance/fsis-2003/fsis402003, accessed on 1 July 2005.

The European Community (particularly DG SANCO[272]) and national governments must prioritise and provide resources for awareness-raising campaigns for vulnerable groups, so that they have the information needed to protect themselves and their families through wise dietary choice as part of the Community Public Health Programme.

New fish advisories should be issued as soon as data collected throughout the EU is analysed, with an emphasis on precautionary approaches, and guidelines for vulnerable groups established. Any new guidelines must be widely publicised and highlight consumption recommendations for fish with high and low levels of mercury.

EU-funded projects should be encouraged to raise awareness on mercury. While Member States must be encouraged to give advice, the EU has a co-ordinating role, as well as an active role to play in raising awareness and therefore giving EU added value to protect EU citizens' health.

Awareness of the potential dangers of mercury exposure needs to be highlighted to all potential vulnerable populations and this includes not only exposure via diet but also point-source exposures in the environment, how to avoid them, what to do if mercury spillage occurs, etc. Education and training of health care professionals is also needed. This could also cover accidental exposure to mercury through spills (in hospitals, dental clinics, schools, homes), etc.

Campaign activities and education programmes should be carried out under the Public Health Programme, RTD Programme, LIFE + Programme and Culture and Education Programme to ensure the education of health care professionals and providers and EU citizens about the risk of adverse human health effects attributable to mercury exposure through fish consumption, point-source contamination and mercury-containing products.

2.6. Improving understanding

Action 13. Priorities for mercury research will be addressed in the 7th RTD Framework Programme and other appropriate funding mechanisms.

The initial proposal from the Commission did not indicate mercury as a priority area for funding within the 7th Research, Technological Development and Demonstration Framework Programme (7th RTD FP). In the specific programmes under the different lines covered by the 7th RTD FP, the Commission does highlight the needs of research for more data on mercury exposures and other research associated with the implementation of the Mercury Strategy.

272 Directorate General for Consumers and Public Health

However, as discussed in several other sections, there is a need for undertaking research to develop technologies relating to control of mercury emissions, particularly to air. Research should be undertaken to eliminate the marketing and use of all remaining mercury applications by finding alternatives to products. In addition, cost-effective mercury removal from wastes should be researched further.

3. SUPPORTING AND PROMOTING INTERNATIONAL ACTION

3. SUPPORTING AND PROMOTING INTERNATIONAL ACTION

The importance of the EU in supporting and promoting international action cannot be stressed highly enough. The European Commission and the Member States need to send a clear message to the international community that measures need to be taken as fast as possible to control mercury emissions, demand and supply globally in order to reduce risks significantly, starting with activities aimed at curbing primary mining and storing excess mercury from decommissioning chlor-alkali plants.

In that respect, several actions (see text in boxes below) are proposed in the EU Mercury Strategy. All international actions are strongly supported by environmental and health NGOs. NGO comments concerning the different international fora, are not the subject of this publication. Nonetheless, in relation to those, a few points need to be made.

The Strategy correctly observes that most of the global mercury demand, encouraged by cheap and available mercury supplies, arises from the use of technologies or processes in the developing world that are already illegal or being phased out in the EU and most OECD countries. In particular, battery production, mercury cell chlor-alkali production, and small-scale gold mining may account for at least two-thirds of global mercury demand,[273] with China and India accounting for up to half of the total global demand. All three of these activities, as practised in much of the developing world, result in substantial exposure to workers and their families, and pollution of the local and global environments. Given the huge and immediate reductions that can be achieved by shifting to non-mercury-based battery production and chlor-alkali technologies already widely used in the EU and elsewhere, targeted international technical and other assistance cannot but produce dramatic results.

3.1. Targeted Technical and Financial Assistance

> Action 14. The Community, Member States and other stakeholders should pursue input to international fora and activities, and bilateral engagement and projects with third countries, including technology transfer, to address the mercury problem.

273 Maxson, P. (2004). Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants. Report by Concorde East/West Sprl for DG Environment of the European Commission.

Action 15. The Commission will consider establishing a specific funding scheme for research and pilot projects to reduce mercury emissions from coal combustion in countries with a high dependency on solid fuels, e.g. China, India, Russia, etc., similar to the CARNOT programme that promotes the clean and efficient use of solid fuels.

A review of the principal components of global mercury demand in the mercury trade report commissioned by DG Environment reveals excellent targets of opportunity for EU intervention to both reduce localised exposure in the developing world and global mercury demand.

Chlor-alkali plants operating in India and elsewhere in the developing world release typically 10-50 times more mercury on a routine basis than plants operating in EU-15 countries.[274] The use of mercury in battery production appears to stem primarily from the continued manufacture of mercury oxide batteries containing 33-50% mercury,[275] which OECD countries banned many years ago.

Taken together, China and India account for approximately half of current worldwide mercury demand and therefore represent priority targets for technical and financial assistance. This assistance can come in a variety of forms, including industry-industry consultations, technology transfers, funding of improved mercury inventories (particularly in China), revolving loan funds to encourage process changes in the Indian chlor-alkali sector, funding to improve enforcement of domestic mercury-content product standards, etc.

The EU and China have recently agreed on a partnership on climate change to reduce the cost of clean energy technologies and other steps to reduce greenhouse gas emissions. Priority areas for technical cooperation include cleaner coal combustion techniques, methane recovery, hydrogen and fuel cells and energy efficiency, energy conservation and renewable energy.[276] This partnership presents an opportunity for coordinated emissions reductions, which should include mercury.

In a similar way, India and the EU are committed to creating the conditions necessary for sustainable economic development. Each recognises the existing interdependencies in the environmental field and the transboundary character of many environmental problems. As major global actors, both partners are fully conscious of their capacity to play a central role in international efforts towards better environmental global governance. India and the EU are signatories and active contributors to the main multilateral instruments, including the Kyoto Protocol and the UN Convention on Biodiversity.[277]

---

274 There are regular reports of plants releasing even more. For India, for example, ref. R. Agarwal's presentation on 22 April 2005 at the "Towards a mercury-free world" conference, Madrid. For Russia, ref. ACAP. 2005. Assessment of Mercury Releases from the Russian Federation. Arctic Council Action Plan to Eliminate Pollution of the Arctic (ACAP), Russian Federal Service for Environmental, Technological and Atomic Supervision & Danish Environmental Protection Agency. Danish EPA, Copenhagen.

275 Maxson, P. (2004). Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants. Report by Concorde East/West Sprl for DG Environment of the European Commission.

276 EU-China climate deal fuels carbon capture hopes, Environment Daily 1934, 06/09/05.

277The India-EU strategic partnership Joint Action Plan, 7/9/2005, http://europa.eu.int/comm/external_relations/india/sum09_05/05_jap_060905.pdf

While the EU is committed to partnerships as described above, projects linked to mercury use and exposure reduction should be kept in mind.

3.2. Rotterdam Convention on Prior Informed Consent (PIC[278])

Action 16. The Community should promote an initiative to make mercury subject to the PIC procedure of the Rotterdam Convention.

The EU should begin to lay the groundwork for worldwide global mercury trade transparency and explore the willingness and ability of countries to impose trade reporting obligations upon firms importing or exporting mercury in their countries.

Sweden has already submitted notification that they will include mercury and all its compounds in the PIC procedure to the Rotterdam Convention and other Member States are considering supporting this position. The Commission should investigate whether there is an interest on the part of other regions to second the initiative, which is required as a first step in the process of making mercury subject to the PIC for all Parties. Technical assistance should be provided to developing countries to integrate the reporting requirements for mercury into currently existing PIC procedures within their governments.

3.3. Convention on Long Range Transboundary Air Pollution

Action 17. The Community and Member States should continue to support work under the Heavy Metals Protocol to the UNECE Convention on Long Range Transboundary Air Pollution.

For the sake of information, we note that the Protocol on Heavy Metals includes an emission limit value (ELV) for mercury for new chlor-alkali plants of 0.01 grams of mercury per metric tonne of chlorine production capacity (i.e. 0.01 g Hg/tonne Cl2). However, no ELVs for mercury emissions from existing plants are specified in the Protocol. Instead, the Protocol requires Parties to evaluate ELVs for existing chlor-alkali plants within two years after the date of entry into force of the Protocol (annex V, paragraph 19), i.e. December

278 http://www.pic.int/en/viewpage.asp?id_cat=0

2005. The Task Force produced a summary of ELVs based on a report,[279] which aimed to review Best Available Techniques (BAT) and ELVs for controlling emissions of heavy metals and their compounds from existing chlor-alkali plants and from Municipal Waste Incinerators. The relevant BATs developed under the IPPC BREFs are also taken into consideration.

Limit values for mercury emissions were set in the Protocol (1998) regarding municipal and hazardous waste incineration: 0.08mg/m3 for municipal waste incineration and 0.05 mg/m3 for hazardous waste incineration. Limit values for mercury-containing emissions from medical waste incineration were to be evaluated by the Parties meeting within the Executive body by December 2005.

The protocol also foresaw that each Party should apply product control measures and product management measures in accordance with the conditions and timescales specified in annex VI and VII respectively. Requirements are included that the Parties achieve specific concentration levels of mercury in batteries (Annex VI to the protocol). Furthermore, the Task Force on Heavy Metals will review available information on technological developments relative to the product control measures in Annex VI and will seek more information on product management measures for mercury, lead and cadmium in relation to Annex VII, including substitution and recycling. Questionnaires (agreed by the parties) will be filled in by the Parties and submitted to the secretariat. More information is expected in 2006. [280]

Additionally, models are being developed to link mercury deposition on forest soil to the critical load for forest soil and mercury levels in freshwater fish, which is expected to lead to a revised heavy-metal protocol with stricter restriction measures.[281]

The review phase is expected to be completed in 2006, and then the revision of the Protocol is expected to start.[282]

Discussions at UNECE level should take into account the relevant work in the regions. Considering that in most cases, EU standards are the stricter ones, the EU should stick firmly to its position and try to promote such emission limit values at UNECE level.

279 UNECE, Technical Input for Reviewing the 1998 Protocol on Heavy Metals, EB.AIR/WG.5/2005/2 (15/7/2005), http://www.unece.org/env/documents/2005/eb/wg5/eb.air.wg.5.2005.2.e.pdf

280 UNECE, Technical Input for Reviewing the 1998 Protocol on Heavy Metals, EB.AIR/WG.5/2005/2 (15/7/2005), http://www.unece.org/env/documents/2005/eb/wg5/eb.air.wg.5.2005.2.e.pdf

281 KEMI - Swedish Chemical Inspectorate. Mercury – Investigation of a general ban, http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf, accessed on 13 June 2005, p. 89.

282 UNECE, WGSR Report of the Thirty-Seventh Session, http://www.unece.org/env/documents/2005/eb/wg5/eb.air.wg.5.80.e.pdf

3.4. UNEP Global Mercury Programme

Action 18. The Community, Member States and other stakeholders should also support the UNEP Global Mercury Programme, e.g. through review of materials and provision of technical knowledge and human and financial resources.

Action 20. To reduce mercury supply internationally, the Community should advocate a global phase-out of primary production and encourage other countries to stop surpluses re-entering the market, under an initiative similar to that of the Montreal Protocol on substances that deplete the ozone layer. To support this objective, the envisaged amendment of Regulation (EC) No. 304/2003 would phase out the export of mercury from the Community by 2011.

In February 2005, as an input into the 23rd UNEP Governing Council meeting (Nairobi, Kenya 21-25 February 2005) where mercury was to be discussed at a global level in view of the possibility to establish a global legislative instrument on mercury, a group of environmental NGOs[283] submitted to UNEP the NGOs Proposed Governing Council Decision[284] based upon a more extensive position paper which had been submitted to UNEP in July 2004[285]. A larger group of NGOs[286] finally attended the meeting.

The UNEP Governing Council adopted a resolution in February 2005,[287] calling upon governments and others to curb the primary production of mercury and the introduction into commerce of excess mercury supplies. UNEP was requested to prepare a report summarising global supply, demand, and trade that would form the basis for considering further measures at its 2007 meeting.

The NGO community considered the following accomplishments in the UNEP decision to be the most important:

- A recognition of the value of both curbing primary mercury mining and the introduction into commerce of excess mercury supplies;
- A decision to undertake an analysis of the global mercury trade, supply and demand in order to better understand the extent and patterns of use;

283 EEB, NRDC, Greenpeace, Ban Mercury Working Group.

284http://www.zeromercury.org/UNEP_developments/050208%20NRDC%20EEB%20GP%20Resolution%20to%20UNEP%20logos.pdf

285 http://www.zeromercury.org/UNEP_developments/040701%20NGO%20coalition%20%20UNEP_Comments.pdf

286 EEB, NRDC, Ban Mercury Working Group (MPP), Greenpeace, Toxics Link -India , Associação de Combate aos POPs - ACPO, groundWork, South Africa, Global Village of Beijing, China, and International Indian Treaty Council

287 GC Decision 23/9 available at http://www.chem.unep.ch/mercury/mandate-2005.htm.

- A request that governments consider banning or restricting the use of mercury in products like batteries and processes such as chlor-alkali facilities;
- A request that governments consider controlling mercury emissions using best available techniques;
- A request that industrialised countries provide developing countries with access to financial resources in order to reduce mercury pollution; and
- A decision at the 24th Governing Council session in two years' time to assess the need for further action on mercury, including the possibility of a legally binding instrument.

The EU Position during negotiations was the following: requesting governments to prioritise and take concrete actions e.g. applying best available techniques to reduce mercury emissions from point sources; insisting on phasing out the mercury cell technique in the chlor-alkali industry by 2020; restricting mercury in batteries to a maximum of 0.2% for button cells and 5 ppm for other batteries by 2010 at the latest; urging governments and the private sector to phase out primary production of mercury on a global scale, and banning the reintroduction of mercury surpluses onto the market. At the same time they clearly gave their support to a global binding instrument on mercury. During the negotiations the general line of having concrete targets was supported by the G77.[288]

As it can be seen, however, not all EU proposals were adopted in the end. As a result, and from the NGOs' experience during these negotiations, it has become clear that more time is needed for discussion between the parties.

It is absolutely necessary for the EU (European Commission and Member States) to intensify its efforts and continue the collaboration started in Nairobi in February 2005, in order to prepare the groundwork for the negotiations for the 24th UNEP Governing Council due to take place in February 2007. In principle, this line of action will also be supported by the EU Environment Ministers when they draw conclusions on the EU strategy on mercury. [289]

More concretely, coordination should be sought by the EU with the G-77 and other interested parties, through bilateral negotiations and other activities, as soon as possible and prior to February 2007, to lay the ground for global mercury reduction strategies and agreements, to target demand reduction activities of global significance in developing countries, and an international treaty on mercury.

288 The Group of 77 (G-77) was established on 15 June 1964 by seventy-seven developing countries signatories of the "Joint Declaration of the Seventy-Seven Countries" issued at the end of the first session of the United Nations Conference on Trade and Development (UNCTAD) in Geneva. http://www.g77.org/

289 Council Conclusions on the Community strategy concerning mercury, 2670th Environment Council meeting, Luxembourg, 24 June 2005.

Furthermore, the NGOs would propose that the EU develops an inventory of all the projects on mercury (all issues) which are taking place between European and developing countries.

This inventory could then be used to identify the needs in order to make better use of financial resources available for work on mercury. The EU needs to better understand that it can assist less developed nations in various ways while advancing its own interests – in this case, in relation to the health effects of mercury on EU citizens – if it adopts a more strategic overview of development assistance.

Considering that MAYASA, in Almadén, Spain is not producing primary mercury any more and in relation to the UNEP decision on curbing mercury mining, the EU should seek ways of working and collaborating with the two remaining big sources of primary mercury (apart from China), Algeria and Kyrgyzstan, with a view to reducing and eliminating primary mining activities and phasing out primary mercury entering the global market. EU supportive measures and actions with these countries should also be considered.

MAYASA has stated in the past that all of their operations are transparent and they are fully supportive of all EU efforts to reduce the use of mercury where it is not legal or responsible. MAYASA has already taken steps to restrict sales of Hg in cases where the end use is unknown or possibly not appropriate. They should be encouraged to continue with this responsible attitude, to avoid involvement in speculative activities on the mercury market, and to publish information annually on their sales (volumes, prices, destinations and purchasers, if possible).

3.5. Small-scale gold mining

Action 19. The Community and Member States should support global efforts contributing to reduced use of mercury in the gold mining sector, e.g. the UNDP/GEF/UNIDO Global Mercury Project. They will also consider possibilities to support individual developing countries through the various instruments related to development cooperation assistance, taking national strategies for development into account.

Small-scale gold mining is the area of highest global mercury consumption (estimated at 800 tonnes in 2004).[290] As much as 95% of all the mercury used in small-scale gold mining is released to the environment. Gold mining results in hundreds of tons of mercury pollution every year which devastates aquatic ecosystems and exposes miners and local communities to a serious public health threat.

290 Veiga MM, Maxson PA, Hylander L, Origin of mercury in artisanal gold mining. Paper accepted 12 August 2004 for publication in 2005 in the Journal of Cleaner Production (Elsevier).

This form of mining usually involves the extraction of secondary gold from "placer deposits" (alluvial, colluvial or elluvial), which can be liberated and treated using gravity methods. Mercury is the preferred method employed by small-scale miners for gold recovery. Gold extraction using mercury is comprised of four stages: 1) amalgamation, 2) separation of amalgamation, 3) removal of excess mercury, and 4) burning of the remaining amalgam to produce a gold sponge. Mercury can be released into the environment at each stage, which makes the promotion of mercury-free alternatives imperative.[291]

Responding to these threats requires a globally coordinated strategy, which joins education and outreach activities with mercury reduction technology development and deployment throughout the small-scale gold mining world. To this end, UNIDO[292] and its partners (UNDP and GEF) are implementing projects in six countries (Brazil, Lao People's Democratic Republic, Indonesia, Sudan, Tanzania and Zimbabwe), through the Global Mercury Project, aimed at introducing improved mining practices and reducing the overall burden of mercury released to international waters. Expansion of this UNIDO work is expected to continue[293] in order to achieve the required improvements globally in a timely manner. As a result, EU nations should facilitate such an expansion through financial and other relevant assistance and through support of UNIDO's request for additional funds through the Global Environment Fund in order to continue its important work.

In addition to these projects, resources are needed to explore and assess the viability of introducing mercury-free gold mining techniques alongside mercury reduction practices. While we applaud UNIDO for its work thus far, we also recognize substantial mining expertise resides in academic and other institutions in OECD countries. In addition, the EU should seek to support the marketing of "clean gold" over time.

The EU should seek to exploit this expertise as part of its strategy and challenge its relevant institutions to develop next generation mercury-free techniques for small-scale gold miners. These techniques should then be given and promoted in the areas concerned.

In the EU, only France and its Overseas Department of French Guiana are known to have been using mercury in small-scale gold mining and this is to be restricted by law by January 2006[294] - no other EU uses are known.

291 Mercury-free gold mining technologies: possibilities for adoption in the Guianas, WWF-Guianas Regional Programme Office, http://www.wwfguianas.org/technicalpapers/mercfreetech.pdf

292 Global Mercury Project, http://www.unites.uqam.ca/gmf/intranet/gmp/index_gmp.htm

293 Next Phase of GMP, Marcelo Veiga, UNIDO, http://www.unites.uqam.ca/gmf/intranet/gmp/files/doc/gmp/GMP_Next_Phase.pdf

294 Report from the International Conference "Towards a mercury-free world", April 2005, page.116

3.6. Other issues

Further to the above, the EU and its member nations should work with the relevant international institutions to initiate a public health initiative on the use of mercury in soaps and cosmetics in the developing world, particularly in Africa. Although probably not an important component of global mercury demand in a quantitative sense, this use of mercury is particularly egregious because of the potential for immediate and prolonged human exposure of vulnerable populations. As reported by UNEP, recent action by Cameroon to limit the content of mercury in cosmetic products to no more than 2% resulted in the removal from the marketplace of 12 soaps and 13 creams.[295] The EU should assume a leadership role in this area because, until very recently, it exported large quantities of these products to Africa and elsewhere, even though the sale of such products was prohibited within the EU.[296]

Furthermore, in view of a global legally binding instrument on mercury, all potentially relevant work at international level should be kept in mind.

Initiatives at global level which could control, and prohibit where possible, the uses and releases of mercury and its compounds should be considered, such as under the Stockholm Convention on Persistent Organic Pollutants[297], and others. Such initiatives could prepare the ground for a global legally binding agreement on mercury and its compounds.

295 UNEP, Global Mercury Assessment, par. 765, p. 179.

296 Maxson P., Mercury Flows in Europe and the World, p. 40.

297 http://www.pops.int/

4. CONCLUSIONS

4. CONCLUSIONS

Mercury and its compounds are highly toxic to humans, ecosystems and wildlife. Mercury is persistent and can change in the environment into methylmercury, its most toxic form. Methylmercury is a potent neurotoxin that interferes with brain functions and the nervous system; it readily passes both through the placental barrier and the blood-brain barrier, inhibiting potential mental development even before birth. Although widely used in different processes and products (chlor-alkali industry, thermometers, dental amalgams, etc.), alternatives are currently available for most of its applications and have already been on the market for a long time. In addition, mercury is a transboundary pollutant that can be transported globally to regions far from its source, making it a global pollutant.

The problematic of mercury has been widely acknowledged. The importance of the European Commission's initiative to adopt a Community strategy on mercury should be underlined. The value of a strong EU commitment to addressing mercury problems on the global stage, especially its focus on reducing worldwide mercury supply (i.e. phase-out of mercury mining, storage of excess mercury supplies) and demand (end unnecessary and obsolete uses), cannot be underestimated. This is a straightforward opportunity to reduce health risks to millions of EU citizens, and many more globally, which should be pursued. As a result, work needs to continue towards the adoption of a global legally binding instrument on mercury.

In order to create a healthy and equitable living environment for future generations, we must stop the vicious circle of poisoning that mercury use, trade, and pollution perpetuate. Voluntary and aspirational international targets are insufficient; no single country or region can resolve the mercury problem on its own. There are alternatives to mercury, but there is no alternative to international determination, cooperation, and action. As the authors of the UNEP Global Mercury Assessment report pointed out in 2002, despite remaining data gaps in our understanding of how mercury negatively affects human and environmental health, international actions to address the global mercury problem should not be delayed any further. Such measures are essential to human health in all parts of the world[298].

298 Linda Greer, Michael Bender, Peter Maxson, and David Lennett, Chapter 6: "Curtailing Mercury's Global Reach," State of the World 2006, Linda Stark (ed.), Worldwatch Institute (Washington, DC), W.W. Norton & Company (New York, London), in press.

5. AUTHORS

5. AUTHORS

The research necessary for producing this document and much of the drafting was carried out by Melissa Blue Sky (Independent consultant/researcher).

Melissa Blue Sky *is Program Director at Oregon Physicians for Social Responsibility where she works on environmental health and global warming. She has worked in the fields of sustainable development and environmental health and began to focus specifically on mercury issues in 2001 as a researcher with the Mercury Policy Project (MPP). In 2005, she was a consultant for the European Public Health Alliance Environment Network (EEN) on their new programme on mercury and health. She also worked for the European Environmental Bureau (EEB) for a short period as an independent consultant on this publication, under the Zero Mercury Campaign. She has a degree in Human Ecology from College of the Atlantic, USA and an LLM in Law in Development from the University of Warwick, England. E-mail: melissaannbluesky@yahoo.com*

The text has been completed by: Elena Lymberidi (EEB), who also edited the publication, Genon Jensen (EEN), Karolína Ruzickova (HCWH Europe) and Michael Bender (Ban HG WG- MPP).

Elena Lymberidi, *'Zero Mercury Campaign' Project Coordinator since November 2004 at the European Environmental Bureau, has experience in EU environmental policy analyses and evaluation, mainly in the field of chemicals, waste and products, as well as on project management and monitoring. Experience in these fields has been gained through previous work at the EEB (1998-2001) and the European Commission (DG ENV, LIFE unit) (2001-2004) respectively. She has been representing the EEB at EC, OECD, UNEP levels in Europe, US and other countries and has organised many conferences, workshops, seminars. She has studied chemistry at the University of Athens (1991-1996), followed by an M.Sc. in Business Strategy and Environmental Management at the University of Bradford (1996-1997) and a Master in Business Administration at the Vrije Universiteit Brussel (2003-2005). E-mail: elymberidi@yahoo.com | elena.lymberidi@eeb.org*

Genon K. Jensen *is the Executive Director of the European Public Health Alliance Environment Network (EEN). She is an expert in environmental health issues and has contributed to mobilising the health sector on various environmental policy issues, such as chemical safety (EU "REACH" legislation) and children's special vulnerability to environmental threats. In 2006, she is launching a global Mercury and Health Campaign. Since 2000, she has been a member of the World Health Organization's European Environment and Health Committee and also sits on the pan-European Children's Environment and Health Task Force, as well as various other NGO and intergovernmental expert groups. She holds a Master's Degree with honours in European studies from the College of Europe, Belgium and a degree in journalism and international policy from George Washington University, USA. E-mail: genon@env-health.org*

Karolína Ruzickova *coordinates the Safer Materials working group of Health Care Without Harm Europe (based in Prague, Czech Republic) and focuses on mercury elimination from health care, especially on finding mercury-free measuring devices for healthcare. She is also an expert on PVC and phthalates substitution for safer materials in medical devices. She co-wrote the report "Preventing Harm from Phthalates, Avoiding PVC in Hospitals". She has a Masters Degree in Sociology and History from Charles University of Prague. After her studies she worked as an intern research associate with Redefining Progress (a San Francisco-based NGO) on the project 'Ecological Footprint' - an educational and informational campaign on a measurement tool illustrating the consumption of natural resources by individuals as well as countries. E-mail: karolina.ruzickova@hcwh.org*

Michael Bender *is the Director of the Mercury Policy Project (MPP)/Tides Center, which he co-founded in 1998. MPP works to promote policies to eliminate mercury uses, reduce the export and trafficking of mercury, and significantly reduce mercury exposures at the local, national, and international levels. He has worked extensively to reduce and eliminate mercury uses, emissions and trade in mercury, and human and wildlife exposure to mercury over the past decade. He is also the Northern Coordinator and co-founder of the Ban Mercury Working Group, an international coalition of 28 public interest non-governmental organisations from around the world. From 1992 to 1998 he represented the US mercury recycling industry. He has an M.Sc. in Resource Management and Administration from Antioch University, New England. E-mail: mercurypolicy@aol.com*

ANNEX

MEASURING & CONTROL DEVICES CONTAINING MERCURY

(Non-electronic and non-electric) Professional and Consumer Uses

ITEM	DESCRIPTION
TEMPERATURE MEASUREMENT & SENSING DEVICES	
Body temperature thermometers	Fever measurement: home, commercial, scientific
Clerget sugar test thermometers	
Heating & Cooling system thermometers	
Incubator / Water Bath thermometers	
Minimum / Maximum thermometers	Home, commercial, scientific
Calibration Thermometers	
Tapered bulb (armoured) thermometers	
Other specialty use thermometers: blood bank, dairy, etc.	
Maximum registering thermometers	
ASTM & Laboratory thermometers	
Cup case thermometer	For tank sample testing
Oven thermometers	Home and commercial
Psychrometers, including Sling psychrometer	Measures moisture content of air or any gas and measures relative humidity. Psychrometers and hygrometers typically contain two thermometers, a “dry bulb,” or ordinary thermometer, and a “wet bulb” thermometer, which has a bulb that is kept constantly wet. Humidity is computed from the difference in the temperatures shown by the two thermometers, each of which con tains mercury.

Hygrometers, including Mason's hygrometer	Measures moisture content of air or any gas Stationary, for measuring relative humidity
Candy and deep-fry thermometers	Home and commercial
Weather thermometers	Home, commercial and scientific
Pyrometers	Measures temperature of extremely hot materials
Mercury Flame Sensor/gas safety valve (stainless steel bulb, capillary tube, and bellows/control device)	Used for 'unsupervised burners' in certain gas-fired devices with standing pilot or electronic ignition pilot, e.g. residential and commercial ovens/ranges, commercial grid dle with concealed pilot, unit heaters, some light industrial oven applications, furnaces, infrared heaters, 'cycle pilot' devices (Robert Shaw and Harper-Wyman produce devices primarily for residential and commercial appliances, White Rodgers produces devices for 'furnace' applications.)
Mercury thermostat sensors (w/stainless steel capillary tube)	used in gas ovens operating up to 750oF. Not used in self-cleaning ovens,discontin ued in 1970's. Currently produced devices use oil or sodium-potassium mixture.
Hydrometers	Measures density or specific gravity of a liq uid. Mercury is used in hydrometers as a weight. It is encased in a thin glass tube with a bulb at one end. The tube is sealed and floats upright in the sample liquid like a fishing bobber. Hydrometers sometimes contain a thermometer for measuring the temperature of liquids. These are called thermo-hydrometers and may contain addi tional mercury in the thermometer.
SPHYGMOMANOMETERS	A type of mercury manometer that is used for measuring blood pressure. Sphygmomanometers measure both maxi mum arterial pressure, when the heart beats and sends blood through the arteries, and minimum pressure, when the heart relaxes and fills with blood again. Mercury is contained inside a plastic or glass tube.

GASTROINTESTINAL TUBES	
Oesophageal dilators (Bougie tube)	Weighted tubes passed down the oesopha gus to dilate a narrowed area
Feeding tubes	
Miller Abbott tubes	Used to treat intestinal obstructions
Cantor tubes	Used to treat intestinal obstructions
PRESSURE GAUGES & FLOW RATE DEVICES	Tube-type and well-type devices, with many applications in the natural gas sector
Barometers	Measure atmospheric pressure (well-type, climatology/meteorology uses). Mercury barometers contain elemental mercury (around 1 kg) exposed to air in a thin glass column. The mercury rises and falls with changes in atmospheric pressure.
Vacuum Gauges	
Flow Meters	Measures flow of gas, water, air and steam: water treatment, sewage plants, power sta tions, other industries. Used in boiler panels to measure vapour pressure, used in model “Ledoux bell” man ufactured by Bailey (ABB)
Fume Exhaust Ventilation Hoods	
Ventilation Hoods in Labs	Used to measure outflow
Manometers	Manometers measure the difference in gas pressure. There are two principal types: digi tal manometers and tube manometers, which consist of a tube with markings des ignating the pressure values. Mercury manometers are generally U-shaped glass or plastic tubes containing elemental mercury that have one end closed. The difference in the levels of mercury in each side of the tube indicates the pressure of the gas being measured. Manometers are frequently used to measure air pressure within air ducts or compressed air lines. They are commonly

	used in power plants, gas and water delivery systems, and other applications.
Laboratory manometers	
Commercial-Industrial manometers	(many types and uses)
Dairy barn manometers	(tube-type, measures milking system vacuum)
Gas meter pressure safety device	(tube device, likely no longer manufactured but many in use)
Permeter	used to measure the permeability of a sand mass to the flow of air (foundry applications)
Mercury diffusion pump	(laboratory/educational use)
Bilge Pump	
Float controls	
Strain gauges	Measure forearm blood flow, or arterial inflow, using a technique called strain gauge plethysmography. Mercury is con tained in a fine rubber tube which is placed around the forearm. The gauge measures the increase in forearm circumference as pressure is applied.
THERMO-ELECTRIC DEVICES (i.e. electronic or electric functions where mercury may not physically make or break an electric circuit)	
Thermostats (non-digital)	Thermostats are used to control the temper ature not only in buildings, but also in equipment, cold rooms, water treatment facilities, and other locations. Digital and electromechanical alternatives are available.
Thermostat probes in electrical equipment	
Thermal switch	integral or remote mounted solid state con trol (similar to a thermostat)
Thermoregulator	an adjustable mercury-in-glass device with an electrical output dependent on the posi tion of the mercury column

Compiled from

Instruments, Products, and Laboratory Chemicals Used in Hospitals That May Contain Mercury, Health Care Without Harm Fact Sheet, Pub 2-03, November 5, 2002

INFORM: Strategies for a better environment. "Purchasing for Pollution Prevention: Mercury-Free Industrial Thermometers, Manometers, Thermostats, and Switches Fact Sheet", © 2005 INFORM, Inc.

Land & Water Resources Council (1999): "Labelling and Collection of Mercury-Added Products," report for the Maine Legislature dated January 1999. (List by J. Gilkeson)

NOTES

NOTES

NOTES

design: www.beelzepub.com

European Environmental Bureau (EEB)
Boulevard de Waterloo, 34
B-1000 Brussels - Belgium
Tel.: +32 2 289 1090
Fax: +32 2 289 1099
E-mail: eeb@eeb.org
Websites: www.eeb.org
www.ecotax.net
www.participate.org
www.chemicalreaction.org
www.zeromercury.org

European Public Health Alliance Environment Network (EEN)
Boulevard Charlemagne, 28
B-1000 Brussels - Belgium
Tel: +32 2 234 3640
Fax +32 2 234 3649
E-mail:
info@env-health.org
Website:
www.env-health.org

Health Care Without Harm Europe (HCWH)
Chlumova 17, 130 00 Praha 3, Czech Republic
Tel: +420 222 78 14 71
Fax: +420 222 78 28 08
Email:
europe@noharm.org
Website:
www.noharm.org/europe

Ban Mercury Working Group / Mercury Policy Project (MPP)
1420 North Str. Montpelier
05602, Vermont, USA
Tel: +1 802 223 9000
Email:
mercurypolicy@aol.com
Website:
www.ban.org/Ban-Hg-Wg
www.mercurypolicy.org

EEB

een
epha environment network

Health Care Without Harm

Ban-Hg-Wg
Mercury Policy Project