Workshop on Mercury - Needs for Further International Environmental Agreements

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Preface

Organisation and funding

The workshop was sponsored by the Nordic Council of Ministers (NMR) and organised by the IVL Swedish Environmental Research Institute (John Munthe) in collaboration with the Swedish Environmental Protection Agency (NV) (Petra Hagström, Lars Lindau), the Swedish Chemical Inspectorate (KemI), (Petra Ekblom) and DG Environment. A project reference group was appointed by NMR with representatives from environmental agencies in the Nordic countries:

Lars Lindau, the Swedish Environmental Protection Agency (NV).

Kirsten Dörge, the Danish Environmental Protection Agency.

Siri Sorteberg, the Norwegian Pollution Control Authority (SFT)

Alf Lundgren, the Swedish Chemical Inspectorate (KemI)

Magnus Nyström, Finnish Environment Institute (SYKE)

Disclaimer

General conclusions from the workshop have been summarised (Ch 3.1) by the organisers as being representative of the views of the majority of the workshop participants. Conflicting or alternative views have also been reported as far as possible. The conclusions do not necessarily comply with existing or planned national policies in individual countries represented at the workshop.

Summary

The purpose of this workshop was to support the development of new strategies to control and minimise releases of mercury to the environment and human exposure. The on-going development of an EU strategy for mercury was especially in focus but international conventions (CLRTAP) and the UNEP Mercury Programme were also discussed.

Specific objectives of the workshop were,

- a) To summarise the state-of-the-art on sources, emissions-distribution-deposition-exposure, options and technologies to reduce uses and releases, the waste problem and waste management options, and health/environmental impacts of mercury.
- b) To identify and discuss priority problem areas.
- c) To derive recommendations for an effective European mercury abatement strategy (based on the Council decision in December, 2002), especially:
 - How to deal with the surplus mercury from the chloralkali industry?
 - How to deal with mercury in products and waste?
 - How to deal with mercury from coal-fired power plants and other atmospheric point sources?
- d) To review national, regional and international programs to reduce impacts on health and the environment due to mercury, e.g. the UNEP mercury programme and the revision of the CLRTAP Protocol on Heavy Metals.

Around 100 persons participated in the workshop representing research, policy, industry and NGO's.

Sammandrag

Syftet med denna workshop var att stödja arbetet med nya strategier för att kontrollera och minska utsläpp av kvicksilver till miljön och mänsklig exponering. Det pågående arbetet med att utveckla en EU-strategi för kvicksilver var speciellt i fokus men internationella konventioner (t.ex. UN ECE CLRTAP och UNEPs kvicksilverprogram) diskuterades också.

Specifika mål med workshopen var:

- a) Att sammanfatta kunskapsläget avseende källor, emissioner-spridning-nedfall-exponering, möjligheter och teknologier för att minska användning och utsläpp, avfallsproblemet och alternativ för avfallshantering, samt hälso/miljöpåverkan av kvicksilver.
- b) Att identifiera och diskutera prioriterade problemområden.
- c) Att ta fram rekommendationer för en effektiv Europeisk strategi (baserat på Rådsbeslutet, december 2002) med speciellt fokus på:
 - Hur ska överskottskvicksilver från klor-alkaliindustrin hanteras?
 - Hur ska kvicksilver i produkter och avfall hanteras?
 - Hur ska kvicksilveremissioner från kolförbränning och andra punktkällor hanteras?
- d) Att granska nationella, regionala och internationella program för att minska effekter på hälsa och miljö orsakade av kvicksilver som t.ex. UNEPs kvicksilverprogram och revisionen av CLRTAPs tungmetallprotokoll.

Ca 100 representanter för forskning, policy, industry och NGOs deltog i workshopen.

1 Workshop aim and expected outcome

1.1 Background

Mercury is present in various environmental media and food (especially fish) all over the globe at levels that adversely affect humans and wildlife. Widespread exposure is occurring due to human-generated sources and past practices have left a legacy of mercury in landfills, contaminated sites, soils and sediments. Even regions such as the Arctic are adversely affected via atmospheric transport and deposition. A fraction of the environmental mercury burden is present as methylmercury, which is the most toxic form of mercury and also has the capacity to bioaccumulate, especially in the aquatic food chain. Consumption of fish and seafood contaminated with methylmercury is the critical exposure pathway for most population groups. Some population groups are especially susceptible to methylmercury exposure, most notably the unborn foetus and young children. For this reason, consumption guidelines and/or restrictions for fish consumption by pregnant women and women of childbearing age have been issued in a number of countries.

The environmental cycling of mercury is complex and involves a number of transformations and transport pathways. This complexity makes the development of quantitative source-exposure descriptions difficult, mainly due to lack of data and process understanding. The general link between environmental releases of mercury and the occurrence of methylmercury in aquatic ecosystems is nevertheless well accepted and has been demonstrated in case studies in e.g. Scandinavia. However, due to the remaining uncertainties, the diversity of mercury pollution sources, and potential costs and challenges to address these sources, there remains a great need for discussions of strategies for pollution control as well as targets for reduced impacts on humans and the environment.

There are a number of examples where countries have initiated measures at regional, sub-regional and international levels to identify common reduction goals and strategies to reduce the impact of mercury pollution. Significant emissions of mercury from point sources still occur and pure mercury as well as mercury-containing products are still common on the global market.

The origin of the development of an EU mercury strategy lies in consideration of the use of mercury in the chlor-alkali industry. However, the strategy will not focus only on this industry, but rather will look at all aspects of the mercury cycle. At the Environment Council meeting of 7 June 2001, the Council concluded that it would call upon the Commission to clarify the legal situation regarding the conversion of the chlor-alkali industry, identify the possible consequences, for all parties concerned, for the use of mercury and report to the Council on the potential need for co-ordinated action in the EU and the accession countries. In response to the Council's request, in December 2002 the Commission presented a report to the Council concerning mercury

from the chlor-alkali industry. This reviewed mercury production and use generally, use of mercury in the chlor-alkali industry, legal issues concerning the conversion to mercury-free technology and consequences of the mercury-cell phase-out. In relation to the consequences of the mercury cell phase-out, the report analysed three scenarios concerning the fate of the then estimated 12,000 – 15,000 tonnes of surplus mercury expected to arise in the EU.

In response to the Commission's report concerning mercury from the chlor-alkali industry, the Council invited the Commission to present in 2004 "a coherent strategy, based, inter alia, on its report to Council (COM (2002) 489), with measures to protect human health and the environment from the release of mercury based on a life-cycle approach, taking into account production, use, waste treatment and emissions".

The "Workshop on mercury - needs for further international environmental agreements" was sponsored by the Nordic Council of Ministers to support the discussion of an EU strategy on mercury.

1.2 Aim

The workshop focussed on the regional environmental and health problems due to emissions and releases of mercury, but also took into consideration initiatives taken at the global level. The aim was to identify the future measures needed to further reduce the negative impacts on human health and the environment from these emissions and releases of mercury. Specific objectives of the workshop were,

- a) To summarise the state-of-the-art on sources, emissions-distribution-deposition-exposure, options and technologies to reduce uses and releases, the waste problem and waste management options, and health/environmental impacts of mercury.
- b) To identify and discuss priority problem areas.
- c) To derive recommendations for an effective European mercury abatement strategy (based on the Council decision in December, 2002), especially:
 - How to deal with the surplus mercury from the chloralkali industry?
 - How to deal with mercury in products and waste?
 - How to deal with mercury from coal-fired power plants and other atmospheric point sources?
- d) To review national, regional and international programs to reduce impacts on health and the environment due to mercury, e.g. the UNEP mercury programme and the revision of the CLRTAP Protocol on Heavy Metals.

2 Existing policies and legislation

The issue of limiting use of mercury and emissions to air, water and wastes is included in a number of international agreements and conventions as well as EU directives. This workshop was mainly focused on the EU Strategy for mercury to be presented in 2004, the UN ECE CLRTAP Protocol on Heavy Metals and the UNEP Mercury Programme.

2.1 EU Directives related to mercury

More than 25 EU Directives dealing with mercury exist. These Directives contain restrictions on use and trade of e.g. mercury containing pesticides, cosmetics, batteries, as well as emission limits for waste incinerators and limit values for drinking water, fish and seafood etc. A summary of these directives and other EU initiatives related to mercury is available at http://europa.eu.int/comm/environment/chemicals/mercury/pdf/summary_of_legislation.pdf.

2.2 The UNEP Mercury Programme

In 2002, UNEP presented a Global Mercury Assessment Report where an extensive overview of the mercury issue was made. This report was presented to the UNEP Governing Council in February 2003. The Governing Council concluded that there is sufficient evidence of significant global adverse impacts from mercury to warrant further international action to reduce the risks to humans and wildlife from the release of mercury to the environment. The Governing Council decided that national, regional and global actions should be initiated as soon as possible and urged all countries to adopt goals and take actions, as appropriate, to identify populations at risk and to reduce human-generated releases. In response to this decision, UNEP has established a mercury programme. Within the programme, UNEP is organising regional awareness raising workshops around the world and has also started developing and disseminating related guidance documents, training materials and toolkits. At the Governing Council in 2005, a decision will be made if further action needs to be taken. Information on the Mercury Programme is available at www.chem.unep.ch/mercury/

2.3 The UN ECE CLRTAP Protocol on Heavy Metals

The Executive Body adopted the Protocol on Heavy Metals on 24 June 1998 in Aarhus (Denmark). It targets three particularly harmful metals: cadmium, lead and mercury. According to one of the basic obligations, Parties will have to reduce their emissions for these three metals below their levels in 1990 (or an alternative year between 1985 and 1995). The Protocol aims to cut emissions from industrial sources (iron and steel industry, non-ferrous metal industry), combustion processes (power generation, road transport) and waste incineration. It lays down stringent limit values for emissions from stationary sources and suggests best available techniques (BAT) for these sources, such as special filters or scrubbers for combustion sources or mercury-free processes. It also

introduces measures to lower heavy metal emissions from other products, such as mercury in batteries, and proposes the introduction of management measures for other mercury-containing products, such as electrical components (thermostats, switches), measuring devices (thermometers, manometers, barometers), fluorescent lamps, dental amalgam, pesticides and paint.

2.4 Other national and international actions on mercury

A number of other activities on mercury control exist within international bodies and NGO's, such as the OSPAR Convention, HELCOM, AMAP, the Mercury Policy Project, etc. Many countries are also running specific websites for information on the mercury issue. A list of relevant websites can be found at:

<http://www.chem.unep.ch/mercury/useful-links.htm>

3 Summary of workshop discussions

The workshop discussion was held both in plenary and in 3 groups. Here, a summary of main discussion points is given. While there was a strong interest and concern about the problems associated with mercury among all the workshop participants, the views on how to deal with this problem and who is responsible were very differing.

There was a general agreement among the workshop participants that mercury is a global pollutant of concern. There was also a general agreement that measures need to be taken to reduce consumption, exposure and emissions to the environment.

- ***EU should be active in supporting and influencing the UNEP programme.*** The UNEP Mercury Programme is an important framework for global action on mercury. Its current activities are focussed on awareness-raising and a number of workshops have been organised around the world. Planned activities include preparation of documentation on risk assessment, inventories and potential pollution prevention methods, and establishment of a clearinghouse for information related mercury. UNEPs work on mercury will be reviewed at the next Governing Council meeting in February, 2005. The EU can support the UNEP Mercury Programme by providing technical and financial support to on-going activities. The EU countries can also support the discussion on further measures by active participation in the preparations for the Governing Council meeting in 2005.
- ***Support activities to reduce global demand of mercury (awareness-raising, training, technology transfer).*** In addition to the needs for support of the UNEP activities described above, there is also a need for direct technical and financial support to reduce the risks of mercury used in artisanal gold mining *e.g.* via support to the UNIDO Global Mercury Project. The UNIDO project works directly with gold miners in 6 countries in Africa, South America and Asia to reduce risks associated with mercury use in artisanal gold mining. See further information at www.globalmercury.org.
- ***Improved transparency of demand and supply to better understand global trade.*** The global trade of mercury is dominated by export of raw mercury from Europe and North America to south America, Asia and Africa. This mercury is largely used in products (mainly batteries) and industrial processes (*e.g.* chlor alkali industries) but large quantities are also most likely used in artisanal gold mining. This practise is illegal in many countries due to the risks of human exposure and environmental releases of mercury. As a first step to reduce the harmful uses of mercury, better information on the demand and supply of mercury is needed.
- ***Substitution materials are available for practically all uses of mercury in products.*** Assessments in the Nordic countries and elsewhere have shown that products containing mercury can be replaced with mercury-free alternatives at reasonable costs with very few exemptions (*e.g.* low-energy lamps). Further evaluation of the costs of substitution may be needed for other countries. One example of large-scale use of mercury in products are mercury cell batteries, which are produced, in large quantities in Asia. There are also some indications that skin-

bleaching soaps are exported from the EU despite the export ban in the Regulation (EC) No. 304/2003.

- ***Waste definition and storage strategies need to be developed.*** While there is no general agreement on how to define surplus mercury *e.g.* from chlor-alkali, there is a general agreement that this issue needs to be solved in the near future. Sweden has adopted the most far-reaching policy where mercury is treated as toxic waste and will be stored in deep-rock facilities, in a stabilised form. Other delegates suggested that a temporary storage might be a more pragmatic solution to allow for future use of the mercury. See also discussion below and report on legal aspects in Appendix 2.
- ***Techniques for removal of mercury from coal combustion flue gases are available.*** Emission reductions have been made and there is potential for further reductions. Technical development is under way for increased efficiency.
- ***EU should address primary mercury mining globally.*** Virgin mercury is still produced in Almaden, Spain. The current production is mainly derived from ore stockpiles and the mining operation is temporarily closed. While opinions on the European production are strong and of opposite nature, most participants agreed that this issue also needs to be addressed on a global scale. In addition to Spain, mercury is currently mined in *e.g.* Algeria, Kyrgysthan and China. Since large stockpiles of mercury are available mainly in Europe and the USA, the global availability exceeds the demand (see also discussion below).

Below, a number of topics are addressed where the participants of the workshop expressed different opinions.

- ***Should the EU work for a (legally binding or voluntary) agreement to reduce significant global adverse effects of mercury.*** Some participants argued that the EU should take the lead in reducing production, trade, use and emissions of mercury to set a good example to the rest of the world. This initiative would allow the EU to also influence other countries to adopt the same strategies via global agreements. Some participants emphasised the need for a legally binding agreement on a global level. This was opposed by others who pointed out that a number of directives related to mercury are already in force or will be in the near future and that EU member states have already agreed to reduce mercury use and emissions in international conventions such as OSPAR and CLRTAP. If any further measures should be taken (*i.e.* restricting trade) they should be globally coordinated.
- ***Should the EU ban export of mercury to reduce global availability and increase prices?*** Europe is, together with USA, the main supplier of mercury on the global market. If this export was banned, the global availability would decrease and possibly prices increase. This would lead to a decreased demand especially in activities where an incitement to reduce spillage and recycle mercury is lacking *e.g.* artisanal gold mining. On the other hand, a European export ban would pave the way for increased mining in other producing areas.
- ***Is surplus mercury waste or commodity?*** This relates to one of the central questions in the discussions of an EU strategy on mercury: Legal aspects of this issue are discussed in detail in Appendix 2. Large quantities of mercury are presently used in the European chlor alkali industry. Over the next 5 to 15 years, the mercury cell

method will be replaced by mercury-free technologies and around 12 000 to 15 000 tonnes of mercury may become available on the market.

- ***How to deal with the surplus mercury?*** The Swedish parliament has decided on a deep rock repository for surplus mercury. This decision was based on an extensive assessment of stability and safety of mercury stored as mercuric sulphide or other stable form in stable rock environment. For many workshop participants, this measure is considered to be too expensive. Many also argued that this solution made the mercury irretrievable for future use. In most countries, alternative solutions have not been evaluated in any greater detail, although storage in surface facilities seems to be the most commonly considered alternative.
- ***Applicability of critical load concepts.*** Critical load and critical limits are values indicating the maximum tolerable input (via deposition) to ecosystems. Calculated critical loads are used in optimisation procedures where cost effective emission reduction strategies can be defined. This concept has been successfully applied in abatement of acidification in Europe. Models and calculation procedures for Hg, Cd and Pb have been developed in Europe. The methods have in principle been accepted by the scientific and policy communities in Europe and countries within the LRTAP Convention will be requested to report critical loads and critical limits during 2004.

4. Individual group reports

4.1 Group 1 EU mercury strategy - products, processes, point sources and international initiatives - Report from working group discussions

Chair: Jozef Pacyna

Rapporteur: Milena Horvat

Number of delegates present: 31

4.1.1 Mercury in products and processes

Are sufficient alternatives available for a complete substitution of mercury used in products and processes?

Two examples with no currently satisfactory substitution exist today: (1) dental amalgam – alternatives exist, but still some questions concerning quality and high price (2) low energy lamps.

- (1) it is necessary to promote the awareness of the need to develop alternatives at all levels. It is important to collect research results, and more information about the substitutes. In relation to amalgam replacements the costs of alternatives should be compared on the basis of the whole life cycle analysis of amalgams and substitutes. This means that costs for use of amalgam should also include external costs, such as cleaning devices in crematories, waste treatment, etc... It was noted that the use of separators in dentistry is still not a practice in a number of European countries. Recycling of waste containing Hg from dentists is not well organised.
- (2) Low energy lamps: the currently available solution is to lower the content of Hg in lamps. Research and development of Hg-free lamps is on going and there is experience in Sweden and USA. No good substitution for Hg in lamps as yet, but 2006 lamps placed on the EU market may only contain certain amounts of mercury according to the RoHS directive (2002/95/EC). Recycling of lamps should be very well organised, as at present only 50-70% recycling efficiency is recorded in Europe. There is a need for higher capture rate.

The Swedish delegate clarified that in Sweden the National Board of Health and Welfare and dentist organisations agree that amalgam is not needed in the general dental care, which is also evident from extensive reduced use during the last 5 years (90 % reduction). The discussion is now, if there is a need for some very limited use in specific patient groups within hospital dentistry. As an important information it was stressed that investigations on metal flows in Stockholm have shown that amalgam is the largest single source of mercury in the sewage sludge. About 50 % of this mercury

originates from leakage from amalgam fillings in peoples mouths, and another large part comes from incomplete separation from dental surgeries.

The use of mercury in almost all measuring instruments can be replaced. There is a list of exemptions in the Directive on the restrictions of certain hazardous substances in electrical and electronic equipment (2002/95/EC) and Directive on end-of-life vehicles (2000/53/EC)).

Are costs associated with mercury substitution acceptable?

Costs aspects need to be very carefully evaluated, taking the whole life cycle analysis into account. Indeed, this needs to be taken into consideration before legal instruments are put in place. For example in case of chlor-alkali industry 1/3 of industries will disappear, and such a change needs some time.

Are legally binding regulations or voluntary agreements preferable?

In summary: the top priority for reducing mercury pollution from products is source reduction. Where viable alternatives are available and substitutes are cost-effective, there is a general support to ban the production of these products. Goals and timelines should be established for doing so, but individual countries should be granted the flexibility to attain this through either voluntary or mandatory means. The directive for electronic equipment is not complete and needs additions/improvements. Some products are missing from the directive.

Marketing and use restrictions: we need impact assessment in all of the countries including the newly associated 10 countries in Europe.

The cases in Denmark and Sweden have been used as examples to implement mandatory reduction and timelines.

Is existing regulation sufficient or is new legislation needed?

The directive for electronic equipment is not complete and need additions/improvements. Some products are missing from the directives.

Additional questions raised during discussion:

Do we agree to act globally or do we need to agree on one EU strategy?

Can we reduce or simply cut down? What is reduction limit, 75% or over 90%?

Is it possible to reduce mercury emissions from coal processes, natural gas and oil?

What is the contribution of un-intentional release vs. intentional use and release?

Mercury emissions from point sources

Coal, manganese, steel industry, cement production, are important source categories.

Coal burning: Aspects of wastes is not as yet covered sufficiently. When air emissions of mercury in coal combustion processes are reduced via control measures, the mercury is redistributed in the products (ashes, liquid waste etc). These aspects are not sufficiently covered by the legislation.

Are existing regulations sufficient to control the main emissions sources?

Regulations: nobody wants to be the one to make changes due to competitiveness in the market. We need regulation in these various sectors at the EU level. Sometimes there are areas with limited knowledge. There is a need of a harmonised approach in these other sectors.

Mercury abatement techniques: EU legislation for large combustion plants, BAT is recommended, recommendations on limit values exist. Techniques that are available are described.

Mercury control largely depends on the application of the IPPC and large combustion plant Directive.

What is needed to develop cost-effective strategies for reducing the impacts of point source emissions?

Pre-treatment measures: coal can be replaced by other alternatives? How realistic is to switch? It is difficult to see the switch from coal (UK, Poland, etc...) in short term. In case this is done, the alternatives may also emit unknown quantities of mercury.

Coal will still be a major source of energy in the future. It is not realistic to suggest short-term changes in energy source.

Available BATs can already reduce emissions, more should be done to further reduce emissions of Hg.

Techniques to reduce mercury: Further development is needed. There are differences in the performance of existing control technologies depended on coal type and type of current technologies (Denox, ESP, De SOx ...). The efficiency of these techniques depend on chemical species of mercury present, but this may also be affected by the equipment itself.

We have BAT, we have regulations! Are regulations sufficient? Cost –benefit analysis also exists. Do we have a strategy: give all the information to the country so that they can make their own strategy. Then they chose according to the feasibility. In practice, it will work from plant to plant basis.

Incentives to capture mercury from point sources?

How much reduction do we want now and what shall we do later? Maybe at the levels given, we shall see no significant changes. Does it work? Do we want more reduction? A clear goal for mercury emission reductions is needed along with relevant strategies to achieve these goals.

If we want more reduction, then the current technologies may not be enough – more development and knowledge needed. For mercury it is always important to have a GLOBAL approach for mercury reduction.

In relation to WFD: it includes all sources to water, including pharmaceuticals. This is not well elaborated and will need significant improvement after the first phase, so that the full implementation will include more specific requirements.

Liquid wastes from various sources: we do not have the correct picture. Some regulations are in place, but we did not have the right information.

There are also other industrial activities that need to be better addressed.

A need for speciation needs to be specified more clearly in the legislation. This needs to be very carefully addressed as the fate and effects strongly depend on mercury species.

Waste (industrial and domestic...) incineration: growing, emissions are very important. Waste incineration in industry, additional mercury sources will appear when some industries will start using waste as a secondary fuel. Special care should be paid to this question.

4.1.2 EU and other international initiatives

What can the EU do to support the UNEP Global Programme?

General comments:

- Emission monitoring methods: methods need to be developed and standardised.
- EU is moving towards reducing impacts of mercury use and emissions via the EU strategy to be developed under 2004. Europe can therefore make a big impact on UNEP.
- Transparency in trade: export/import: information flow outside the Europe may have big impact on other countries.
- Support international project to reduce exposure and impact of mercury.
- Mercury Rotterdam convention: mercury to be included as a product, so far included only in pesticides
- Regulation of amalgam use is there, but we need strong implementation in all member states.

One possibility for UNEP is to organise a consultant meeting to explore all possibilities to transfer knowledge from Europe to other continents. Recommendation was to follow the model similar to ozone actions. UNEP plan of actions: EU and UNEP should establish working groups on specific issues.

BUT: some delegates were of the opinion that we first we need in EU more harmonised strategy before going to UNEP GC.

A harmonised EU strategy with a progressive and holistic approach will enhance progress within the UNEP process through raising awareness and demonstrating real needs for an international agreement (legally binding or voluntary).

EU should progress on topics of generally known uncertainties in particular in technologies, methodologies, sharing research results, providing data, real-case examples for nations that have less possibilities to undertake these tasks. Europe should also promote the use of alternative products.

What can the EU do to support the revision of the heavy metal protocol of the ENECE CLRTAP?

EU and CLRTAP: EU is a partner like every other country of EU and N America. Implementation of the protocol should be enforced.

Emissions from tailings from previously contaminated sites should be included. Not only point sources, but also disperse sources are important in Europe. If we have strict regulations – we need the same processes to remove mercury – dilemma.

Emissions from waste treatment: Reduced when ban off the use of mercury in products.

4.2 Group 2 EU mercury strategy - export, waste, long-term storage and international initiatives

Chairs and Rapporteur: Jakob Maag (COWI), and Peter Maxson (Concorde East/West).

Number of delegates present: 24

4.2.1 Status of this document

This document should be considered as a summary of exchanged views in the group. It cannot be considered as conclusions made on a common basis.

4.2.2 How to prevent exported mercury from being applied for harmful uses?

The expectation that future mercury supply will exceed demand could require the introduction of new measures. The present situation allows for the transfer of mercury to uses which could be considered as "inappropriate", such as artisanal gold mining and also production of batteries with more mercury than the level accepted in the EU.

In the present situation, mercury use in artisanal gold mining cannot be expected to be completely eliminated according to UNIDO, but it can be reduced by promoting low technology mercury re-use and non-mercury technology among the miners.

Cyanidisation, the only current alternative usable for all ore types, is a very dangerous technique for the miners. If mercury was made more scarce resulting in rising prices, this would be an incentive for the miners to re-use their mercury and thereby to decrease releases.

UNIDO encourages development of mercury free gold extraction methods. Among others, small scale gravimetric extraction methods are emerging, but they are only applicable (with adequate efficacy) for some ore types.

4.2.3 Surplus mercury - waste or commodity?

Different views on this were expressed. Mercury may be toxic, but if it is pure it should not be considered waste. One reason for considering it waste could however be that this would allow keeping a better record of what happens to it, and to ensure better that it is handled properly (due to waste export regulation).

Could mercury be included in the PIC procedure (Rotterdam Convention)? Would that help keep track of where it is going and what it is used for?

Could mercury be included in an annex to the POPs Convention forbidding recycling or shipment for recycling (similar restrictions are placed on POPs in that convention)?

4.2.4 The current legal framework of the EU

Many issues seem to be outlined in the existing legal framework, but it seems the framework has to be filled in with more details.

Some aspects as regards the legal framework were identified during the discussion - see the other sections in this document.

4.2.5 Incentives to prevent mercury export from EU

Could it be an option that governments offer to buy surplus mercury to prevent it from being marketed?

In the USA, a voluntary agreement that the Federal Government takes over stewardship of excess mercury from the chlor-alkali industry is currently under consideration. The government would not pay for the mercury, but would pay for storage and other costs.

On the question of how to prevent others from exploiting the situation and send more mercury on the market, some participants noted that someone had to start the movement, while others felt that the EU taking the lead would be difficult in many ways.

The question whether such restrictions of mercury trade would offend WTO rules was posed. In Sweden, the mercury export ban did not result in any WTO problems.

4.2.6 Mercury storage

Temporal storage could be seen as a politically pragmatic solution in the current EU situation, if marketing restrictions are desired. There was a general opinion in the group that long-term, safe and retrievable storage was an option that had advantages. It could continuously be checked if the storage was safe. It would be a good way to start if it was decided to take mercury out of the market, because it would be inexpensive (compared to final deposition), and it would be easier to get political agreement.

Also, the option would remain of bringing the mercury on the market in case the employed release prevention measures did not work as intended. Not much would be lost in trying it. For "pure" surplus mercury, the volumes are very limited. Other solutions would have to be implemented for soil, building materials etc. contaminated with mercury, because here volumes are much larger.

When considering temporary storage versus final disposal, it could be considered that the higher expenses for final disposal could - in the present situation - perhaps be better spent on other elements of a mercury reduction strategy.

But EU restrictions to reduce the amounts of mercury brought on the market would perhaps just make other countries produce more virgin mercury. Holding back mercury in storage would only make sense if mining is phased out and the storage also applies to by-product mercury (from mining of other metals) and mercury recycled from other sources.

A global agreement on these issues would make it easier to accept national or regional restrictions. On the other hand, global agreements are more difficult and take more time to reach. In this context, it was expressed that the western countries have a special responsibility in handling their own mercury issues - also to go forward with a good

example. This could be an important signal to other countries. For example, a participant noted that in India, the issue of mercury reduction was recognised, but not of high political priority. Such a signal from the EU might make it a higher priority in India as well.

If EU mercury marketing restrictions were to be employed, it could be done in the context of an overall mercury management plan, in a stepwise process combining a demand strategy (reduce demand) and a supply strategy (reduce supply). Defining the long-term vision facilitates the further discussion and implementation work.

4.2.7 EU and international initiatives on mercury

EU could push for a legally binding instrument on inorganic pollutants, perhaps similar to the Convention on Persistent Organic Pollutants (POPs).

EU could contribute to transparency of mercury flows through consumption statistics, public accounts, obligations and reporting requirements to trade actors. For example, mercury traders could be licensed and held to certain standards of responsibility/behaviour.

Promote/participate in the performance of a demand and consumption inventory in countries with large consumption, for example China. In a similar fashion, the USA is currently working on inventorying and improving control technologies in China.

Follow up on UNEP mercury workshops with information and/or training. Support UNEP's work on guidance for substitution and inventory of major mercury release sources. Help the exchange of lessons learned/know how in various industrial sectors, as well as on government level.

The EU could also support UNIDO's work with reducing mercury releases from artisanal gold mining. Besides the 6 countries where UNIDO already work, a dozen others have asked UNIDO for similar assistance. The EU could also help gold mining communities to make the transition to alternative livelihoods.

The EU could help develop a strategy to address/close down primary mercury mining worldwide.

The EU could help develop a "Pollutant Release Transfer Registry".

The EU needs to ensure that its own rules and regulations are clear and enforced. For example, the EU could promote monitoring and enforcement of illegal import/trade, such as mercury levels in batteries.

4.3 Group 3 Mercury in the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) and UNEP Global Mercury Programme.

Chair: Lars Lindau, Swedish Environmental Protection Agency

Rapporteur: Grace Howland, Environment Canada

Number of delegates present:

The discussion was divided between UNEP and LRTAP. Some additional aspects /questions were added. These are shown in bold.

4.3.1 Atmospheric emissions of mercury

i) Emission inventories, emissions from point sources (Q 1.2), air pollution modelling, and critical loads

- EMEP emissions inventories are good progress but not so good for speciation.
- Information on oxidised species of Hg is most important form for modellers.
- Workshop should ask countries to input not only total Hg info to LRTAP but also speciated data
- speciation is a tricky field, would need to look at emissions, dispersion, receptors
- should include natural emissions
- key uncertainty is how much deposition is staying in the ecosystem
- not only a question of deposition but how the speciation will change due to land use, climate change
- do inventories show what proportion of emissions are from upset conditions?
- some info on future review of reported emissions by LRTAP Implementation Committee
- some discussion about time resolution for emissions reporting: monthly, yearly

ii) Is the use of a critical load based concept or other effect-based concept feasible for the development of cost-efficient abatement strategies?

- At the recent Mar 4-5 workshop on critical loads in Potsdam, Germany, there was a strong vote from the participants for the use of effects-based methods for heavy metals as scientific input to the review of the HM Protocol. According to its workplan the Working Group on Effects will produce advanced maps of critical loads of Pb, Cd and Hg and their exceedances in 2005. While a participation of 18-20 countries in a mapping exercise can be expected, it is still unclear how many countries will participate for Hg.
- important to understand what is meant by the critical loads concept, and how maps with result are useful
- WGE will call for critical loads information for all 3 LRTAP HMs (see above).

-process is further along for Pb and Cd than Hg but maps for all should be available after a year

-critical loads approach for HMs does not have as high a profile in Canada and US; there are questions about working backwards from the critical loads to emissions reductions, and whether the quantity of information required for the approach is an obstacle for countries with larger geographic areas

-some critical loads work involving indexes were developed in Amazons – it was not very useful

-maps are useful in identifying sensitive areas; focusing resources for monitoring; enhancing communication with policy makers

-the maps impact mostly on European scale emissions and fall out maps are useful as a further motivation to reduce emissions

-one view was that critical loads should not replace other approaches

-some debate on the link between deposition and bioavailability of Hg; how this is covered in the critical loads maps

-are the maps needed when we already have the information for exposure through fish consumption?

- What happens after critical load maps are prepared? Links to atmospheric models and emission scenarios.

iii) What are the main areas of technological research and development necessary for improved abatement?

-not much discussion as this was well covered in the workshop presentations

iv) Should the EU and other developed nations take the lead in implementing technology for reducing emissions from point sources?

-yes

Question was raised on whether UNEP had intention to focus work on coal fired energy sector.

UNEP is in an awareness raising mode; there may be scope for countries to address specific sectors at the 2005 Governing Council if discussions progress far enough for agreement on concrete goals in specific sectors

-the opinion was expressed that there may be “juicier” areas to focus on within the different regions

-the focus should be on a regional basis, what are the largest sources and what reductions could be achieved

-the aspect of financial support would need to be included in talk of UNEP work in specific sectors

iv) Emissions trading?

-some support was expressed for this approach to emissions reductions (see later)

4.3.2 What can the EU do to support the revision of the Heavy Metals Protocol of the UNECE LRTAP?

-critical loads and maps information?

What could be done to phase out or reduce the use of mercury in processes (artisanal gold mining, chlor-alkali)?

-positive results will be seen by doing work on the ground through education and adjustment in the price of mercury. Without these, emissions will increase.

-there should be a shared responsibility for increased controls on exports

-countries could share lessons learned. For example, mercury consumption in chlor-alkali facilities is indicative of how the facilities are functioning. Perhaps a metric could be developed to compare facilities and help identify where to give the best support

4.3.3 What could be done to phase out or reduce the use of mercury in products?

-suggestion to start with largest opportunities for which there are readily available alternatives and work in a stepwise approach

-for small scale gold mining, this is difficult: accessibility and low cost of mercury are factors that need to be addressed – maybe through a ban on mercury trading?

- the EU should not produce or export mercury containing products (e.g. lightening creams) that cannot be sold in Europe. Export of e.g. skin-lightening soaps is already prohibited and should be enforced.

-to reduce demand for Hg: regulate pricing of mercury and mercury products on the European market

-one of the most important actions is to support developing countries in reducing their Hg demand

-it was pointed out that two recommendations in the Global Mercury Assessment report appeared relevant to this discussion:

1037h *"Establishing an international plan for the prevention of illegal import of mercury and mercury compounds as raw material and/or hazardous waste"*

1041f *"Developing a framework to manage the transboundary movement of mercury, its compounds and products containing mercury and technology in particular into developing countries and countries with economies in transition. This may be achieved by adopting the process used by the Montreal Protocol, or through other models such as the Rotterdam Convention."*

-a concrete step might be to look at the import and export data such as were presented and try to resolve discrepancies and improve our understanding of these figures

4.3.4 What measures can be taken to restrict global trade of mercury?

- a priority of UNEP work should be to work on controlling trade in Hg, at the international level
- participants had a range of views on difficulties of achieving consensus or common agreement in UNEP, vs. optimism that it was possible to achieve a global solution to a global problem

Are legally binding regulations or voluntary agreements on a global level preferable?

- should also look to complementarity with other activities e.g. Regional Seas, SAICM
- some participants advocated a binding agreement for mercury
- choice of any one approach should not restrict taking other actions
- North American countries indicated that they were in a consultative stage to develop views on next steps for global mercury
- should encourage countries represented at the workshop to submit views in response to the recent request for views on next steps for global mercury from UNEP, to assist UNEP in developing a comprehensive document for this discussion item at the Governing Council meeting in 2005
- global emissions trading was raised as a possible mechanism for emissions reductions
- there was a discussion on speciation considerations in emissions trading and global vs. local impacts and results

What can the EU do to support the UNEP Global Mercury Programme?

Suggestion that EU could help with development of the information clearing house

Desire expressed that indigenous peoples be involved in the regional workshops

- more research into several areas is needed to increase understanding but concrete actions are also needed
- UNEP is the framework but is driven by countries; if there is not ownership of solutions they won't succeed

4.3.5 Research needs:

- global monitoring network for atmospheric Hg
- link monitoring and research activities with global reduction efforts
- improve understanding of link between emissions and levels in ocean fish
- not only the atmosphere and oceans but soils need more study
- without a multi-compartment approach development of critical loads is very difficult (LRTAP?)
- workshops such as one upcoming in May 2004 are a means of support (provide information)

- also continuing studies on trade (Hg movement in “technosphere”) are important
- a global satellite network to show artisanal gold mining activities

4.3.6 Funding aspect

- GEF is a possible source of funding
- decisions are now being taken in GEF whether to look to broader terms for funding chemicals areas
- countries should communicate priorities to GEF representatives
- should pick cost-effective strategies, e.g. when looking at costs for developing a Convention
- model of the POPs Convention was cited
- several participants supported the concept that technical support is another avenue; collective technical assistance opportunities
- countries should list all these financial and technical support options
- not look immediately to new funds but see what is there now or in pipeline
- try to help developing countries develop abatement programs

5. Workshop programme

Workshop programme: "Mercury - needs for further international environmental agreements" Brussels, March 29-30, 2004

09:00	09:15	Welcome, introduction to workshop aims	Alf Lundgren, Chairmen Nordic Chemicals Group	
<i>Session 1. On-going activities and mercury assessments</i>				Alf Lundgren, Kemi
09:15	09:35	A European strategy for mercury - status report	Herbert Aichinger, DG Environment	
09:35	09:55	Summary of the UNEP Global Mercury Assessment Report and current UNEP activities.	Aase Tuxen, UNEP	
09:55	10:15	Summary of The EC Position Paper on mercury.	Nicola Pirrone, CNR IIA	
10:15	10:35	Mercury management in Canada	Grace Howland, Environment Canada	
10:35	10:55	<i>Coffee break</i>		
<i>Session 2. Environmental distribution and health effects</i>				Dieter Jost, UBA
10:55	11:15	The Arctic mercury problem.	Simon Wilson, AMAP	
11:15	11:35	The ACAP Mercury project.	Jacob Maag, COWI	
11:35	11:55	Atmospheric mercury - emissions, transport and deposition.	Oleg Travnikov, EMEP MSC-East	
11:55	12:15	Mercury in CLRTAP- Towards effect based control strategies	Kjell Johansson, Swedish EPA	
12:15	12:35	Examples from recent EU funded research on mercury.	Jozef Pacyna, NILU	
12:35	13:50	<i>Lunch</i>		
<i>Session 3. The mercury market</i>				Aase Tuxen, UNEP
13:50	14:10	Regulatory and other incentives for limiting export and trade of mercury	Ulf Öberg, Öberg Associés	
14:10	14:30	Production and use of mercury, the mercury market.	Peter Maxson, Concorde	

14:30	14:50	Taking mercury out of commerce and use: breaking the global cycle.	Michael T. Bender, Mercury Policy Project/Ban Mercury Working Group	
14:50	15:10	Substitution of mercury in products and processes	Henri Heron, Danish EPA/ Petra Ekblom, Swedish Chemicals Inspectorate	
15:10	15:30	Mercury in small-scale gold mining.	Marcello Veiga, UNIDO	
15:30	15:50	Mercury and the European Chlor-Alkali Industry	Arseen Seys, EUROCHLOR	
15:50	16:10	Coffee break		
Group Discussions				
16:10	16:30	Introduction to working group discussion	John Munthe, IVL	
16:30	18:00	Working group discussion		
18:00		Close of day 1		

<i>Tuesday, March 30</i>				
Session 4 Abatement of emissions and waste management				Jozef Pacyna, NILU
09:00	09:20	Mercury in European coal energy sector	Jan van der Kooij, Eurelectric	
09:20	09:40	Mercury abatement in coal combustion	Sally Shaver, US EPA	
09:40	10:00	Performance of Mercury Emission Controls for Power Plants	George Offen, EPRI	
10:00	10:20	Mercury emissions from the production of Manganese and Secondary steel	Tor Færden, Norwegian EPA	
10:20	10:50	Managing surplus Hg in the US	David Lennet, Natural Resources Defense Council	
10:50	11:10	Treatment and safe storage of mercury waste	Stina Lundberg, Swedish EPA	
11:10	11:30	Coffee break		
11:30	11:50	Summary	John Munthe, IVL	
Group discussions				
11:50	15:00	Group discussions including lunch in working groups	WG chairs	
15:00	15:20	Group report 1	Rapporteur	Lars Lindau, Swedish EPA
15:20	15:40	Group report 2	Rapporteur	
15:40	16:20	Group report 3	Rapporteur	
16:20	17:20	Plenary discussion		
17:20	17:40	Summing up, continued work	John Munthe, IVL	
17:40		Close of workshop		

6. List of participants

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Workshop on mercury - needs for further international environmental agreements

Appendix 1. Summaries of workshop presentations

- AMAP - The Arctic mercury problem
- Concorde East/West Sprl, Brussels – Mercury production, trade & use in the EU and worldwide
- Electric Power Research Institute – Performance of Mercury Emission Controls for Power Plants
- EURELECTRIC – Mercury in European Coal Energy Sector
- The Arctic Council Action Plan Mercury Project
- The Swedish Chemicals Inspectorate –Swedish phasing out of mercury in products
- The Swedish Environmental Protection Agency- Swedish Policy for a Mercury Free Environment/Final Storage of Mercury Waste
- The Swedish Environmental Protection Agency - Mercury in CLRTAP, towards effect-based control strategies
- UNEP Mercury Programme - UNEP Global Mercury Assessment and overview of current activities of the UNEP Mercury Programme
- Öberg Associés – Legal opinion on the possibilities in European Community law to ban or to restrict the export of mercury to third countries in particular with regard to mercury from decommissioned cells in the Chlor-Alkali industry – executive summary
- Danish Environmental Protection Agency - Danish phase-down of mercury use

Slide 1

The Arctic Mercury Problem

Presentation by Simon Wilson

Arctic Monitoring and Assessment Programme (AMAP)

at the NCM Workshop on Mercury, Brussels, 29-30 March 2004

(For more information consult AMAP assessment reports available as electronic documents from www.amap.no)

Slide 2

Mercury in the Arctic arises from both natural and anthropogenic sources. Anthropogenic sources in the region are few, and so most Hg contamination is a result of long-range transport (mainly via the air) from source areas in Europe, North America and SE Asia. Global anthropogenic emissions to air are currently estimated at ca. 2100 t/yr (in the same order as natural emissions); emissions to air decreased by ca. 30% between 1980 and the mid-1990s, but may be increasing again due to emissions from SE Asia.

Slide 3

The main atmospheric mercury species is gaseous elemental mercury (GEM). Models indicate that ca. 45% of mercury in Arctic air comes from sources in Europe, 30% from China/Japan, 10% from N. America, and 15% other sources. The AMAP background air monitoring network for Hg includes 5 main stations (some with data back to 1992/1994). The Russian Arctic sector lacks consistent air monitoring; however, Hg monitoring has been conducted at two stations based on bilateral support.

Slide 4

GEM has a lifetime in air of ca. 2 years allowing 'global' transport. In the mid-1990s, reactive gaseous mercury (RGM, which has a shorter lifetime in air) was identified at Alert. Investigations linked this to mercury depletion events (MDEs) in which photo-chemical reactions remove GEM from the lower atmosphere and deposit it to snow as RGM. MDEs have now been observed at all other Arctic air monitoring stations (also in Antarctica) and occur following polar sunrise. They have been a focus of extensive studies over the last 5 years.

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The Arctic comprises ca. 1-2% of the Earth's surface. Models had estimated Hg deposition in the Arctic at ca. 80 t/yr. However, adding MDE chemistry into the models more than doubled the estimated Hg deposition in the region, to an amount equivalent to ca. 6-10% of the annual anthropogenic emissions to air. This compares with a delivery of ca. 10 t/yr by rivers (and ...? by oceans). Part of the deposited Hg is re-emitted, but some 30-50%(?) remains, and can enter the aquatic ecosystem during the period of peak biological productivity.

Because MDE chemistry includes several factors that are climate related, there is a question of possible linkage with climate change. Potentially, climate change can act to either promote or reduce the likelihood of MDEs; it is unclear which will dominate. It is also possible that MDEs are relatively recent phenomena associated with climate change over the last few decades.

Several types of environmental record provide evidence of increasing Hg contamination in the Arctic from the pre- to post-industrial period. Recent trends in areas close to sources tend to be downward, however in some remote areas (western Canadian Arctic) there is evidence of continuing increasing trends. This may reflect differences in pathways of contamination and/or the more dominant trend signal closer to sources following emission reductions.

Mercury bioaccumulates – that is, it is taken up from water by biota. Mercury also biomagnifies in food-webs, especially the Arctic marine food-web. As a result, very high Hg concentrations are found in the tissues and organs of some Arctic species – in particular top-predators, such as polar bears - and humans.

Slide 9

Effects thresholds are derived from laboratory (and in some cases field) studies, few of which relate directly to Arctic species. Extrapolation across species must be borne in mind when comparing levels observed in Arctic animals with thresholds. In some areas, some Arctic species (especially long-lived mammalian species, such as seals, toothed whales, and polar bears) have Hg levels that exceed effects thresholds. This is a clear warning signal.

Slide 10

Human exposure to mercury occurs through dietary intake. Highest intakes are associated with indigenous peoples traditional diets, especially those that include high consumption of marine mammals (and freshwater fish such as pike). Highest blood Hg levels are thus found in the Inuit of Canada and Greenland. Studies have focused on women of reproductive age due to the potential health effects of pre-natal and early childhood exposure to Hg.

Slide 11

Indigenous groups in certain areas of the Arctic that rely on marine-based traditional diets have some of the highest blood mercury levels of any populations on the Earth, resulting in exceedance of public health guideline and action levels. In some cases food advisories are issued to reduce exposure for critical groups, however this requires careful communication. Traditional diets are an important part of indigenous spiritual and cultural identity. Alternatives may not be available, and a change to western diets has been implicated in increased prevalence of some diseases.

Slide 12

Increasing trends in mercury levels are also reflected in humans – from studies examining hair of 500 year old mummies found in Greenland, and their clothing.

Slide 13

Selenium may provide some protection against mercury toxicity. Traditional diets are also high in selenium and other vital nutrients. The dilemma for Arctic indigenous people is how to balance concern over contaminants in their food against the considerable benefits associated with such a diet.

Slide 14

The last AMAP assessment included some 'considered speculation' regarding the possible effect of international action to reduce Arctic contamination. Speculation factors for Hg included the prospect of a global agreement by 2010. Initially a small increase in human exposure might be expected (due to increased Asian emissions) but a global agreement might reduce exposure by 10-15% in 2030 relative to 2000 levels. Exposure reductions for Hg are less than for POPs as Hg has a shorter half-life in biological tissue.

Slide 15

The Arctic is contaminated by mercury as a result of long-range transport from anthropogenic sources in Europe, N. America and SE. Asia. Biomagnification and traditional diets are responsible for the high levels of Hg found in some Arctic species and some Arctic indigenous human populations. There is potential for adverse health effects in wildlife and humans and some studies in the Arctic have linked Hg exposure to subtle health effects in children.

Slide 16

Mercury contamination of the Arctic can only be addressed in a global context. AMAP has raised the need for possible international action through the Arctic Council and UNEP. Partly in response to the evidence from the Arctic, UNEP conducted its 'global study on the health and environmental impacts of Hg' ... Will this lead to a global agreement? By 2010? What will be the outcome of the EU-mercury strategy meeting? In any event, monitoring of the Arctic is needed to document the problem and hopefully track the progress following reduction of Hg emissions.

Presentation summary

Title: Mercury production, trade & use in the EU and worldwide
Presentation Monday 29 March, 14:10 14:30
Presenter: Peter Maxson - Concorde East/West Sprl - Brussels
Workshop: Nordic Council of Ministers
Workshop on mercury & international environmental agreements (29-30 March 2004)

Mercury sources

Global mercury **supply** to the markets is dominated by three main nations that mine mercury for export (Spain, Kyrgyzstan and Algeria), and (until recently) China, which has long supplied its own robust home market. While Spain deals with the political and social issues associated with its mining, China has reportedly closed its main mines under international pressures, and as other sources are more than adequate, and mercury remains so inexpensive on the international market.

Due to a range of factors - government subsidies to mercury production by mines, sales of mercury holdings from the US and the USSR governments, sales of mercury inventories from closing chlor-alkali plants, increasing recovery/recycling of secondary mercury, and greatly shrunken demand for mercury within industrialized economies - there has been an abundance of mercury available to the market during recent decades, forcing mercury prices down and holding them at a historically low level. This has led to the closure of all private mines, and curtailment of production at any but the lowest-cost remaining government sponsored (or owned) mines. As calculated by the author,¹ the mercury supply from 1994-2000 has averaged 3600 tonnes per year, and from 1996-2000 the average has been about 3400 tonnes per year, which one could take as a rough estimate of global mercury supply in 2000.

¹ See Maxson, P., *Mercury flows in Europe and the world: The impact of decommissioned chlor-alkali plants*, Concorde East/West Sprl for the European Commission, DG Environment, Brussels, February 2004.

Mercury demand

Demand for mercury has long been widespread, but the global mercury commodity market is small in both tonnage and value of sales. Most transactions are among private parties and not publicly reported. While continuing its long-term decline in most of the OECD countries, there is evidence that demand for mercury remains relatively robust in many developing economies, yet there is very little public data pertaining to its end use in many nations.

Mercury demand has come from a range of products and processes over the years, but recently it is mostly used in the chlor-alkali industry, small-scale gold mining, dental amalgams, electrical switches and relays, measuring equipment, energy-efficient lighting, etc., as well as a significant continued use in batteries. At the same time, it continues to be found in a dizzying array of other uses, such as toys, lighthouses, cosmetics and paints, not to mention some 1000 homeopathic products

identified by the US Food & Drug Administration, and more esoteric applications such as spiritual cleansing rituals, etc. Despite the wide range of applications, global demand for mercury continues a gradual overall decline, and the general market oversupply persists.

Through all of the above, especially in light of gradually increasing awareness and regulation, the global demand for mercury has declined from over nine thousand tonnes annual average in the 1960s, to over eight thousand tonnes in the 1970s, to just under seven thousand tonnes in the 1980s. The average annual global demand for mercury decreased to around four thousand tonnes in the 1990s, and is well below that today, of which some 10 percent is consumed in the EU.

At the same time, while the last 15-20 years have shown a significant reduction of mercury use in the OECD countries, mercury consumption in many developing countries, especially South and East Asia (as in the case of mercury use in products), and Central and South America (as in the case of artisanal gold mining) has been robust. The main factors behind the shifts in mercury demand in the OECD are the reduction or substitution of mercury content in some products and processes in some regions (paints, batteries, pesticides, chlor-alkali, etc.), a general shift of mercury product manufacturing operations from OECD countries to third countries (thermometers, batteries, etc.), and continuing robust supplies of mercury, combined with a long-term decline in mercury prices.

Mercury trade

An analysis of mercury **trade** statistics confirms that regionally, North America and Europe have dominated mercury consumption in the past, but in recent years they have been overtaken by East Asia, especially China, and South Asia. However, the EU continues to play a predominant role in the majority of global trade in raw (i.e., commodity grade) mercury. EU Member States imported nearly 400 tonnes of raw mercury and exported over 1400 tonnes in 2000, while global movements of raw mercury probably amounted to well over 8000 tonnes – much of it changing hands repeatedly. In fact, on average, some three tonnes of raw mercury appear in international trade statistics for each tonne of mercury consumed during the same year.

Trade statistics concerning mercury are far from perfect, but they frequently reveal surprises, such as the evidence that there remains a very active trade in mercuric oxide batteries, especially through China, but also through the EU and the US – despite legal marketing restrictions for a number of years. Tracing the flows of mercury through the economy demonstrates how fluid and global mercury trade really is. Mercury could be recovered from a Western European mercury cell chlor-alkali plant, sold to the Spanish mercury mining and trading company, shipped to Germany for further conversion into mercuric oxide, sold to mainland China for the manufacture of button-cell batteries, and the batteries exported to Hong Kong for incorporation into mass-produced watches for export to the European Union and the US.

Mercury prices

Mercury **prices** have been on a downhill slide for most of the past 40 years. During the last 10 years they have stabilised at about their lowest levels ever, although prices in US dollars have recently firmed as the value of the dollar has declined against other major currencies. Adjusting for inflation, mercury sells at less than five percent of its peak price during the 1960s, reflecting, in addition to a chronic oversupply, the regulatory pressures on industry and others to responsibly dispose of mercury waste at hazardous waste sites, or alternatively, to send it to recyclers. Low mercury prices enshrine and protect existing uses, discouraging innovation that would certainly take place to reduce mercury consumption if mercury were a more expensive commodity. For example, chlor-alkali factories, and even small-scale gold miners are under no significant economic pressure to reduce consumption of mercury. Therefore, while there is little besides regulation or awareness-raising to discourage the use of mercury in products and processes, economic theory argues that low prices may invite new and additional uses of mercury.

Through a variety of public policies, governments may influence the mercury market, including available supply, price, and even the number of customers on a global basis. Regulatory measures influence mercury movements and markets by encouraging educational programs, collection and recycling, substitutes for mercury products, etc. At the same time, it may be argued that regulatory programs keep mercury prices low by putting an effective negative value on mercury wastes, so that recyclers could theoretically be paid to accept wastes, process them and give recovered mercury away for free and still make a profit. One might ask whether, in such a regulatory environment, a free market in mercury still exists. One could also ask whether a free market in a toxic substance is really in the best interest of society. At the least, one might ask that government authorities come to some international agreement on basic objectives with regard to mercury, so that regulatory authorities are able to work within a consistent framework.

The small market for elemental mercury is characterised by a limited number of virgin and secondary producers and mercury brokers. The same companies buy and control inventories, and trade mercury to influence the market and prices – in recent years less successfully. As an example, MAYASA, the Spanish mercury mining and trading company, purchased most or all of the USSR mercury stockpile in the 1990s. In recent years MAYASA has also purchased residual mercury inventories from Western European chlor-alkali plants as they close or convert to mercury-free processes. Meanwhile the market oversupply looks set to continue and even expand, potentially encouraging increased mercury uses and demand outside the OECD countries.

Important observations concerning mercury markets

To fully appreciate EU and global mercury markets, a number of observations should be highlighted:

- The markets for mercury are global, and the EU is a key player. The EU provides 30 percent of the global mercury supply, it is a partner in over 50 percent of global mercury trade, and it consumes some 10 percent of global mercury demand;
- Raw (i.e., commodity grade) mercury is extensively traded around the world, at the rate of some three times the annual consumption. Apart from the clear implications with regard to monitoring these movements, and possible releases, this could be taken as an indicator of reasonable market efficiency – matching sellers with buyers worldwide;

- The world market for commodity-grade mercury is small (no more than 15 million euro), with relatively few key players, whose importance, however, is weakening somewhat as by-product and other secondary mercury recovery increases and a more diverse group of secondary suppliers and recyclers appears, who don't depend on mercury production costs to stay in business;
- Mercury prices are at a lower level in real terms than at any time in history, and there are no market reasons for any firming of prices in the foreseeable future;
- For at least two decades, the mercury commodity market has been strongly influenced by public policies and government supplies, and has not operated on purely economic grounds. The term "free market" is hardly applicable. Depending on other developments, by 2020 there may be no more primary mercury mining (there is little or no economically justified mining now), and the cost of "producing" mercury will reflect only recycling and recovery costs, which are driven by regulation, and which could therefore send prices even lower. In fact, regulations tend to give mercury a negative value. Whether it is commodity mercury or mercury waste, holding mercury is a liability, and it costs money to dispose of it. The only way to add value to mercury is to put it in a product and sell it, or to use it in an industrial process, with the obvious risk of eventual emissions and exposures. Regulation has already pushed many of these production processes out of the OECD;
- Overall, mercury supplies seem easily able to continue to meet and outstrip demand. Besides the more traditional mining and by-product mercury sources, there is supply from chlor-alkali factories and from a growing number of industries, owing to environmental regulations that encourage recovery of mercury, regardless of the market price;
- Consumption of mercury has declined significantly in the EU and other OECD countries, but this decline is not evident in the rest of the world, to which this low-value commodity is increasingly being shifted;
- Under any reasonable assumptions (i.e., declining global demand, decreased mining activity, increased supply from secondary sources, etc.), a net worldwide oversupply of mercury relative to known industrialised demand is expected to remain a hallmark of mercury markets into the foreseeable future. Assuming a continuation of present policies, this oversupply could accumulate to 10-15,000 tonnes by 2020, which would further soften the price of mercury. Following economic logic, at least some of this oversupply would find new customers in those nations with weaker regulations or enforcement with regard to mercury use and emissions;
- As mercury markets have demonstrated a particular ability to adapt to changes in supply and demand, a continued period of low prices and oversupply will encourage some uses (and eventual emissions) that would not otherwise have occurred, or at the least, they will discourage a number of other mercury reduction efforts;
- In general terms, the more mercury circulating in the economy and the environment, the more chance for misuse and abuse, emissions and exposure.

Performance of Mercury Emission Controls for Power Plants

by

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Palo Alto, California, USA
March 28-29, 2004

EPRI has been conducting research and development of mercury control for power plants since the late 1980's. For the first half-decade, the work was focused on understanding the fundamentals, which meant learning about the differences between power plant and incinerator mercury emissions and controllability, as well as the chemicals in the flue gas from a coal-fired power plant that are important to the chemistry of mercury. It also meant learning how to measure mercury accurately, and especially the species of mercury. Currently, much of our work is directed towards field tests of mercury controls at power plants in collaboration with the U.S. Department of Energy (DOE) and our member power companies. Each of these tests is scheduled to last 2-4 months, except for a program at a plant with a baghouse that will be conducted for nearly one year.

A major factor driving the research in the United States (U.S.) is the wide diversity of our power plants. While we share a large dependence on coal with some European countries, our plants tend to span a wider range of ages, duty cycles, and extent of post-combustion control for NO_x and SO₂ than generally seen elsewhere. Most importantly, the plants burn a very wide variety of coals – low- to high-sulfur eastern bituminous, western bituminous, sub-bituminous including the unique Powder River Basin (PRB) coal, and two generic types of lignite (low and high chlorine). Coal type greatly impacts the ability of particulate, NO_x, and SO₂ controls to capture mercury. It also impacts the performance of processes designed specifically to capture mercury or make it easier for other air pollution controls to capture the mercury.

A major focus of mercury control R&D is the development of data and understanding of the effect of selective catalytic reduction (SCR) for NO_x control and flue gas desulfurization (FGD) for SO₂ control on mercury capture. With eastern bituminous coals, the SCR appears to oxidize any elemental mercury in the flue gas so that it can be captured by the FGD. Removal rates of 80-90% have been observed in short-term tests, but not all coals, catalysts, and FGD types have been tested. This effect may not occur, at least not in the long term, at plants that fire PRB (a very high calcium, low chlorine coal). As in Germany, we have observed that some scrubbers (or FGDs) convert a fraction of the oxidized mercury they capture back to elemental mercury, which then escapes back to the flue gas and is emitted. We are just beginning to collect reliable data in search of an understanding of this mechanism. The effect seems to be reduced significantly when the flue gas is directed through an operational SCR.

For plants without an SCR, or for those firing PRB or lignite, sorbent injection is currently the leading candidate control. This can range from activated carbon injection (ACI) ahead of the electrostatic precipitator (ESP; also known as electrofilter) to injection of a sorbent ahead of a small, polishing baghouse (cloth filter) placed behind the ESP. This last approach is an EPRI-patented process called TOXECON™. In a variant,

TOXECON II™, the sorbent is injected in the ESP ahead of one of the last fields. Both configurations separate the ash from the injected carbon so that ash sales are not affected. The use of a polishing baghouse in the basic TOXECON™ configuration also allows use of much less sorbent than needed for injection ahead of an ESP. Depending on the coal burned at the power plant, ACI ahead of an ESP can produce 50% to nearly 90% mercury capture, at least in short-term tests. The amount of sorbent needed to achieve these mercury capture rates appears to be strongly dependent on the coal, with less sorbent needed for low-sulfur than high-sulfur eastern U.S. or South American coals, and lower maximum mercury capture levels achievable with western U.S. coals (PRB and lignite) than eastern U.S./South American¹ coals. With injection ahead of an ESP, annual sorbent costs for a 500 MW boiler could be as high as \$3.5 million. EPRI and others in the U.S. are actively conducting R&D to develop and demonstrate alternative sorbents – lower cost activated carbon, chemically treated activated carbon for flue gases that lack the minimum amount of chlorine needed for effective sorption by activated carbon, halogen addition to the boiler to compensate for the lack of free chlorine in the flue gas, even gases that react with the mercury to form a solid.

For plants burning western U.S. fuels and equipped with an FGD (wet or semi-dry), EPRI and the DOE are investigating low-temperature catalysts designed specifically to oxidize elemental mercury for subsequent capture by an FGD. These could be placed in the back end of an ESP, following the last field and possibly extending slightly into the converging cone. Another approach being investigated is halogen injection into the boiler to promote natural oxidation of the mercury in the flue gas prior to entering the FGD.

We are also in the early stages of investigating a number of innovative technologies that could capture mercury without the use of expendable chemicals, like activated carbon. MerCAP™, another EPRI-patented concept, consists of plates coated with a material that forms an amalgam with mercury (e.g., gold). These plates would be placed in the flue gas behind the SO₂ control to collect the mercury over long periods of time. Periodically they would be regenerated and the mercury captured in concentrated form. Carbon beds or structures inserted into bags in a baghouse could serve the same function. Another idea is a reactive membrane that captures the mercury in an amalgam on the surface of the membrane and then continuously regenerates the membrane by drawing the mercury through it.

Recently coal management has attracted greater interest. This includes selective procurement of low-mercury coals, increased washing of eastern U.S. coals (averages 35% mercury removal), selective mining to separate out mercury-rich layers within a coal seam, and upgrading of western U.S. low-rank coals to remove water. The latter process is believed to also remove as much as 70% of the mercury in the lignite or PRB, and one design may begin pre-commercial operation by 2005.

In summary, great progress has been made in understanding how to control mercury from power plants and in demonstrating some of the leading technologies, but much work remains to be done before mercury controls can be considered commercially available and cost effective for the range of conditions in the U.S. coal-fired power industry.

¹ Based on very limited mercury capture data on South American coals

*Workshop on Mercury – Needs for Further
International Environmental Agreements*

29-30 March 2004, Brussels

Mercury in European Coal Energy Sector

EURELECTRIC

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Introduction

Most of mercury emissions – from both natural and anthropogenic processes – are released to the atmosphere as elemental mercury Hg^0 . On account of its high vapour pressure, weak adsorption capacity and limited chemical reactivity, the lifetime of this toxic metal in the atmosphere can reach 1 to 2 years. A great part of vapour mercury is thus transported on a global scale and can travel on long distances from the emission sources. Other forms of emitted mercury – oxidized and particulate – have shorter lifetimes and are transported before being deposited on both local and regional scales. Contrary to Hg^0 , oxidized mercury Hg^{2+} is soluble in water and more reactive with surface material, particulate Hg being submitted to settling. During its transport, elemental mercury can be oxidized, particularly in cloud water, before wet or dry deposition to water or land surfaces.

Once deposited, mercury is subject to methylation by micro-organisms – bacteria, plankton – present in stream, lake and coastal waters. An important source of methylmercury HgCH_3 consists in drainage water from soils rich in humus substances in which mercury accumulates. In certain cases, methylmercury could also be formed in the atmosphere and directly deposited to the water surface.

Mercury methylation is a key step in the entrance of Hg in the food chain for HgCH_3 has the capacity to accumulate in organisms (bioaccumulate) and to concentrate (biomagnify), especially in the aquatic food chain (fish and marine mammals). Nearly all of the mercury in fish is methylmercury. Methylmercury is adversely affecting both human and wildlife. This compound which is a potent neuro-toxin readily passes the placental barrier and the blood-brain barrier, which may in particular cause adverse effects on the developing brain. Studies have shown that methylmercury in pregnant women's diets can have subtle, persistent adverse effects on children's development as observed at about the start of school age. In the Scandinavian Peninsula, for example, the brown water lakes are areas where the content of mercury in fish – especially pike – restricts its consumption for fertile woman; methylmercury, in this case, originating from drainage water from organic soils. The origin of this mercury burden is a mixture of domestic sources such as chlor-alkali industries, metal industries and transboundary air pollution

The retention time of mercury in terrestrial ecosystem, particularly soils where mercury is bound to organic carbon which limits its mobility, is very long, probably several decades but centuries cannot be excluded. Today, the deposition of mercury to forest sites in Scandinavia exceeds its discharge rate via drainage water. This means that the problematic mercury situation in Scandinavia is deteriorating despite present deposition that has probably decreased below the deposition level of a few decades ago when the emissions of mercury in Europe were significantly higher. This implies that old emissions of mercury are in many cases responsible for the current situation with high mercury content in fish.

During the last twenty years several dominating point sources to mercury emissions in Europe have been closed or modified e.g. chlor-alkali and metal industries. During the years 1980 to 2000 mercury emission from the industry was reduced from 860 t/year in 1980 to 239 t/year in 2000 (1). During the same years the mercury emission from combustion of fuels such as bituminous coals has been reduced from 350 to 114 tonnes/year. Mercury emissions from coal-fired power plants will still keep on decreasing in the forthcoming years by a more widespread implementation of pollution control technology like flue gas desulfurization or denitrification systems which have also a strong effect on mercury capture.

1 Overview of mercury emissions

Mercury can be emitted by processing of mineral resources at high temperatures, like the combustion of fossil fuels, cement production, incineration of waste, and roasting and smelting of ores. Emission inventories for total mercury have been elaborated by Pacyna et al. The reference year for the first survey was 1982. Updates were made for the reference years 1987, 1990, 1995 and 2000 (1). It appears that coal combustion is the largest single source of mercury emissions. Emissions from coal - fired large combustion plants contribute 27% to the total emissions in 2000, and coal combustion in small installations (plants below 50 MWth and residential heating) contribute 24%. The total anthropogenic mercury emissions in Europe amounted to 239 tonnes/ year in the year 2000.

The inventories clearly demonstrate that the mercury emissions in Europe decreased considerably over the whole period. Between the years 1990 and 2000 the reduction was 60%. According to Pacyna et al. global emissions have increased in the same period especially as a consequence of the increase of the emissions in Asia and Africa. The contribution of European emissions therefore was reduced from 33 to 10% in the same period.

An important issue is the accuracy of the emission estimates. The accuracy of the estimates of anthropogenic emissions of mercury in Europe is considered to be between 25 and 50%. In the preparation of this paper EURELECTRIC has collected information about the mercury content of the coal in different countries and the influence of dust collectors and SO₂ and NO_x abatement on mercury emissions. This information can be used to increase the accuracy of the emission estimates for coal combustion in coal - fired power stations. Another important aspect is that this information cannot only be used to demonstrate the ongoing reduction of mercury emissions from the electricity industry in Europe, but also for the EU or a specific country.

2 Comparison of mercury emissions from EU and US power stations

Until 1985 it was generally considered that during coal combustion all mercury was released as elemental mercury. However mass balances performed in the Netherlands in the eighties showed that between 7 and 90% of the mercury is captured by ash collected in the ESP. This appears to correlate with the chlorine content of the coals. It was assumed that mercury reacts with free chlorine to form HgCl₂. HgCl₂ condenses more readily than elemental mercury on the ash particles. These results were presented at the first Conference "Mercury as a global pollutant" in Gävle in Sweden in 1991 (2). At the same conference Hall et al. presented similar results obtained by laboratory experiments (3). Nowadays, the speciation of mercury is measured, so direct proof of the existence of ionic mercury is given.

Results from the USA and Canada show generally less capture of mercury in the ESP than found in Europe.

According to Devito and Rosenhoover little mercury condensation on pulverized fuel ash was shown in their measurements in power stations in the USA (4). In agreement with this observation it appeared that measurements in the eighties in the Netherlands in a power station with relatively high ESP temperature did not correlate with other measurements. The mercury emissions were considerably higher and only slightly dependent on the chlorine content of the coal (9)

In power stations with ESP temperatures below 140 °C, HgCl₂ starts to condense on fly ash particles. HgCl₂ is a sticky compound and adsorbs easily on particles when the temperature is favourable. Therefore it can be removed effectively from the flue gases in the ESP.

The reason for the difference between the mercury emissions in Europe and in the USA is that the ESP's are operated at higher temperatures in the USA. At temperatures of 140 °C and higher, HgCl₂ is also volatile. Therefore in power plants where the ESP is operated at high temperatures to prevent low temperature SO₃ corrosion, the mercury emission is high and independent of the Cl content of the coal.

3 Future outlook of mercury emission from coal-fired power stations

In many European power stations bituminous coal is burned. The mercury content in bituminous coal may vary considerably, but from a number of studies it appears that the concentration is generally low. Many power stations import coal from all over the world. In a study in the Netherlands, mercury concentration in 109 samples was analyzed. In general the concentrations are low (< 0.1 mg/kg coal) and the range is narrow (0.03- 0.3 mg / kg coal). An overview of the results is presented in Table 1

Country of origin (concentrations are in mg/kg)	Number	Mean	Standar Dev.
Australia	17	0.08	0.06
Colombia	7	0.06	0.03
China	2	0.15	-
Egypt	1	0.10	-
Germany (Ruhr area)	1	0.16	-
Indonesia	7	0.04	-
New Zealand	1	0.05	-
Poland	10	0.35	0.55
Russia (Kuzbass)	1	0.06	-
South Africa	12	0.09	0.02
Spitsbergen (Norway)	2	0.14	0.12
United States (Eastern)	15	0.14	0.12
Venezuela	2	0.08	-
Blend	36	0.09	0.07
Total	109	0.12	0.19
Weighted averaged in the Netherlands in 1999		0.11	0.20

Table 1. Mercury concentrations in bituminous steam coal as imported in the Netherlands (9)

During combustion, the mercury in the coal is released as gaseous elemental Hg. As contact between the coarse particles that fall rather quickly to the bottom of the boiler, the mercury concentration in bottom ash or slag is low. A large part of the mercury is available in the fly ash and is therefore collected by the ESP.

On average 50% of the mercury originally available in the coal is found in the fly ash.

Just as removal in the ESP is dominated by the speciation of Hg, this is also true for the removal by FGD. Wet scrubbers effectively remove HgCl_2 , but elemental Hg is barely removed. In addition, liquid redox reactions, by which HgCl_2 can be (re)converted to Hg, can occur in the scrubber. Also adsorption and desorption processes in the scrubber may complicate the findings. However, on average 50% of the mercury is removed in the scrubber. This leads to an overall for ESP and FGD of 75%. This means that on average 25% of the mercury in the coal is emitted into the air (Figure 1). For coal with an average mercury concentration of .11 mg/kg the emission concentration will be about $3 \text{ } \mu\text{g}/\text{m}^3$.

Figure 1. Mercury overall mass balance in a power plant equipped with an ESP and a FGD system, and an imported bituminous coal

In stations that are equipped with a SCR installation the emission will even be lower. In the SCR system the oxidation of elemental Hg is catalyzed leading to higher concentrations of ionic Hg, that can be removed by ESP and FGD systems.

There are many reasons why the mercury emissions from coal – fired power stations in Europe will be reduced in the near future. The application of BAT on existing plant beyond October 2007 will lead to retirement of old plant or the further equipment with FGD and SCR. The accession of ten new countries to the EU will lead to emission reduction and the application of abatement technology according to the LCP Directive.

Most probably the NEC and Emission Trading Directive will shift the balance of coal and gas in Europe. Also the Waste Incineration Directive will lead to further emission reduction. Quantitatively, the rate of mercury emission reduction is however not known.

4 Fate of mercury in combustion by-products

Once Hg is captured from the flue gas through the ESP and the FGD, it is trapped in the fly ash and FGD by-products. Thus there is concern that this mercury could be emitted into local ecosystems during disposal and utilization in manufactured materials like cement, concrete, gypsum wallboard or aggregates. This possible re-

emission occurs through two main mechanisms: leaching by water, which is the most important, and possible revolatilization in ambient air.

Different areas of interest have to be investigated regarding coal combustion and FGD by-products:

- concentrations in laboratory and field leachates,
- mercury flux to air by thermal desorption by means of laboratory and field experiments,
- effect of specific Hg control technologies (e.g. activated carbon injection) on mercury stability in the products
- effect of ammonia addition – in SCR/SNCR control technology – on mercury leaching,
- methylation potential at combustion of FGD products disposal sites

Several experimental studies have been undertaken or are in progress - principally in the US (5)-(8), most of them being supported by EPRI or DOE - to assess the importance of these processes and their consequences on mercury stability.

Maximum mercury concentration in the fly ash from combustion of coals - like those burned in Europe - is commonly between 0.1 and 0.5 µg/g (0.1-0.5 ppm).

TCLP¹ leaching tests were realized in laboratory at acidic pH on several fly ash and bottom ash samples coming from different ranks of coals. They have shown that Hg concentration in the leachates remains below 1 ppb and is less than 0.1 ppb after four weeks (in Europe drinking water standard for mercury is 1 ppb). Other similar experiments on fly ash samples, but performed at high basic pH with another leaching procedure, have given comparable results.

Thermal desorption experiments carried out on coal ash samples have indicated little potential for environmental impact because no significant mercury emissions were detected at temperatures below 150 °C with very low release rates at ambient temperatures for low rank coals. A laboratory study on several fly ash samples from subbituminous and bituminous coals have given a release rate of 0.004 pg/g/day which, applied to an annual amount of 200,000 tons of fly ash a year produced by a coal-fired power plant, gives a potential release of 0.3 g of mercury.

More sophisticated flux chamber experiments, reproducing ambient conditions, controlling light, temperature, air flow, air Hg and moisture, were realized using ash samples with high mercury concentration (>1 ppm) stemming from lignites, subbituminous and bituminous coals. They have shown that if the Hg release rate can reach 30 ng/m²/h for some lignites, the value is generally negative indicating a net mercury deposition instead of a re-emission.

Regarding mercury captured by active carbon injection, it appears from laboratory leaching studies on different fly ash samples that the powdered activated carbon can resist Hg dissolution 10 to 30 times better than the unburned carbon.

TCLP leaching tests performed at acidic pH on wet FGD sludge samples containing a mercury content in the range 0.35–0.75 ppm have given concentrations of less than 1 ppb. Other leaching tests carried out on manufactured FGD aggregates or sludge filter cake showed that the mercury concentration in the samples had increased, probably on account of solubilization of non-mercury components during the leaching procedure.

¹ Toxicity characteristic Leaching Procedure: EPA method to determine the mobility of both organic and inorganic analytes present in liquid, solid and multiphasic wastes

Leaching tests have been realized on gypsum samples coming from FGD installed on power plants burning different ranks of coal (lignite, sub-bituminous and bituminous) with a Hg content of about 0.1 ppm. The Hg content in the gypsum ranged from 0.5 ppm for low rank coals to less than 0.1 ppm for bituminous ones. Mercury concentrations analyzed in the leachates were generally found to be below 0.06 ppb. These results confirmed a previous study showing that no appreciable mercury loss from FGD solids was detected during air purging or water leaching tests.

A substantial amount of work remains to be done in order to check on mercury stability in combustion and FGD by-products from power plants. They will have particularly to focus on by-products coming from units equipped with SCR/SNCR denitrification systems which favour – above all catalytic systems - mercury oxidation and enhance the capture in fly ash and FGD products. Furthermore, the impact of ammonia slip from such DeNOx equipments on fly ash chemistry and mercury leaching has to be investigated. Microbial activity in fly ash and sludge has also to be studied through microbiological experiments in order to evaluate its potential impact on production of organomercury compounds.

Nevertheless preliminary results are very encouraging. They show a very low mercury release in the environment from fly ash and FGD sludge or gypsum.

Conclusion

In Europe, coal-fired power plants burn more and more imported bituminous coals with lower mercury emissions at the stack. In the last twenty years the overall mercury emission from the electricity industry has been drastically reduced. The increasing recourse, in addition to particle collector, to control technologies for desulphurisation and denitrification of the combustion flue gases, enhance mercury capture with efficiency than can reach 90 % or more. Results of first studies on fate of mercury collected in the fly ash, sludge or by-products of flue-gas desulphurisation systems do not show any significant mercury release in ecosystems.

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The ACAP Mercury Project

**Summary of the presentation by Jakob Maag, COWI¹
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Workshop on mercury - needs for further international environmental agreements.
Held by The Nordic Council of Ministers in Brussels, 29.-30. March 2004.

Abstract

Based on AMAP's findings of potentially critical exposures of mercury and a number of other pollutants in the Arctic region, the Arctic Council decided to initiate the "Arctic Council Action Plan to Eliminate Pollution of the Arctic" (ACAP). The ACAP mercury project is designed to establish an overview of important mercury release sources in the Arctic countries, and based hereon take initiatives to promote development of action plans/strategies on mercury, and initiate one or a few demonstration projects on mercury release reductions in areas where progress is slow. The project is co-ordinated by Denmark. It was commenced in 2002 and planning aspect continuing through 2004, with initiation of implementation of demo projects after 2004. Two assessments of releases, uses and wastes of mercury is in finalisation, one covering the Russian Federation, and one embracing all the Arctic countries. Both reports will be published by summer 2004.

Adverse impacts of mercury in the Arctic

Mercury is a bio-accumulated toxic metal that is of concern for both humans and the environment. Mercury accumulates in biota such as fish and marine animals. This is of particular concern for the health of local and indigenous people in the Arctic who are highly dependent on food from the marine food web. Mercury is a volatile compound and emissions within and outside the Arctic can be sources for input of mercury to the Arctic region.

The Arctic Monitoring and Assessment Program (AMAP) reports emphasises the need for more knowledge about the sources, transport, fate and behaviour of mercury in the Arctic. Despite this need for more information the AMAP reports concludes that actions should be taken to reduce the anthropogenic input of mercury to the Arctic environment. Although sources for mercury pollution of the Arctic are not well known and important sources might be located outside the region, it is likely that sources within the Arctic states contribute significantly to the input of mercury to the Arctic environment.

There are clear and established concerns for human health. For example, in North Greenland, 16 percent of the adult population studied had blood mercury concentrations exceeding 200 µg/l, which is the minimum blood concentration WHO regards as toxic for non-pregnant adults (AMAP, 1998³). More than 80 percent of the population in North Greenland exceeded 50 µg/l blood (Hansen and Pedersen,

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³ AMAP (1998): Assessment report: Arctic Pollution Issues. Arctic Monitoring and Assessment Programme, Oslo, 1998

1986⁴), which almost corresponds to the benchmark dose level for neurobehavioral deficits found in the US NRC (2000⁵) evaluation of the Faroe Islands Studies (Grandjean *et al.*, 1997⁶). The traditional marine diet on Greenland and other parts of the Arctic has very positive nutritional qualities and is not readily replaced with other foods. However, it is clear that the risks associated with this diet increase with increasing levels of methylmercury contamination. It is further important to note that, beyond the physical benefits associated with the traditional diet, it also plays an important role in the social and cultural life of indigenous communities in the North (UNEP, 2002⁷).

The "ACAP" action plan

Within the framework of the Arctic Council, the eight Arctic Countries agreed on taking actions to contribute to the reduction of exposures to a number of priority pollutants, including mercury, in the Arctic region. With the 2000 Barrow Declaration, the Arctic Council issued the "Arctic Council Action Plan to Eliminate Pollution of the Arctic" (ACAP), addressing 6 projects on priority pollutants including mercury and a number of POPs (Persistent Organic Pollutants).

Mercury Project Parties

- ACAP is supervised by the ACAP Steering Committee (Chaired by US EPA; secretariat Norwegian EPA), one of several working groups under the Arctic Council
- The Danish Environmental Protection Agency is the co-ordinator for the mercury project
- COWI are consultants for the Danish EPA on the project
- The mercury project is supervised by a Steering Group representing the eight Arctic countries, as well as other parties with interests in the project.

Summary of project components

Project assessments (phase 1)

In order to give a proper basis for the development of action plans/strategies on mercury reduction, as well as for selection of demonstration project(s), a regional Arctic Mercury Assessment has been prepared. As per March 2004, a draft report exists, which is under review in the project Steering Group. The report is expected to be published in spring/summer 2004 on www.arctic-council.org (or a related website). The assessment describes current releases, usage and disposal of mercury across all eight Arctic countries, and presents initial ideas for priority actions to reduce mercury releases to the environment. Existing reduction measures are also summarised in the report.

The regional assessment is primarily based on information submitted by the Arctic countries. In order to facilitate a uniform and transparent reporting from the countries, a questionnaire was developed requesting the data needed for the inventory. The filled in questionnaires submitted by the Arctic countries will be part of the publicly available assessment report in the form of appendices to the report. As a part of the project, a national mercury assessment for the Russian Federation was also prepared. The report is the first detailed assessment of mercury releases, uses and wastes published internationally. The Russian assessment data were used in the Arctic Mercury Assessment.

⁴ Hansen, J.C. and Pedersen, H.S. (1986): Environmental exposure to heavy metals in North Greenland. *Arctic Medical Research* 41: 21-34. As cited in AMAP, 1998

⁵ NRC (2000): Toxicological effects of methylmercury, Committee on the toxicological effects of methylmercury, Board on Environmental Studies and Toxicology, Commission of Life Sciences, National Research Council, National Academy Press, Washington DC

⁶ Grandjean, P., Weihe, P., White, R.F., Deves, F., Araki, S., Yokoyama, K., Murata, K., Sorensen, N., Dahl, R. and Jorgensen, P.J. (1997): *Neurotoxicology and Teratology* 1997, 20, 1

⁷ UNEP Chemicals (2002): Global Mercury Assessment. Available at www.chem.unep.ch/mercury.

For a presentation of findings of the Arctic Mercury Assessment and The Assessment of Mercury Releases from the Russian Federation, please consult the reports when they are published on www.arctic-council.org or a related website (linked to Arctic Councils website), presumably by late spring or summer 2004.

Action plans/strategies on mercury (phase 1)

Specifically for the Russian Federation, the project includes assistance to development of a draft proposal for a national priority setting plan on mercury. The development of the proposal has been initiated and will be undertaken in co-operation between Russian experts and COWI in co-ordination with Russian authorities.

Evaluation and selection of demonstration project(s) on mercury release reductions (phase 2)

Among the point sources reported from the Arctic countries, a handful of specific point sources with substantial mercury releases in Russia will be evaluated in more detail as regards their suitability as potential demonstration projects. One or a few projects will be selected for implementation of mercury release reduction measures and will be described further in order to facilitate future fund raising for the implementation.

Demonstration project implementation (phase 3)

Fund raising and implementation of the demonstration project is scheduled for a future phase 3 of the project, commencing after 2004. Only projects in the Russian Federation will be considered for support in the project.

Project time schedule

Regional and Russian assessments: 2002 - 2004

Proposal for priority setting plan for the Russia Federation: 2004

Evaluation and selection of demonstration project site(s): 2004

Initiation of demo project implementation: After 2004

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SWEDISH PHASING OUT OF MERCURY IN PRODUCTS

Presentation on Workshop on mercury – needs for further international environmental agreements, March 29-30, Brussels

Introduction

Risk reduction of mercury has been an item of high priority in Sweden since the 1960s. In the early 1990s it was concluded that the reduction of mercury emissions at point sources would not be sufficient to reduce the environmental load beyond critical levels. The Swedish Parliament decided to reduce the use of mercury in products mainly by regulatory means with the ultimate aim of a total phase-out. The regulation has been supported also by voluntary agreements.

The official policy on mercury has lead to an awareness and acceptance in Swedish industry and society to avoid mercury. Dependent on the kind of commercial product, this has included varying amounts of investments in developing new techniques.

Between 1992 and 2003 approximately 95 % of the sold amounts of mercury in products have been phased out in Sweden.

Experiences on the phase-out of mercury-containing products

Measuring instruments and electrical components/devices

In the early 1990s a wide range of measuring instruments and electrical components such as mercury-thermometers, barometers, manometers, relays, contacts and thermostats was prohibited for import, professional manufacture and sale in Sweden.

In general, alternative techniques were available. Granting time-limited exemptions in order to start and fulfilling initiatives for development of alternatives have reduced negative effects for industry and users. A few of these exemptions are still valid, but only for spare parts. Also, some dispensation for individual products has been granted during the years.

In 1990 the sold amounts of mercury in measuring instruments and electrical components was estimated to at least 8000 kg. In 1992 it had decreased to 4800 kg and in 1997 it was only 20 kg. The sold amount of mercury is still approximately 20 kg. However, mercury may occur now and then in components included in equipment imported to Sweden.

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Dental amalgam

The sold amount of mercury in dental amalgam has decreased rapidly over the last five to six years from 980 kg in 1997 to approx. 110 kg in 2003. In 1991/92 the sold amount of mercury in amalgam was 1700 kg. There are several available alternatives to amalgam on the market. The most common fillings in Sweden today are composites, but also other “white” fillings are used. A phase out of the use of amalgam has been investigated several times in Sweden, and a voluntary agreement not to use amalgam for fillings in children’s and youth’s teeth up to the age of nineteen was reached in 1995 between the Government and the Swedish Federation of County Councils. In 1999 the dental care compensation ceased to pay for amalgam fillings, which has made it more expensive for the patients to use amalgam. This has probably contributed to the reduced use together with a demand for other fillings due to an awareness of environmental and health risks from amalgam among patients and dentists.

Batteries

In 1992 the sold amount of mercury in batteries was 2300 kg. The regulation in the EC Battery Directive, amended in 1998, has led to a sharp reduction in sold quantities of mercury in batteries. Mercury oxide batteries accounted for 700 kg of approximately 800 kg of mercury in batteries in 1997. The amount of mercury in sold batteries for 1999 was estimated to be around 100 kg, and the amount in button cell batteries 2003 was estimated to 24 kg. The collection rate for button cell batteries is only around 50 percent (SOU, 2000), which means that mercury from these batteries is still emitted in the waste stream.

Light sources

The sold quantities of mercury in linear fluorescent lamps and compacts fluorescent lamps has only marginally decreased since the mid 1990’s and was 2003 around 120 kg as compared with 150 kg in 1997. In 1991/92 the sold amount was 300 kg. Mercury in light sources has not been regulated nationally, and no voluntary agreement has been reached. In order to minimise the environmental impacts from the use of mercury in these products, maximum permitted mercury contents will be introduced in the coming EC Directive on Restrictions of Hazardous Substances in electric and electronic equipment (RoHS). Hopefully, mercury free alternatives will be introduced on the market in the near future.

Investigation of a general ban on mercury

The Swedish Government has commissioned the National Chemicals Inspectorate to investigate the possibilities of a national general ban on the marketing and use of mercury and to make a proposal for such legislation. A general ban would better meet the national goal of a total phase- out of mercury in new products.

The possibilities of a national regulation in relation to EU legislation have been analysed. Based on that analysis the need for exemptions from a general ban as well as economic and environmental impact analysis are carried out. The investigation includes for example dental amalgam, chemicals for analysis and use in the chlor-alkali industry.

The report, which is to be delivered on 30 June 2004, will be translated into English and made available on KemIs website.

27 jan 2004

Stina Lundberg
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Swedish Policy for a Mercury Free Environment/Final Storage of Mercury Waste

Mercury has been a target for political decisions in Sweden for a long time due to high levels of mercury in the environment. Thousands of Swedish lakes contain fish with increased levels of mercury. The overall aim for the Swedish policy is to reduce the levels of mercury in the environment to normal background levels.

A number of decisions have been taken on measures to restrict the flow of mercury in the society. One of the most important decisions is a national goal decided by the Parliament in 2001 that mercury should be phased-out in products put on the market by 2010 unless there are no feasible alternatives. A general ban on mercury in products is now being considered.

The Swedish strategy to achieve a "mercury free environment" consists of measures to reduce the input of mercury into society by imposing a ban on it in different products and processes, collect mercury from society's so-called "hidden mercury store" and to effect a terminal disposal of mercury. Additionally substantive actions are taken to restrict emissions of mercury to air, land and water.

Final storage deep down in bedrock – the Swedish solution for mercury waste

After many years of research and investigations Sweden has now taken a big step to realise a final storage for mercury waste that gives a satisfactory protection for the environment. A decision was taken by the Parliament in 2003 that waste containing one percentage mercury, or more, shall be put into a deep bedrock repository. Also for waste containing less mercury than one percentage underground storage shall be used if motivated. The geological repository shall be in place at the latest 2015.

For a long time large quantities of discarded goods and products have been stored pending a solution. Large amounts of waste are also stored in industry, either temporarily or at sites that do not meet long-term environmental safety requirements.

The aim has been to find a final storage that is able to provide protection against mercury's harmful effects in both the short and the long term. Very high quality final storage capable of serving its purpose for a very long time will therefore be required. Storage must also be proof against unforeseen occurrences such as a breach of containment or inadvertent human entry. Investigations have shown that final storage deep down in bedrock is the best technical solution in Sweden, it is environmentally motivated and not economically unrealistic.

Before realizing an underground storage much work is still needed though. At this stage most important is to come up with legislation preventing use, export and traditional landfilling. Further investigations and technical development is also needed. And finally, it is of big importance to increase the knowledge and the understanding for an underground storage in the society, an underground storage cannot be realized without local acceptance.

The responsibility for building an underground storage, including necessary investigations and technical development, rests on the waste owners. Authorities have the responsibility to direct the process in the right direction.

Mercury in CLRTAP, towards effect-based control strategies.

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Background

The UN/ECE Convention on Long-range Transboundary Air Pollution (CLRTAP) has over the years contributed substantially to an essential framework for controlling and reducing the damage to human health and the environment caused by transboundary air pollution. In the years from its entering into force (1983) until today problems of acidification and eutrophication due to anthropogenic emissions of sulphur and nitrogen compounds as well as damage to individual receptors like human health, surface waters, vegetation, materials and cultural heritage by air pollutants were the main focus of the effect-oriented work under the convention.

In the 1990s, problems related to heavy metals, their accumulation in ecosystems and their impact on the environment and human health became increasingly important. Specific attention was devoted to deriving effect-based abatement strategies. A UN-ECE protocol on Heavy Metals was signed by 36 parties in Århus (Denmark) in 1998. It addresses three particularly harmful metals: cadmium, lead and mercury. According to one of the basic obligations, the parties will have to reduce their emissions of these three metals below the levels in 1990 (or an alternative year between 1985 and 1995). The Protocol aims at cutting emissions from industrial processes, fuel combustion and waste incineration. It lays down stringent limit values for emissions from stationary sources and suggests best available techniques (BAT) for these sources. The Protocol requires the parties to phase out leaded petrol and introduces measures to lower heavy metal emissions from other products. In article 6 of the protocol the parties were encouraged to support the development of an effects-based approach to optimise future control strategies.

Since 1997 five workshops have been organised to develop effects-based approaches and critical limits for heavy metals. A manual for calculating critical loads has now been finalised and will be presented at the Task Force Meeting on ICP Modelling and Mapping in May 2004. The aim of the manual is to provide a guidance to derive critical loads for heavy metals (lead, cadmium and mercury) for both terrestrial and aquatic ecosystems, summarising:

- General methodological aspects of calculation and mapping critical loads of heavy metals

- Mass balance models and input data to calculate critical loads.
- Critical limits that are essential to carry out the critical load calculations,
- Transfer functions, describing i.a. the relation between mercury concentrations in precipitation and biota, while accounting for the impact of soil and water chemical properties.

Environmental problems

Regarding mercury, two endpoints have been chosen for calculating critical load: mercury concentrations in fish and in the organic top layer of forest soils. These two receptors are highly sensitive to increased mercury deposition.

Due to emissions of mercury to air the concentrations of mercury in fish has increased in many parts of the world. Mercury is nowadays present all over the globe in fish at concentrations that adversely affect human beings and wildlife (UNEP 2002). In Sweden, concentrations of mercury in fish from lakes have increased markedly during the 20th century. The Hg concentration limit of 0.5 mg/kg in fish, based on recommendations by WHO/FOA and used a.o. by the EU, is currently exceeded in about half of the Swedish lakes (ca 50 000 lakes) if referring to one-kilogram pike (*Esox lucius*). As a consequence, the National Food Administration of Sweden has recommended that pregnant women and women planning to have children should not consume some of the most common fish species (like pike and perch) from lakes and rivers (Johansson et al 2001).

Also in top layers of forest soils the concentrations of mercury has accumulated substantially as a result of anthropogenic emissions of mercury during many decades. In southern Sweden the concentration of mercury in the humus layer has increased about three to five times compared to the estimated background levels. Recent findings based on field studies and laboratory experiments suggest that the enhancement of the mercury concentrations is responsible for a reduction of microbial activity in the soil Bringmark and Bringmark 2001, Johansson et al 2001). More broadly, the UNEP Global Mercury Assessment (2002) concluded that microbiological activity in soil appears to be very sensitive to mercury, and that significant impacts may already be taking place in forest soils over large parts of Europe. The microbiological activity in soil is vital to the processing of carbon and nutrients in the soil, and the health of the microbial community has a great effect on the living conditions of trees and soil organisms, which form the basis for the terrestrial food chain.

Calculation of Critical loads

To calculate critical loads for mercury in soils a simple mass balance is used. The method is based on the balance of all relevant fluxes into or out of the organic topsoil layer (humus layer) in forest soil. Assuming steady state for this soil layer implies that the internal metal cycling within the ecosystem can be ignored. In

consequence the critical load of mercury can be calculated from the sum of tolerable outputs from the humus layer by harvest and leaching minus the natural inputs by weathering release. Weathering can however be ignored outside volcanic and ore rich areas.

For the endpoint mercury in fish, the critical level of atmospheric deposition is calculated by linking the concentrations in fish directly to the main immissions through two different transfer functions describing the relationship of their mercury concentrations at steady state (Meili et al. 2003). With this method there is no need for mass balance consideration or detailed understanding of ecosystem processes. One of the transfer functions (TF_{HgSite}) relates mercury concentrations in biota to the mercury concentration in precipitation at watershed steady state. Once the mercury concentration in the standard fish is established for an ecosystem, the mercury concentration in other fish types can be addressed by means of the transfer function TF_{HgBio} , describing the deviation from the standard fish.

Detailed descriptions of the methods to calculate critical loads and levels of mercury can be found in the Mapping Manual on the website: <http://www.unece.org/env/wge/mapping.htm>. The manual is planned to be used for a first mapping of critical load of mercury, lead and cadmium in the ECE region in 2005. The mapping result will then form a basis for discussions of a new protocol on heavy metals.

Preliminary calculations of critical loads, according to the methods in the mapping manual, have been performed for mercury in Sweden. The results show that the critical load varies in the country due to the different sensibility of different catchment areas. For both the calculations on soils and fish there is a marked exceedance of the atmospheric deposition of mercury in the southern half of the country. The current deposition is here about 2 – 8 times higher than the critical load/level. Accordingly the results suggest that the deposition of mercury should be reduced by about 80 per cent in large areas in south Sweden to reach the critical load/level.

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United Nations Environment Programme

برنامج الأمم المتحدة للبيئة • 联合国环境规划署
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT • PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE
ПРОГРАММА ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ ПО ОКРУЖАЮЩЕЙ СРЕДЕ

Chemicals

Substances chimiques

UNEP GLOBAL MERCURY ASSESSMENT AND OVERVIEW OF CURRENT ACTIVITIES OF THE UNEP MERCURY PROGRAMME

Aase Tuxen, UNEP Chemicals

GC decision 21/5 on mercury assessment -

UNEP's work on mercury was initiated in February 2001 through the UNEP Governing Council's decision 21/5 on mercury assessment. Responding to concerns expressed in a number of fora that national/regional action was not sufficient to address mercury pollution in those regions, the Governing Council requested UNEP to undertake a global assessment of mercury and mercury compounds, for consideration at its next session in 2003. The process should also outline options for addressing any significant global adverse impacts of mercury. It requested the Executive Director to report on the results of the assessment to the Governing Council at its 22nd session, and agreed to consider whether there is need for assessments of other heavy metals of possible global concern at that session.

Development of the Global Mercury Assessment

The approach chosen in developing the Global Mercury Assessment report proved to be successful, ensuring a transparent process and a large ownership in its results and recommendations. After requesting input and relevant information from Governments, IGOs and NGOs, a first draft of the report was developed through the assistance of consultants with extensive experience and involvement in drafting publications relevant to mercury, both at national and international level. As a large part of the previously published reviews relevant to mercury focussed on OECD-countries, where much of the current research is ongoing and some reduction measures implemented, an attempt was made to identify and include relevant information also from non-OECD countries.

An open-ended Working Group was established to assist in the review and finalization of the assessment report, with members nominated by Governments, IGOs and NGOs. The Working Group had the opportunity to review and comment on the draft report four times during the process, both through written comments and in a drafting group during a meeting of the Working Group, where a number of unresolved issues in the draft were discussed, agreed and finalized. During the meeting, the Working Group also agreed on the key conclusions with regard to the global adverse impacts of mercury and developed an outline of options for addressing the impacts. Although the assessment report was not independently peer-reviewed, because of its extensive review by the Working Group, which encompassed a number of scientific and technical experts familiar with the issues associated with mercury, it is considered to be a useful summary of current science and other topics relevant to mercury.

Key findings

Based on the information presented in the report, the Working Group formulated a number of key findings relevant to their conclusion. Some of the most important are:

- Mercury is persistent and cycles globally – emissions in any continent can contribute to deposition in others;
- Due to long-range transport, even nations with minimal Hg releases, and other areas remote from industrial activity, may be adversely affected;

- Studies from numerous geographic areas indicate a significant portion of humans and wildlife throughout the world are exposed to methyl-Hg levels of concern;
- Many humans/wildlife across the globe are at risk, largely due to consumption of contaminated fish.

Information submitted for the development of the report on mercury levels in fish from a number of countries all over the world clearly shows that mercury is now present in the environment all over the globe at levels that may affect humans and wildlife. This situation is giving rise to growing concern and has resulted in a number of governments issuing fish consumption advisories recommending certain sensitive groups to avoid eating certain fish with high levels of mercury. So far, such advisories have been limited to developed countries, and much less is known of the potential risks in developing countries.

The Working Group also recognized that, due to the substantial efforts in recent years by a number of Governments, mercury may now be more problematic to less-developed regions.

- Growing energy demands in a number of developing countries, where emission controls and alternative technologies are not easily available, may result in increasing emissions of mercury, especially if the demands are met by coal combustion;
- Poor waste treatment facilities, both for hazardous waste and consumer/product waste may result in increasing uncontrolled releases of mercury to the environment;
- Artisanal gold-mining activities in a number of developing countries, due to rising gold process, is resulting in enormous releases to the environment.

In addition, uses being phased out in developed countries may still be ongoing in developing countries, with potential export of outdated technologies and products and possible exposure of these populations to the harmful effects of mercury.

Conclusions

Based on these key findings, the Working Group recognized that addressing the global adverse impacts of mercury can not be limited to local/regional levels. They concluded that sufficient evidence of significant global adverse impacts from Hg now exists to warrant further international action. They also recognized that better understanding on a number of issues relevant to mercury pollution is important, however, it is not necessary with full consensus on all aspects or complete evidence in order to start initiating action globally.

Based on these conclusions, the Working Group developed an outline of possible options for addressing problems – covering short, medium and long-term goals. The Working Group, however, did not make any recommendations with regards to which options would be the most appropriate, recognizing the need to take into consideration the specific needs and conditions in each country.

GC decision 22/4 V on mercury programme -

The Global Mercury Assessment was published in December 2002 and made available to Governments before the Governing Council session in February 2003. The assessment report and the work undertaken by the Working Group was very well received by the Governing Council at its 22nd session in February 2004 and the Council fully endorsed the Working Group's conclusion that there was sufficient evidence of significant global adverse impacts from mercury and its compounds to warrant further international action to reduce the risks to human health and the environment.

The Governing Council decided, through adoption of decision 22/4 V Mercury programme, that national, regional and global actions, both immediate and long-term, should be initiated as soon as possible and urged all countries to adopt goals and take national actions, as appropriate, with the objective of identifying exposed populations and ecosystems, and reducing anthropogenic mercury

releases that impact human health and the environment. The Council also requested UNEP to initiate technical assistance and capacity building activities to support the efforts of countries to take action regarding mercury pollution.

The Governing Council did not draw any final conclusions with regard to the full range of possible options outlined by the Working Group in the assessment report. It agreed that the priority in the immediate future is to support capacity-building, particularly for developing countries and countries with economies in transition, and working with partners to mobilize funding from various sources to support these efforts. With regard to long-term action, the Council will, at its next regular session in February 2005, review progress made in taking action against mercury pollution and consider the need for further measures for addressing the significant global adverse impacts of mercury and its compounds, including for example the possibility of developing a legally binding instrument, a non-legally binding instrument or other measures or actions. It will also consider what further action might be taken with regard to other heavy metals, for example, lead and cadmium.

The new UNEP Mercury programme -

To follow-up on the Governing Council's decision, UNEP has established a new mercury programme, located in the Chemicals Unit in Geneva, Switzerland. In the short term, the programme will focus on assisting countries to understand and address Hg problems, through

- Building inventories of uses and releases;
- Identifying populations at risk;
- Developing communication and outreach to at-risk populations;
- Initiating actions to reduce uses and releases of Hg, including promoting mercury-free products, technologies and processes, using environmentally friendly alternatives.

A first priority will be to organize regional/sub-regional awareness raising workshops for developing countries and countries with economies in transition, in order to assist them in assessing their own situation with regards to mercury pollution and identifying possible ways of dealing with any problems they might have. A tentative schedule for the various workshops is given in the table below (however, location and timing may change).

Region	Tentative timing	Tentative location
Asia and the Pacific	26–30 April 2004	Bangkok, Thailand
Anglophone Africa	31 May to 4 June 2004	Pretoria, South Africa
Common-wealth of Independent States	19-22 July 2004	Kiev, Ukraine
South America	13-17 September 2004	Buenos Aires, Argentina
West and Central Asia	11-15 October 2004	Kuwait
Franco-phone Africa	23-26 November 2004	Dakar, Senegal
Central America and the Caribbean	January 2005 (tentative)	Port of Spain, Trinidad and Tobago
Central and Eastern Europe	Not decided yet	Not yet decided yet

UNEP will also be working to develop training materials, guidance documents and toolkits on a number of topics and establishing a clearing house for information that may be of use to Governments and others in their efforts to evaluate and address mercury pollution. These include:

- Developing inventories of Hg releases;
- Identifying populations at risk;
- Communication/outreach to populations at risk;
- Options/approaches to reduce Hg releases.

In order to make these and other important materials accessible to Governments and other stakeholders in a more effective manner, a clearing house function, based on standard software packages, is also under planning/development. This function, once developed, may also be used to provide information on other heavy metals, such as lead and cadmium.

In the longer term, the programme will aim to focus on encouraging and supporting development of national and regional action plans to address Hg. Mobilization of technical and financial resources to support national, regional and global efforts and capacity-building will also be essential.

Preparations for the next Governing Council 21-25 February 2005 -

In preparation for the upcoming discussions at the next Governing Council, UNEP sent a communication to Governments and other stakeholders on 23 February 2004 inviting them to:

- report on any progress made in the implementation of decision 22/4 V, especially with regards to any goals or national actions taken since the last Governing Council session;
- provide any views with regard to the need for further measures for addressing the significant global adverse impacts of mercury and its compounds; and
- provide any views on what further action might be taken with regard to other heavy metals, for example, lead and cadmium.

Deadline for response is 1 July 2004. A report from UNEP, including a synopsis of the views and input received will be presented to the Governing Council for consideration in February 2005.

LEGAL OPINION

**ON THE POSSIBILITIES IN EUROPEAN COMMUNITY LAW TO BAN OR
TO RESTRICT THE EXPORT OF MERCURY TO THIRD COUNTRIES**

**IN PARTICULAR WITH REGARD TO MERCURY FROM DECOMMISSIONED CELLS IN
THE CHLOR-ALKALI INDUSTRY**

EXECUTIVE SUMMARY

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Provided there is a political will at Community level, there are various legal bases within the existing framework for restricting metallic mercury from decommissioned cells of chlor-alkali plants from reaching the global market. There is a strong likelihood that mercury from discarded cells from the chlor-alkali industry already falls within the common definition of waste under EC law. Further regulatory action is nevertheless needed to restrict the possibilities to recover the metallic mercury.

In the absence of regulatory progress and/or a common understanding among the stakeholders of the necessity to ban or at least to restrict the export of metallic mercury to third countries, national authorities, environmental interest groups and/or the chlor-alkali industries which, *under national law*, are required to dispose of the mercury in an environmentally responsible manner, should consider the option to institute legal proceedings before national courts and/or before the Community Courts. This would clarify whether or not mercury from decommissioned cells in chlor-alkali plants in other Member States falls within the *EC waste definition*.

It is only once this issue is definitely settled by the Court that it will be possible to assess whether a ban on the export of mercury to third countries can be achieved through the existing Waste Shipment Regulation, by amending that regulation or by using a different legal basis.

However, it must be stressed that the classification of mercury from decommissioned chlor-alkali cells as waste does not solve the problem of exports to third countries. Indeed, such mercury may, at a certain given point in time, cease to be waste once it has undergone a recovery operation by a third party. The EC waste legislation should therefore under all circumstances be supplemented with restrictions on the marketing, use, recovery and the export of metallic mercury.

If the Community legislator were to consider it necessary to adopt general obligations concerning the controlled disposal of mercury because of the risks it presents for the environment and for human health, the correct legal basis for such an act would be Article 175 EC. Such an act would be adopted under the codecision procedure in article 251 EC. A legislative precedent to this effect is Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT).

A sectorial approach does not seem to be a suitable legal basis for addressing the environmental issues arising from the safe disposal of metallic mercury from decommissioned cells from the chlor-alkali industry. Nevertheless, the upcoming legislative initiatives of the Water Framework Directive, read in conjunction with Article 9 (4) of the IPPC Directive, which states that in all circumstances the conditions of a plant permit must contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole, may constitute an alternative legal basis for regulating metallic mercury from decommissioned cells in the chlor-alkali industry.

Under all circumstances, since mercury as such does not constitute waste, it is necessary to find another legal basis under EC law in order to restrict or ban the export of mercury to third countries. A ban could be achieved, *inter alia*, by including mercury in Annex I of Council Directive 76/769/EEC of 27 July 1976 on the approximation of laws, regulations, and

administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations.

By introducing a general ban on the use of mercury within the Community, the holders of that substance would, with all likelihood, also be required to dispose of it under the EC waste legislation. Thereby, the existing export ban under the Waste Shipment Regulation would be applicable.

Another alternative from an environmental perspective would be to include metallic mercury in Annex V to 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. According to Article 14(2) of Regulation No 304/2003, chemicals and articles the use of which is prohibited in the Community for the protection of human health or the environment, as listed in Annex V, shall not be exported. Precedents to that effect are that Polychlorinated biphenyls (PCBs) and Cosmetic soaps containing mercury, which are already listed under Annex V. Since Annex V is not listed under the applicable procedure for modifying the Annexes under Article 22 of the Regulation, an amendment to the Regulation under the normal codecision procedure would be required.

A more limited approach would be to restrict the export of mercury to third countries by requiring Prior Informed Consent (PIC) by the recipient state. This could be achieved by including mercury in another of the Annexes to Regulation No 304/2003.

Assuming that there exists proven technology that may be relied upon in the disposal of mercury waste in Europe, and assuming further that a reliable operator could be found which would manage a facility of this kind, project financing of a mercury waste disposal facility would seem to represent a feasible alternative, provided that an adequate revenue flow can be generated and secured.

Apart from certain restrictions that could require special licenses or concessions relating to the handling and treatment of toxic waste and other environmentally dangerous products, laws and regulations relating to the ownership and operation of mercury disposal facilities would not seem to preclude a project financing structure. The regulated movement of goods within the EU under EC waste legislation should not be an obstacle to guaranteeing the necessary transportation of mercury waste from one source within a Member State to a disposal facility in another Member State. Finally, the currency of any revenues generated within the EU would not appear to preclude a project finance structure.

The only matter that seems not to be in place, and the absence of which would preclude a project financing structure of a mercury waste disposal facility, is the possibility of securing an adequate revenue flow over an extended period of time. An export ban on mercury to third countries at the EU level and a ban on recovery therefore seem to constitute conditions *sine qua non* for the realisation of project financing of a mercury disposal facility in Europe.

WORKSHOP ON MERCURY, 29-30 MARCH 2004,
BRUXELLES

Danish phase-down of mercury use

Recently an update of uses and emissions in 2001 was made. A resumé of the data was distributed before the meeting. Data for 1982/83 and 1992/93 are also available.

The Danish legislation on mercury in products is comprised of

- national bans
- national restrictions
- EU legislation

In 1994 a national Order imposed a general ban – with exemptions – on sale of mercury-containing products. The Order has been revised twice. The latest edition is from July 2003.

The bans cover thermometers, measurement equipment, contacts, chemicals, lighting equipment etc. In the late 1990's mercury use in the chlor/alkali industri ceased, and this use was banned in the Order from 2003. Use covered by the bans has diminished from app. 7,700 kg to app. 200 kg.

The restrictions cover mainly dental amalgam. From 2003 mercury is allowed only in dental fillings for adult molar teeth with wear on the filling. Use for this purpose has diminished from app. 3,100 kg to app. 1,200 kg.

The EU legislation covers mainly batteries. Use for this purpose has diminished from app. 4,700 kg to app. 100 kg.

An oversight of the data over the 18-19 year period shows:

- intended use has decreased from app. 16,000 kg to app. 1,600 kg
- unintended use (impurities in coal etc.) has remained stable at app. 2,000 kg
- emissions to water and soil have almost ceased
- emission to air has decreased from app. 5,500 kg to app. 1,400 kg. It remains high, primarily due to incineration of old products
- controlled landfill has stabilized at app. 3,000 kg

It is striking that in 2001 emissions and controlled landfill together (app. 5,000 kg) is higher than use (app. 3,600 kg). The reason is the delay of disposal of old mercury-containing products.

LEGAL OPINION
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IN PARTICULAR WITH REGARD TO MERCURY FROM DECOMMISSIONED CELLS IN
THE CHLOR-ALKALI INDUSTRY

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2 INTRODUCTION AND SCOPE OF THE OPINION

The present legal opinion was commissioned on 28 October 2003 by IVL, the Swedish Environmental Research Institute, in order to assess the possibilities in Community law to ban or to restrict the export of mercury to third countries. The opinion is drawn up in view of the Nordic Council of Ministers' Workshop on Mercury – Needs for Further International Environmental Agreements, to be held in Brussels (Belgium) on 29-30 March 2004.

Under the terms of referral, the opinion shall especially address the possibilities to restrict, as soon as possible and within the existing legal framework of Community law, metallic mercury from decommissioned cells in chlor-alkali plants from reaching the global market.

The present opinion does not address whether and to what extent the Member States may unilaterally regulate the issues in question. Nor does it cover the possibilities to address those issues under public international law, or to what extent Multilateral Environment Agreements, and in particular a general ban on the export of mercury, are consistent with WTO-rules.

The opinion further addresses the conditions for project financing of investments in mercury disposal facilities. The section on project financing has been drawn up in collaboration with advokat Björn Öberg, Advokatfirman Björn Öberg AB, Stockholm, Sweden. Project finance is in this context used to refer to a non-recourse or limited recourse financing structure in which debt and equity are combined for the construction and operation of a particular facility in which lenders base credit appraisals on the project revenues from the operation of the facility, rather than the general assets or the credit of the sponsor of the facility, and rely on the assets of the facility, in particular any revenue-producing contracts and other cash flow generated by the facility, as sole collateral for the debt.

Given the number of local laws, bilateral agreements and regulations that would have to be considered in structuring and implementing a project involving the financing, procurement, construction, ownership, operation and maintenance of a mercury disposal facility, the present opinion is furthermore limited to outlining certain key considerations that would have to be considered wherever a project of this kind is implemented in Europe. For the purpose of this opinion, we have assumed that a mercury disposal facility would primarily service the chlor-

alkali industry. We have not considered any other secondary market such as households or other holders of mercury for disposal.

In drafting the present legal opinion, the author is grateful for valuable information and comments provided by representatives of the EC Commission, the US Environment Protection Agency, the Swedish Environmental Protection Agency, the Swedish National Chemicals Inspectorate, Euro Chlor, Norsk Hydro, Hydro Polymers AB, representatives of the waste recovery, disposal and transport industry, the Natural Resources Defense Council, Greenpeace International, the Mercury Policy Project, the Basel Action Network, Toxic Link and the Ban Mercury Working Group. A study visit was carried out at the chlor alkali plant of Hydro Polymers AB in Stenungsund (Sweden) on 3 February 2004.

Under the terms of the agreement, a draft report was to be completed by 30 January 2004. The draft was presented to IVL on 28 January 2004, and submitted to the stakeholders for comments on 9 February 2004.

The present legal opinion concludes the engagement under the terms of the agreement.

3 EXECUTIVE SUMMARY

3.1 Restrictions under the EC Waste Legislation

In order to assess the possibilities to restrict or ban the export of mercury to third countries, it is first necessary to classify that substance under EC waste legislation. Indeed, if the substance constitutes waste, it is subject to Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community,¹ as amended by Council Regulation (EC) No 120/97 of 20 January 1997² (hereinafter the “Waste Shipment Regulation”).

Annex V, Part 1, List A to the Waste Shipment Regulation enumerate types of waste which are classified as hazardous for the purposes of the Basel Convention and therefore are covered by the export ban. Mercury and mercury compounds are listed under List A, heading *A1 Metal and metal-bearing wastes* under positions A1010 and A1030. In other words, as long as mercury constitutes waste under EC waste legislation, an export ban is already in place under Community law.

In our opinion, there is a strong likelihood that mercury from discarded cells from the chlor-alkali industry falls within the common definition of waste under EC law. Under the case law of the European Court of Justice, the Waste Framework Directive 75/442 is intended to cover all objects and substances discarded by their owners, even if they have a commercial value and are collected on a commercial basis for recycling, reclamation or reuse.

We do not share the Commission’s conclusion, expressed in its Report to the Council concerning Mercury from the Chlor-alkali Industry,³ that “the mercury from the cells of decommissioned chlor-alkali plants cannot automatically be presumed to fall within the waste definition”. In our view, this interpretation lacks support in the case law of the European Court of Justice, ignores the common definition of the concept of waste, which is of direct application in the Member States, and relies too heavily on a subjective definition of waste.

¹ OJ 1993 L 30, p. 1.

² OJ 1997 L 22, p. 14.

³ COM (2002) 489 final.

Arguably, Member States may not only have *authority* under EC waste legislation and the IPPC Directive and its permitting conditions, but are possibly even under a *legal obligation* to clarify the mercury's waste status, restrict the resale, recovery and reuse of the mercury, and direct the mercury from the chlor-alkali plants to a designated disposal facility while the mercury is still in the possession of the plant owner. Since plants must be operating in accordance with the IPPC Directive by October 30, 2007, and are thus subject to the permit requirements, Member states have the authority to impose such restrictions on the fate of the mercury through the Directive after that date. A Member State which defines mercury from decommissioned cells in the chlor-alkali industry as falling outside the scope of the common definition of waste under EC law may well be in breach of its obligations under the EC Treaty.

Moreover, the by-product argument developed by the Court in its recent and rather contentious case law does not alter the fact that if the management of a chlor-alkali plant were to decommission mercury cell as the result of public opinion or is required to do so by a legal decision in accordance with the IPPC Directive, it would be necessary to find that the holder of the mercury is discarding it, or intends to or is required to discard it.

Provided that pure metallic mercury from decommissioned cells in chlor-alkali plants falls within the general definition of waste under the Waste Framework Directive, it should be classified as dangerous waste. Even if that is not the case, the Member States may still classify such substances as dangerous waste.

In the absence of regulatory progress and/or a common understanding among the stakeholders of the necessity to ban or at least to restrict the export of metallic mercury to third countries, national authorities, environmental interest groups and/or the chlor-alkali industries which, *under national law*, are required to dispose of the mercury in an environmentally responsible manner, should consider the option to institute legal proceedings before national courts and/or before the Community Courts. This would clarify whether or not mercury from decommissioned cells in chlor-alkali plants in other Member States falls within the *EC waste definition*.

It is only once this issue has been definitely settled by the Court that it is possible to assess if a ban on the export of mercury to third countries can be achieved through the existing Waste Shipment Regulation, by amending that Regulation or by using a different legal basis.

However, it must be stressed that the classification of mercury from decommissioned chlor-alkali cells as waste does not solve the problem of exports to third countries. Indeed, such mercury may, at a certain given point in time, cease to be waste once it has undergone a recovery operation by a third party. At that point, the export ban under the Waste Shipment Regulation no longer applies.

In order to clarify the legal situation, the EC waste legislation should therefore under all circumstances be supplemented with restrictions on the marketing, use, recovery and export of metallic mercury. If the Community legislator were to consider it necessary to adopt general obligations concerning the controlled disposal of mercury because of the risks it poses for the environment and human health, the correct legal basis for such an act would be Article 175 EC. Such an act would be adopted under the codecision procedure in Article 251 EC. A legislative precedent to this effect is Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT).⁴

A sectorial approach does not seem to be a suitable legal basis for addressing the environmental issues associated with the safe disposal of metallic mercury from decommissioned cells from the chlor-alkali industry. Nevertheless, the upcoming legislative initiatives of the Water Framework Directive, read in conjunction with Article 9 (4) of the IPPC Directive, which states that in all circumstances the conditions of a plant permit shall contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole, may constitute an alternative legal basis for regulating metallic mercury from decommissioned cells in the chlor-alkali industry.

3.2 The legal basis for a general export ban or export restrictions

⁴ OJ 1996 L 243, p. 31.

Since mercury as such does not constitute waste, it is necessary to find another legal basis under EC law in order to restrict or ban the export of mercury to third countries. A ban could be achieved, *inter alia*, by including mercury in Annex I to Council Directive 76/769/EEC of 27 July 1976 on the approximation of laws, regulations, and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations.⁵

By introducing a general ban on the use of mercury within the Community, the holders of that substance would, with all likelihood, also be required to dispose of it under the EC waste legislation. Thereby, the existing export ban under the Waste Shipment Regulation would be applicable.

Another alternative from an environmental perspective would be to include metallic mercury in Annex V to 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.⁶ According to Article 14(2) of Regulation No 304/2003, chemicals and articles the use of which is prohibited in the Community for the protection of human health or the environment, as listed in Annex V, shall not be exported. Precedents to that effect are Polychlorinated biphenyls (PCBs) and Cosmetic soaps containing mercury, which are already listed under Annex V. Since Annex V is not listed under the applicable procedure for modifying the annexes under Article 22 of the Regulation, an amendment to the Regulation under the normal codecision procedure would be required.

A more limited approach would be to restrict the export of mercury to third countries by requiring Prior Informed Consent (PIC) by the recipient state. This could be achieved by including mercury in another of the Annexes to Regulation No 304/2003.

3.3 Project financing of a mercury disposal facility would seem to be feasible alternative

⁵ OJ 1976 L 262, p. 201, as amended by Council Directive 89/677/EEC of 21 December 1989, amending for the eighth time Directive 76/769/EEC, OJ 1989 L 398, p. 19.

⁶ OJ 2003 L 63, p. 1.

Assuming that there exists proven technology that may be relied upon in the disposal of mercury in Europe, and assuming further that a reliable operator could be found which would manage a facility of this kind, project financing of a mercury disposal facility would seem to represent a feasible alternative, provided that an adequate revenue flow can be generated and secured.

Apart from certain restrictions that could require special licenses or concessions relating to the handling and treatment of toxic waste and other environmentally dangerous products, laws and regulations relating to the ownership and operation of mercury disposal facilities would not seem to preclude a project financing structure. The regulated movement of goods within the EU under EC waste legislation should not be an obstacle to guaranteeing the necessary transportation of mercury waste from one source within a Member State to a disposal facility in another Member State. Finally, the currency of any revenues generated within the EU would not appear to preclude a project finance structure.

The only issue that seems to be prevalent, and the absence of which would preclude a project financing structure for a mercury waste treatment facility, is the possibility of securing an adequate revenue flow over an extended period of time. A ban on the export of mercury to third countries at the EU level and a ban on recovery seem, therefore, to be conditions *sine qua non* for the realisation of project financing of a mercury disposal facility in Europe.

4 BACKGROUND

4.1 Legal framework

4.1.1 The IPPC Directive

The chlor-alkali industry produces chlorine and alkali by electrolysis of a salt solution. The main technologies applied for chlor-alkali production are mercury, diaphragm (asbestos) and membrane cell electrolysis. In the mercury-cell process the cathode is liquid mercury. Mercury cells in the European Union currently contain some 10,000–18,000 tonnes of mercury.

Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control⁷ (hereinafter the IPPC Directive) lays down a framework requiring Member States to issue operating permits for certain installations that engage in industrial activities. The purpose of the Directive is to achieve integrated prevention and control of pollution arising from activities listed in Annex I to the Directive (Article 1).

The Directive lays down measures designed to prevent or, where that is not practicable, to reduce emissions in the air, water and land from those activities, including measures concerning waste, in order to achieve a high level of protection of the environment as a whole.

The IPPC Directive applies to new or substantially changed installations, with effect from October 1999 and no later than October 2007 for existing installations. These permits must contain conditions based on Best Available Techniques (BAT) as defined in the Article 2(11) of the Directive, to achieve a high level of protection of the environment as a whole.

Article 9, paragraphs 3 and 4, requires installations to have permit conditions based on Best Available Techniques (BAT). The mercury-cell process is not considered to be the “Best Available Technique” (BAT) for the chlor-alkali sector.⁸ The Best Available Technique specific to mercury cell plants is considered to be conversion to membrane cell technology.

Under the Reference Document on Best Available Techniques in the Chlor-Alkali sector, all possible measures should be taken to protect the environment as a whole during the remaining life of mercury cell plants. The majority of mercury losses are in the various wastes from the process. Measures should be taken to minimise current and future mercury emissions from handling, storage, treatment and disposal of mercury-contaminated wastes. Decommissioning of mercury cells should be carried out in a way that prevents environmental impact during and after the shutdown process as well as safeguarding human health.

⁷ OJ 1996 L 257, p. 26.

⁸ Reference Document on Best Available Techniques in the Chlor-Alkali Manufacturing Industry (October 2000), which was adopted by the Commission in December 2001 (publicly available on the Internet at <http://eippcb.jrc.es>).

The Directive states in Article 5 that existing installations, i.e. installations in operation before 30 October 1999, should operate in accordance with the requirements of the Directive by 30 October 2007.

However, in accordance with Article 9 (4), when determining the permit conditions based on BAT for the individual installation, the competent authority shall take into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions. It is, therefore, the local competent authority that decides on the specific permit conditions.

In other words, there will be a gradual phase-out of the mercury-cell process in the European chlor-alkali industry in the coming years as old plants approach the end of their economic lifetime and/or have their permits updated according to the requirements of the IPPC Directive. The precise timetable for this phase-out will depend on how competent authorities of the Member States, under the supervision of the Commission and under the jurisdiction of the European Court of Justice, interpret and implement the IPPC Directive and whether or not the recommended phase-out of mercury cells is implemented. The total amount of mercury to be decommissioned will be approximately 10,000–18,000 tonnes. Approximately another 2,000 tonnes of mercury are expected to come from the mercury-based chlor-alkali plants in EFTA and the Accession countries.

4.1.2 The Waste Framework Directive

Under Article 3(1) of Council Directive 75/442/EEC of 15 July 1975 on waste,⁹ as amended by Council Directive 91/156/EEC of 18 March 1991¹⁰ (hereinafter the Waste Framework Directive),¹¹ the Member States are to take measures to encourage, first, the prevention or reduction of waste production and its harmfulness and, second, the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials or the use of waste as a source of energy.

⁹ OJ 1975 L 194, p. 39.

¹⁰ OJ 1991 L 78, p. 32.

¹¹ The Waste Framework Directive is currently under consolidation, see the Commission Proposal of 27 November 2003 for a Directive of the European Parliament and of the Council on waste, COM(2003)731 final.

The sixth recital in the preamble to the Waste Framework Directive states that it is desirable to encourage the recycling of waste and the re-use of waste as raw materials and that it may be necessary to adopt specific rules for re-usable waste. To date, no such specific rules have been adopted.

The first paragraph of Article 4 of the Waste Framework Directive requires the Member States to take the necessary measures to ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment and, in particular, without risk to water, air, soil, plants and animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

The second paragraph of Article 4 of Waste Framework Directive supplements that provision with a specific obligation which requires the Member States to take the necessary measures to prohibit the abandonment, dumping or uncontrolled disposal of waste.

According to the case law of the Court, Article 4 of the Waste Framework Directive is intended to implement the precautionary principle and the principle that preventive action should be taken.¹² These principles are enshrined in the second sentence of the first paragraph of Article 174(2) EC. By virtue of those principles, it is for the Community and the Member States to prevent, reduce, and, insofar as possible, eliminate from the outset the sources of pollution or nuisance by adopting measures of a nature such as to eliminate recognised risks.¹³

The first paragraph of Article 4 of Directive 75/442 does not actually specify the measures which must be taken to ensure that waste is disposed of without endangering human health or harming the environment. The Court has held that it is nonetheless true that it is binding on the Member States as to the objective to be achieved, whilst leaving to the Member States a margin of discretion in assessing the need for such measures. Thus, a significant deterioration in the environment over a protracted period without any action being taken by the competent

¹² Joined Cases C-175/98 and C-177/98 *Lirussi and Bizzaro* [1999] ECR I-6881, paragraph 51 and Case C-318/98 *Fornasar and Others* [2000] ECR I-4785, paragraph 37.

¹³ Case C-318/98 *Fornasar and Others*, cited above, paragraph 37.

authorities indicates, in principle, that the Member State concerned is outside the limits of the discretion conferred on it by that provision.¹⁴

4.2 Prior initiatives within the Community institutions

The Convention for the Protection of the Marine Environment of the North-East Atlantic (“OSPAR Convention”) was opened for signature at the Ministerial Meeting of the Oslo and Paris Commissions in Paris on 22 September 1992. The Convention has been signed and ratified by all of the Contracting Parties to the Oslo or Paris Conventions (Belgium, Denmark, the Commission of the European Communities, Finland, France, Germany, Iceland, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland) and by Luxembourg and Switzerland.

The OSPAR Convention entered into force on 25 March 1998. It replaces the Oslo and Paris Conventions; however, Decisions, Recommendations and all other agreements adopted under those Conventions will continue to be applicable, unaltered in their legal nature, unless they are superseded by new measures adopted under the 1992 OSPAR Convention.

The European Community is a contracting party to the OSPAR Convention. OSPAR Decision 90/3 of 14 June 1990 recommends that existing mercury cell chlor-alkali plants should be phased out as soon as practicable, with the objective that they be phased out completely by 2010. The recommendation of mercury cell phase-out in Decision 90/3 was reviewed in 1999-2001 but no changes were made. The Council has not formally approved OSPAR Decision 90/3. According to the Commission, in its Report to the Council concerning Mercury from the Chlor-alkali Industry,¹⁵ the Community therefore has no obligation to act in compliance with it. However, as a signatory to OSPAR the Community is bound under the aims of OSPAR and as such should seek to uphold decision 90/3.

At the Environment Council meeting held on 7 June 2001, the Council called upon the Commission to “clarify the legal situation regarding the conversion of the chlor-alkali industry, identify the possible consequences, for all parties concerned, for the use of mercury

¹⁴ Case C-365/97 *Commission v Italy* [1999] ECR I-7773, paragraph 68 (the “San Rocco” case) and Case C-387/97 *Commission v Greece* [2000] ECR I-5047, paragraph 55.

and report to the Council, preferably by the end of 2001 on the potential need for co-ordinated action in the EU and the accession countries.”

4.2.1 The Commission’s Report to the Council concerning Mercury from the Chlor-alkali Industry

In its Report to the Council concerning Mercury from the Chlor-alkali Industry,¹⁵ the Commission concluded that “the mercury from the cells of decommissioned chlor-alkali plants *cannot automatically be presumed to fall within the waste definition*. Whether the decommissioned mercury is waste can only be concluded on a *case-by-case basis*, depending on whether the plant owner is discarding, intends to discard or *is obliged under national legislation to discard the mercury*” (my emphasis).

It follows from the interpretation of the Commission that the decommissioned mercury is not automatically governed by the EU waste legislation or by the requirements of the Basel Convention. This means, according to the Commission, that the rules under Community waste legislation and the Basel Convention for treatment and trade within and outside the EU are not generally applicable.

In support of this view, the Commission has pointed out that mercury is obtained from decommissioned cells and by treatment of equipment and waste containing mercury. This mercury is pure and of a similar quality to that sold on the open market.

With regard to the definition of waste under the Waste Framework Directive and available case law of the European Court of Justice, the Commission considered that:

“pure mercury siphoned off from disused electrolysis cells for sale on the open market cannot be presumed to be waste. This depends on whether in fact the owner of the decommissioned plant discards, intends to discard or is obliged under national legislation to discard the mercury. This is to be decided case by case according to the individual circumstances.

The requirement under the IPPC Directive 96/61/EC to phase out the mercury-cell process in the Chlor-alkali industry is not considered sufficient to make the

¹⁵ COM(2002) 489 final, p. 9.

¹⁶ COM(2002) 489 final.

general presumption that, in the event of a chlor-alkali plant being decommissioned, the decommissioned mercury will be discarded, is intended to be discarded or that there is an obligation to discard the pure mercury. It can therefore not be concluded or presumed that pure mercury siphoned off from disused electrolysis cells of decommissioned chlor-alkali plants is waste for the purposes of Community waste legislation.

On that basis the decommissioned mercury is not automatically governed by the Community waste legislation or by the requirements of the Basel Convention. This means that there are no special conditions for its treatment, nor any requirements as to its trading within the EU and outside.”

4.2.2 The position of the Council within the United Nations Environmental Programme

In preparing for the 22nd Meeting of the United Nations Environmental Programme (UNEP), the Council recognised, at its meeting on 9 December 2002, that there is sufficient evidence of significant global adverse impacts on human health and/or the environment arising from the release of mercury into the environment. Ideally, in addition to dealing with the problem of mercury from the chlor-alkali industry, a coherent and sustainable strategy should include action in relation to primary production of mercury in Europe.

As an overall EU position regarding the chemical issues at the UNEP’s Governing Council in February 2003, the Council agreed that the conclusions in the Commission’s report on mercury from the chlor-alkali industry, as well as the UNEP Global Assessment of Mercury¹⁷, warrant action specific to mercury and its compounds. It also agreed that Member States should support and actively work for concrete international action to be initiated on mercury and its compounds, for instance a legally binding instrument or other appropriate instruments, and that global assessment of other heavy metals such as lead and cadmium shall commence.

The Council invited the Commission to present in 2004 a coherent strategy containing measures to protect human health and the environment from the release of mercury based on a life-cycle approach, taking into account production, use, waste treatment and emissions.

¹⁷ Global mercury assessment report (UNEP/GC.22/INF/3) and the report of the Global Mercury Assessment Working Group (UNEP/GC.22/INF/2).

At the meeting of the UNEP Governing Council held in Nairobi on 3 – 7 February 2003, the UNEP Governing Council accepted the key findings of the Global Mercury Assessment. It found that there are sufficient global adverse impacts of mercury and its compounds to warrant further international action to reduce the risks to human health and the environment from the release of mercury and its compounds into the environment. The Governing Council decided that national, regional and global action, both immediate and long-term, should be initiated as soon as possible to protect human health and the environment through measures that will reduce or eliminate releases of mercury and its compounds into the environment.¹⁸

It also requested its Executive Director to solicit submissions from the Governments on their views with regard to further measures for addressing the significant global impacts of mercury and its compounds, pending its next meeting. The Executive Director is thereupon requested to compile and present the submissions and a factual analysis of such submissions and a synthesis of views and options submitted, including, for example, on the possibility of developing a legally binding instrument, a non-legally binding instrument or other measures or actions.

4.3 The views of the Chlor-alkali Industry

Each of the Western European Chlor-Alkali Producers which are members of the European chlorine industry association (Euro Chlor) have signed a number of voluntary commitments on mercury cells for the production of chlorine, alkali hydroxides and hydrogen. The Western European chlor-alkali industry has also volunteered to have commitments on the reporting of mercury emissions and on environmentally appropriate disposal of mercury from shut-down cells.

To the extent they are relevant to the present opinion, those voluntary commitments include:

- 1) Not to increase mercury chlor-alkali production capacity, by reiterating a commitment made in 1995 not to install mercury cells for any incremental chlor-alkali production capacity (First Commitment).

¹⁸ UNEP/GC.22/L.7.

- 2) A commitment not to sell or transfer mercury cells after plant shutdown to any third party for re-use (Second Commitment).
- 3) (...)
- 4) (...)
- 5) A commitment to closing or converting their mercury cell chlor-alkali plants to non-mercury processes when the plants reach the end of their economic lives (Fifth Commitment).¹⁹
- 6) The safe disposal of metallic mercury from shutdown cells (Sixth Commitment).

As regards the Sixth Commitment, the member companies of Euro Chlor are determined to use best environmental practices and best available techniques to handle appropriately the transport, storage and disposal of metallic mercury that arises after shutdown of the cells, with the aim of avoiding emissions and spillage into the environment.

Indeed, large quantities of pure mercury (some 12,000 tonnes) will become available as a result of the closure or conversion of the mercury cellrooms. Recognising that the pure mercury from cellrooms is best used in a manner that minimises the need for adding mercury to global circulation by mining and extracting virgin mercury, the member companies of Euro Chlor have therefore agreed:

- i. To source so far as possible their future requirements for mercury for the operation of existing cellrooms from the pure mercury arising from cellroom closures and conversions. The result will be that members' net purchases of virgin mercury from external sources will be minimised, and probably zero.
- ii. To regard as the most-favoured option the return of all pure mercury not required within the industry to an established mercury producer so as to displace new production of the equivalent quantity of virgin mercury. The

¹⁹ According to the Western European Chlor-Alkali producers, the timing of conversion or shutdown of existing chlor-alkali plants using the mercury technology will to a large extent depend on factors such as the environmental performance of the plant and its age, state of its equipment and economic attractiveness of its relevant market and downstream product mix. The mercury cell producers have announced that they could commit to closing or converting their mercury cell chlor-alkali plants to non-mercury processes by the end of the year 2020 at the latest, on condition that there is an agreement between all stakeholders.

feasibility of this most environmentally favoured solution will depend critically on the time-span over which the plants are converted or closed.

As part of the West-European chlor-alkali producers' strategy for a safe disposal of metallic mercury from shutdown cells and in order to address the issue of market disruption, as well as social responsibility, Euro Chlor has signed an agreement with the state-owned *Miñas de Almadén y Arrayanes SA* - MAYASA of Spain, one of the world's most important mercury producers and marketers.

MAYASA is the owner of the only European dedicated mercury mine, located at Almadén in Spain, south west of Madrid. The mine – the largest in the world – is subsidised by “sub-activity subsidies” from the Spanish State to which a commitment to reduce mining activities is attached. In 1999, about 100 persons were directly employed in the mining section of the company.

The agreement stipulates that Miñas de Almadén will accept all surplus mercury from Western European chlorine producers on condition that it displaces, tonne for tonne, mercury that would otherwise have been newly mined (referred to as “prime”) and smelted to satisfy legitimate uses. All Western European members of Euro Chlor have agreed to transfer their surplus mercury to Almadén or, in compliance with principles of free trade and competition, an alternative European mercury producer.

According to Euro Chlor, there is no legal obligation in the IPPC Directive to phase out mercury cells. However, Article 5 does require that Member States shall take the necessary measures by means of plant permits in order that existing installations operate in accordance with the requirements of the IPPC Directive by 30 October 2007.

In accordance with Article 9 (4) of the IPPC Directive, when determining the permit conditions based on BAT for the individual installation, the competent authority shall take into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions. According to Euro Chlor, these emission limits and appropriate technical measures are, in other words, site-specific and take into account technical and economic considerations specific to the plant concerned while ensuring the primary objective of the IPPC Directive, which is a high level of protection of the

environment as a whole. It is therefore the local competent authority that decides on the specific permit conditions.

Euro Chlor concludes that it is up to the Member States to decide, on an individual basis, when existing installations should comply with the IPPC Directive and whether or not the plant owners are obliged under Community law to discard the metallic mercury in question. Thus, Euro Chlor contends that there is no legal obligation under Community law to discard the mercury in question.

However, Euro Chlor and representatives of the chlor-alkali industry seem to concede that both the selling of decommissioned cells (including the mercury contained therein) to a recycler and other recovery of mercury from mercury containing waste constitute recovery operations under EC waste legislation. It is also uncontested that the cell itself becomes waste as soon as it is emptied of mercury, and would have to be considered hazardous waste if were to remain contaminated with some mercury.

However, *as far as concerns mercury that is removed from the cells in the chlor alkali plant and sold*, Euro Chlor disputes the fact that this operation constitutes a recovery operation or that the mercury in question constitutes waste under EC waste legislation, for the following reasons:

- There is neither an intention to discard, nor a discarding activity, nor a requirement to discard the mercury in question.
- The mercury is 99.9% pure mercury and is thus able to replace virgin mercury without any further treatment. Draining mercury from the cells to flasks cannot be considered as treating this mercury.
- Mercury is a raw material and not commonly regarded as waste. In no way it can be considered a by-product of the chlor-alkali process. In fact, mercury from chlor-alkali cells has been placed on the market for at least the last 20 years and was never in the past considered as a waste management operation.
- The mercury removed from the decommissioned cells may be treated as normal mercury. No special environmental precautions must be taken for further processing. Thus, the draining from the cell into the flasks is not a recovery operation because the holder only decommissions the cell once it is emptied of the mercury. The drained

mercury is 99.9% pure and of the same quality as the mercury sold on the open market.

- The chlor-alkali plants are also not required to discard the mercury. A requirement to discard exists, for example, for products the expiration date of which has expired, or for products the use of which has been prohibited. This is not the case with mercury. The fact that mercury cell technology may at some point in time be phased out under the IPPC Directive does not mean that plain mercury will no longer be used for other purposes within the EU. Whilst mercury certainly falls into the catch-all category of Q 16 of Annex I to the Waste Framework Directive, it does not appear to be covered by the scope of the other Q categories.

Nevertheless, according to representatives of the European chlor-alkali industry, alternative options to the Almadén agreement, such as long-term temporary storage of metallic mercury, are currently under consideration. Representatives of Euro Chlor and of the chlor-alkali industry have also expressed an open mind as to including mercury under the Rotterdam Convention and require Prior Informed Consent for the export of metallic mercury to third countries, thereby securing control of mercury flows and encouraging responsible use of the substance.

4.4 The Views of Environmental Interest Groups and Other Stakeholders

Participants in the Third Annual General Meeting and Learning Event of Communities and Small-Scale Mining (CASM) in Elmina, Ghana, September 7-14, 2003, which was hosted by the Minerals Commission of Ghana, have expressed concern regarding the quantities of mercury which may be available on the market in the near future. In a petition to the EU Environment Commissioner, Margot Wallström, they point out that the extensive use of mercury by small-scale gold miners using the amalgamation technique causes damage to both human health and the environment. Small-scale miners cause the emission of an estimated 500 – 700 tonnes of mercury annually, of which at least 10% is emitted in Africa, a region poorly recognized regarding mercury usage in small-scale mining. Globally, 10 – 15 million small-scale miners are using mercury for extraction of gold. This extensive use of mercury with associated emissions should cease in the future. There are an increasing number of alternative, mercury-free methods on the market and environmental education and the use of retorts can immediately reduce the scale of mercury emissions caused by small-scale miners.

The amount of mercury presently available on the global market is larger than can be justified from an environmental perspective. The petitioners therefore asked the Commissioner not to exacerbate the situation regarding mercury usage in gold mining and in some soap by unrestricted sales of excess mercury from European stocks. According to the petitioners, the European Chlor-alkali industry's agreement with Miñas de Almadén to transfer excess mercury for reselling on the world market entails that Miñas de Almadén is buying this mercury at 70% below the world market price. The arrangement between the European Chlor-alkali industry and Miñas de Almadén may take away any incentives for reductions in mercury use by small-scale miners.

According to representatives and lawyers of the above-mentioned environmental interest groups, mercury from chlor-alkali plants under closure or conversion meets the definition of waste within Waste Framework Directive on four separate grounds.

- First, the definition of “waste” under the Waste Framework Directive is triggered in part by what the holder “is required to discard”. The IPPC Directive requires this closure or conversion because mercury cell technology is not considered BAT and is thereby factually and legally obsolete. The fact that a plant owner may choose to close or convert at a convenient time within the legally allowed transition does not negate the overriding legal context in which these plants currently operate, particularly since the definition of waste is not principally based upon the subjective intent of the plant owner. Even though the IPPC Directive may provide some flexibility regarding the timing of plant closure/conversion, it provides no flexibility as to the eventual result and it is that result which triggers the legal obligation to discard the mercury.
- Second, the mercury is also a waste under the remainder of the “waste” definition in the Waste Framework Directive since the chlor-alkali plant owner is discarding or intends to discard the mercury. Because the essential objective of the Directive is to protect human health and the environment, achieve a high level of protection, and operate based upon the precautionary principle, the terms “waste” and “discard” must be interpreted broadly. Indeed, a “waste” determination principally involves looking at all the circumstances and reaching a conclusion that does not undermine the efficacy of the Waste Framework Directive.

Based upon applicable case law, there are four key considerations leading inevitably to the conclusion that the chlor-alkali mercury is intended for discard and thereby constitutes waste under the Waste Framework Directive.

- a) The mercury itself is not the end product of the manufacturing process but, instead, is only sought for subsequent use because the factory is closing or converting its method of production. Accordingly, this mercury cannot even be considered a by-product since it is not the result of a manufacturing process but a consequence of the discontinuation thereof.
- b) The foreseeable uses of the mercury will contribute to the very kind of regional and global mercury impacts the IPPC and EC waste legislation are intended to prevent. Indeed, the special precautions EU Member States have taken with regard to the use of mercury (e.g. restrictions on use in products, the phasing out of mercury cell chlor-alkali plants) demonstrate the environmentally hazardous nature of the mercury, the special precautions required, and the risks posed by transporting it to the developing world.
- c) It can hardly be argued that the mercury is integral to a production process in the developing world given the ambiguity regarding the fate or reuse of any particular shipment of mercury, the availability of alternatives to mercury in most cases, and the fact that at least some of the foreseeable uses would violate EU and local law.
- d) The mercury drained from the cells may include impurities that differ from virgin mercury, which can render the mercury unsuitable for some uses and/or necessitate further processing. These impurities can include dioxin, and dissolved metals and their compounds.²⁰ If the mercury material is contaminated with dioxins or furans, which is not beyond the realm of possibility, then it is a hazardous waste by virtue of its contamination. The point has also been raised that mercury from chlor-alkali cells may contain

some sodium hydroxide (NaOH), which would actually increase its suitability for use in small-scale gold mining using the amalgamation method.²¹

- Third, if not regulated the mercury from these plants is likely to be transported to the developing world for uses that will certainly exacerbate both the European and global mercury problem. Four major demands for this mercury will be for:
 - a) producing batteries, perhaps even for EU consumption, that do not meet EU mercury content standards and may also violate regulations in the country of manufacture;
 - b) filling mercury cells at chlor-alkali plants in places such as India, where mercury consumption by this sector is at least 50 times higher than average European consumption;
 - c) gold extraction; and
 - d) miscellaneous uncontrolled and unmonitored applications.

Accordingly, the mercury must be considered a waste in order to achieve effective implementation of the IPPC Directive.

- Fourth, the used mercury is a waste under the Organization for Economic Cooperation and Development (OECD) and Basel Convention agreements since the mercury is destined to be disposed or recycled. Parties to these conventions are bound by their terms, such as Article 4 of the Basel Convention which obligates the parties to ensure that transboundary movement of hazardous and other wastes “is reduced to the minimum consistent with the environmentally sound and efficient management of

²⁰ See BAT Reference Document for the Chlor-alkali Sector at 96, noting the potential for dioxin creation if graphic anodes have been used.

²¹ Indeed, the use of mercury in small-scale gold mining is popular in small-scale mining areas since the amalgamation method is simple to apply and requires relatively low investment. This method can be described as follows. Small-scale gold miners in developing countries generally use the amalgamation method and mix mercury into the crushed rock or soil containing gold. Soil and refuse are washed away by water, leaving both contaminated with mercury. Excess mercury is separated from the amalgam by squeezing it through a piece of cloth. The gold is then purified from the mercury by heating it, normally using an acetylene burner in the goldfield. The mercury evaporates into the air and is subsequently deposited on land and in surface waters; it accumulates in fish and poisons humans who eat fish which have a high mercury content (Hylander L. D. 2001. Global mercury pollution and its expected decrease after a mercury trade ban. *Water, Air Soil Poll.* 125 (1/4):336).

such wastes, and is conducted in a manner which will protect human health and the environment against the adverse effects which may result from such movement.”

While the Waste Framework Directive generally encourages the recovery of waste and has been interpreted accordingly, Article 3 of the Directive carefully limits this encouragement to “appropriate” measures. Since the reuse of chlor-alkali mercury is not an environmentally desirable result when compared to storage and/or permanent disposal, this aspect of the Directive and the related case law is inapplicable.

While the ECJ has consistently stated that a waste determination must be conducted in light of all the circumstances and their relationship to the aim of the Directive, it does not follow that this “waste” determination should be made on a case-by-case basis. To the contrary, the determination involving the chlor-alkali mercury can and should be made generically given the purposes of the IPPC and Waste Directives, the scope of the Euro Chlor agreement, and the nature of the global problem. Moreover, inconsistent decisions could lead to trade disputes and advantages to certain companies or countries.

Doubts have also been expressed as to whether Miñas de Almadén is operating under normal market conditions or whether that company is only profitable due to state aid and EU subsidies. The amount of state aid and/or EU subsidies granted to Miñas de Almadén is also disputed. It has been submitted that between 1985 and 1997, the mercury mining company received subsidies amounting to US\$ 150.8 millions, of which US\$ 59.7 millions were used to support the loss-making mining and production of, mainly, mercury, thereby adversely affecting the commercial nature of mercury.²² According to publicly available information, the mining division has incurred losses for several years.²³ Production was 673 tonnes of mercury in 1998 and 433 tonnes in 1999. About 85% of the production is exported, primarily to China, the Philippines, Brazil and other developing countries. Emissions into the air is

²² Hylander and Meili, 2004, *The Rise and Fall of Mercury: Converting a Resource to Refuse After 500 Years of Mining and Pollution*, *Crit. Rev. Environ. Sci. Technol.* (Accepted), quoting Gironés, E. O. and Viejobueno, C. D., *Spain's Almadén mine: 2,000 years of solitude*, in: *Large Mines and the Community*, Chapter 5, McMahon, G. and Remy, F., Eds., World Bank, Washington, DC. / International Development Research Centre, Canada, 2001; Maxwell Espinosa, *Shareholders Directory*, 8:th ed., S. P. A., Madrid, Spain, 1995, 596.

²³ Hylander (2001), p. 331-344.

estimated at around one kilogram of mercury per hour during the production of mercury in Almadén.

4.5 A Comparative Outlook – The US Experience

4.5.1 The strategic stockpile

The U.S. Government holds more than 5,000 tonnes of mercury. In the early 1990s, a decision was taken to sell the US Department of Defense's "strategic" stockpile of virgin mercury. The US EPA subsequently convinced the Department of Defense to delay further sales until some sort of control system could be worked out to prevent eventual uses that could not be adequately controlled. Therefore, the interim policy of the US has been to store federal holdings of mercury on environmental grounds. This stock has been kept in storage since 1994, but no long-term solution has yet been found.

The US EPA is a consulting agency to the Department of Defense's (DoD) Defense Logistics Agency (DLA) in preparing the DLA's Environmental Impact Statement (EIS) on how it should manage its 4,408 metric tonne stockpile of mercury which is in excess of national defense needs. The draft EIS was published in April 2003. The long-term alternatives that DoD is considering include resuming sales of the mercury, continuing to store and maintain its stockpile, and establishing a consolidated national mercury repository for all excess elemental mercury from the DLA.

Initially, the DLA considered evaluating a treatment and storage alternative that would have involved processing the mercury to a stabilized form before storing it. This option was ruled out for three reasons. First, mercury can be stored in its elemental form and has been safely stored for more than fifty years. Second, if beneficial uses were identified in the future, the elemental form would be the desired starting point. Finally, treatment technologies currently under development are not ready for full-scale application.

4.5.2 Mercury from decommissioned cells in the chlor-alkali industry

Under US federal law, the issue whether mercury from decommissioned cells can be classified as waste has been examined by the US Environmental Protection Agency (EPA) in

a regulatory interpretation regarding mercury from the HoltraChem Manufacturing Company facility in Orrington, Maine.

In that case, approximately 84 tonnes of free-flowing elemental mercury was being stored in Orrington, Maine. The mercury was previously used in mercury cells at the HoltraChem chlor-alkali facility in the manufacture of chlorine. For economic reasons, the HoltraChem Manufacturing Company ceased operations at the Orrington facility in September 2000 and the mercury was stored on site since that time.

The mercury was offered for sale to Mercury Waste Solutions, Inc. (“MWS”). MWS is in the business of commercial resale of mercury. Pursuant to Agreements planned to be signed by MWS and the Natural Resources Council of Maine (“NRCM”), the mercury would temporarily be stored for at least four years at MWS’s facility in Union Grove, Wisconsin, rather than being immediately resold as a product. MWS had reserved the right to sell the mercury commercially at the end of an initial four-year storage period, if MWS determined that it might be adversely impacted by major changes in cost structure or regulations by continuing to store the mercury. In any event, in the absence of any change in law, regulations and/or policy, MWS has the right, and intends, to sell the mercury commercially by no later than the end of the eight-year storage period.

The Maine Department of Environmental Protection determined that the HoltraChem mercury was a hazardous waste under Maine State law. The State acted pursuant to its authority under US federal law to impose requirements which go beyond the minimum federal hazardous waste requirements. However, Maine’s interpretation does not set a precedent for interpreting the federal regulations.

According to the regulatory interpretation by the US EPA (see Annex I), HoltraChem mercury is a secondary “material” which is potentially subject to regulation under the US Resource Conservation and Recovery Act (RCRA), since the mercury was used in an industrial process. However, so long as it is recycled back into commerce or stored in order to be recycled back into commerce, the mercury (even if a secondary material) will remain classified under the federal regulations as a non-regulated product. So long as the mercury retains its product status, it will not be subject to any RCRA regulatory requirements under the federal regulations.

However, the US EPA's interpretation of "waste" must be put into context. It would seem that the interpretation was rendered in order to allow the mercury to be stored in lieu of placing it in commerce. Under federal hazardous waste law, waste cannot be stored indefinitely but, instead, must be treated and disposed. Accordingly, a non-waste determination was needed to enable the party in question to store the mercury for at least four years and thereby allow for the development of a mercury stewardship program in the US. According to representatives and lawyers of the above-mentioned environmental interest groups, the lesson to be learned from US law is not the determination regarding the definition of waste but, rather, the policy of encouraging the storage of excess mercury through the non-waste interpretation.

Moreover, when comparing US federal law and Community law, one should bear in mind several factors, some of which distinguish the two legal systems and some of which bring them together. First, there is no requirement under US law that chlor-alkali facilities phase out the use of mercury. Second, the EC waste definition, which to some extent seems comparable to the definition under Maine State law, is broader than the federal definition under the US Resource Conservation and Recovery Act. Third, according to sources within the US administration, there is no U.S. effort to limit or regulate shipments of pure mercury to foreign countries for use as is in foreign industries. Fourth, while legislation has been proposed, there is no U.S. law to remove mercury from commerce and stockpile or treat it.

Finally, it can also be noted that the Natural Resources Defense Council and Sierra Club filed a complaint in February 2004 in the U.S. District Court of Appeals for the District of Columbia. The complaint alleges the Environmental Protection Agency has neglected as much as 65 tonnes of mercury that escaped from nine factories in 2000 and remains unaccounted for, and failed to set clear limits on other mercury emissions. The NRDC is asking the EPA to reconsider its rules or adopt new standards that bar use of mercury for chlorine production. The NRDC alleges that the "EPA has the authority to require mercury cell plants to convert to nonmercury technology, but instead of requiring facilities to match the performance of the least-polluting sources in the industry, as the Clean Air Act envisions, it has arbitrarily based its . . . decisions on what the worst performers – those plants still using an antiquated mercury-based process – are doing."

5 LEGAL CLASSIFICATION OF MERCURY FROM DECOMMISSIONED CELLS IN THE CHLOR-ALKALI INDUSTRY UNDER THE EC WASTE LEGISLATION

In practice, when decommissioning cells from the chlor-alkali industry, this is done by draining mercury from the cell into flasks rather than feeding it back into the cycle (cell). Under normal circumstances, liquid amalgam flows from the electrolytic cell to a separate reactor, called the decomposer or denuder, where it reacts with water in the presence of a graphite catalyst to form sodium hydroxide and hydrogen gas. The sodium-free mercury (99.9% pure) is pumped back into the electrolyzers and reused. This is a continuous process.

For the mercury to be taken out of the cells, circulation is stopped and the pure mercury is drained into flasks from the denuder instead of being recirculated to the cell. According to the Chlor-alkali industry, the drained mercury is 99.9 % pure, can be sold, and is thereby able to replace virgin mercury without further treatment.

5.1 Mercury from decommissioned cells in chlor-alkali plants cannot be presumed to fall outside the EC definition of waste

We do not share the Commission's opinion that "the mercury from the cells of decommissioned chlor-alkali plants cannot automatically be presumed to fall within the waste definition. Whether the decommissioned mercury is waste can only be concluded on a case-by-case basis, depending on whether the plant owner is discarding, intends to discard or is obliged under national legislation to discard the mercury". On the contrary, in our view mercury from decommissioned cells in chlor-alkali plants cannot be presumed to fall outside the EC definition of waste. The reasons for this assessment are set out below.

5.1.1 The common definition of waste in EC law does not exclude substances which are capable of economic reutilisation

The first subparagraph of Article 1(a) of the Waste Framework Directive defines waste as "any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard".

Under the categories of waste set out in Annex I of the Directive, head Q1 refers to “Production or consumption residues not otherwise specified below”; Q3 refers to “Products whose date for appropriate use has expired”; Q13 refers to “Any materials, substances or products whose use has been banned by law”; and Q16 includes “Any materials, substances or products which are not contained in the above categories”.

As a preliminary remark, the Court concluded in *Tombesi*²⁴ that, in order to ensure that the national systems for supervision and control of shipments of waste conform with minimum criteria, Article 2(a) in Title I of the Waste Shipment Regulation, referring to Article 1(a) of the Waste Framework Directive, laid down a *common definition of the concept of waste which is of direct application*, even to shipments within any Member State.²⁵ Moreover, as regards the Hazardous Waste Directive,²⁶ it must be borne in mind that the fifth recital of the preamble to that Directive states that, in order to improve the effectiveness of the management of hazardous waste in the Community, it is necessary to use a precise and uniform definition of hazardous waste based on experience.

According to the consistent case law of the Court, the concept of waste does not exclude substances and objects which are capable of economic reutilisation.²⁷ In other words, the EC definition of waste is, in principle, oblivious to the fact that mercury siphoned off from disused electrolysis cells is pure, of a similar quality to that sold on the open market, and that the holder of that substance may very well intend to sell the substance on that market rather than to dispose of it as waste.

In *Tombesi*,²⁸ the Court rejected the argument, put forward by the UK Government, that a substance is to be regarded as waste if it leaves the normal commercial cycle or the normal chain of utility and is consigned to a specialized recovery operation such as those in Annex IIB, a matter which must be decided on a case-by-case basis.²⁹ The Court held that the system

²⁴ Joined Cases C-304/94, C-330/94, C-342/94 and C-224/95 *Tombesi and Others* [1997] ECR I-3561.

²⁵ Joined Cases C-304/94, C-330/94, C-342/94 and C-224/95 *Tombesi and Others*, cited above, paragraph 46.

²⁶ Council Directive 91/689/EEC of 12 December 1991 on hazardous waste, (OJ 1991 L 377, p. 20) as amended by Council Directive 94/31/EC of 27 June 1994 amending Directive 91/689/EEC on hazardous waste (OJ 1994 L 168, p. 28).

²⁷ Joined Cases C-206/88 and C-207/88 *Vessoso and Zanetti* [1990] ECR I-1461, paragraph 9.

²⁸ Joined Cases C-304/94, C-330/94, C-342/94 and C-224/95 *Tombesi and Others*, cited above.

²⁹ This view was shared by Advocate General Jacobs, who opined that the approach of distinguishing between goods belonging to the normal commercial cycle and waste by examining whether an object or substance is consigned to a recovery operation is entirely in keeping with the Directive, see paragraph 56 of the opinion.

of supervision and control established by the Waste Framework Directive is intended to cover all objects and substances discarded by their owners, even if they have a commercial value and are collected on a commercial basis for recycling, reclamation or reuse.³⁰

5.1.2 The decommissioning of cells from the Chlor-alkali industry constitutes a recovery operation

The Court has observed that neither the Waste Shipment Regulation nor the Waste Framework Directive contains a general definition of disposal or recovery of waste, but merely refers to Annexes II A and II B to the Directive, in which various operations falling within the scope of those concepts are listed.

As is stated in the introductory note to Annexes II A and II B to the Directive, each of those annexes is intended to list disposal or recovery operations as they occur in practice. Moreover, it is clear from the wording of the operations in those Annexes that some of them are described in very general terms and in fact covers categories of operations, with examples of operations sometimes being provided to illustrate the relevant category of operation.

The Court has concluded that the intention of Annexes II A and II B to the Directive is to list the most common disposal and recovery operations and not to specify precisely and exhaustively all the disposal and recovery operations covered by the Directive.³¹

For the purpose of applying the Waste Framework Directive and the Waste Shipment Regulation, it must be possible to classify any waste treatment operation as either disposal or recovery, and a single operation may not be classified simultaneously as both a disposal and a recovery operation.³²

Nevertheless, while a single operation must be given a single classification in the light of the distinction between a recovery operation and a disposal operation, a waste treatment process can in practice include several successive stages of recovery or disposal. It follows from the Waste Framework Directive and the Waste Shipment Regulation that, in such a case, the

³⁰ Joined Cases C-304/94, C-330/94, C-342/94 and C-224/95 *Tombesi and Others*, cited above, paragraph 52.

³¹ Case C-6/00 *ASA* [2002] ECR I-1961, paragraphs 58-60.

³² Case C-6/00 *ASA*, cited above, paragraph 63.

treatment process as a whole is not to be assessed as a single operation, but each phase must be classified separately for the purpose of implementing the Regulation when it constitutes a distinct operation in itself.³³

As is clear from the sixth indent of Article 6(5) and the fifth indent of Article 7(4)(a) of the Waste Shipment Regulation, an operation classified as waste recovery may be followed by a disposal operation of the non-recoverable fraction of that waste. In such a case, the classification of the first operation as a recovery operation is not affected by the fact that it is followed by an operation to dispose of the residual waste.

The Court has underlined that it follows from Article 3(1)(b) and the fourth recital of the Waste Framework Directive that the essential characteristic of a waste recovery operation is that *its principal objective is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources*.³⁴

Annex II B of the Waste Framework Directive lists among the operations which may lead to recovery, under point R3, “Recycling/reclamation of metals and metal compounds”.

In this respect, there is little doubt that the draining of mercury from the cell into flasks rather than feeding it back into the cycle may constitute a waste recovery operation under the Waste Framework Directive. The fact that the holder of the cell claims only to decommission the cell once it is emptied of the mercury does not alter that legal classification.

According to the case law of the Court, even where waste has undergone a complete recovery operation as a consequence of which the substance in question has acquired the same properties and characteristics as a raw material, that substance may nonetheless be regarded as waste if, in accordance with the definition in Article 1(a) of the Waste Framework Directive, its holder discards it or intends or is required to discard it. The fact that the substance is the result of a complete recovery operation for the purposes of Annex IIB to the Directive is only one of the factors to be taken into consideration for the purpose of determining whether the

³³ Case C-116/01 *SITA EcoService Nederland* ECR [2003] I-0000, paragraph 41-43.

³⁴ Case C-6/00 *ASA*, cited above, paragraph 69.

substance constitutes waste and does not as such permit a definitive conclusion to be drawn in that regard.³⁵

In accordance with Article 4 of the Waste Framework Directive, such waste must be recovered without endangering human health and without the use of processes or methods likely to harm the environment. According to Article 10 of the Directive, any establishment or undertaking which carries out a waste recovery operation through the recycling or reclaiming of metals and metal compounds must obtain a permit.

On the other hand, according to the case law of the Court, the application of an operation listed in Annex II A or II B to the Waste Framework Directive does not, of itself, justify the classification of that substance as waste.³⁶ In other words, the fact that draining mercury from a cell into flasks rather than feeding it back into the cycle corresponds to the definition of a recovery operation under the Waste Framework Directive does not, in itself, entail that such mercury is considered as waste, although such a fact may constitute evidence to that effect.

Whether metallic mercury from decommissioned cells is in fact waste within the meaning of the Directive must, therefore, be determined in light of all the circumstances, regard being had to the aim of the Waste Framework Directive and the need to ensure that its effectiveness is not undermined.³⁷ Contrary to the assumption of the Commission, this does not imply that such an assessment can only be made on a case-by-case basis.

5.1.3 The broad definition of waste is not a predominantly subjective one

In *Inter-Environnement Wallonie*,³⁸ the Court stated that it follows from the wording of Article 1(a) of the Waste Framework Directive, that the scope of the term “waste” turns on the meaning of the term “discard”.

It is clear from the chlor-alkali industry’s second voluntary commitment not to sell or transfer mercury cells after plant shutdown to any third party for re-use, that the holders of those cells

³⁵ Joined Cases C-418/97 and C-419/97 *ARCO Chemie Nederland and Others*, paragraphs 94-95.

³⁶ Case C-9/00 *Palin Granit* [2002] ECR I-3533, paragraph 27.

³⁷ Joined Cases C-418/97 and C-419/97 *ARCO Chemie Nederland and Others*, cited above, paragraph 73.

³⁸ Case C-129/96 *Inter-Environnement Wallonie* [1997] ECR I-7411, paragraph 26

intend to discard those cells at their end-of-life or, at latest, when they will be required to do so under the IPPC Directive.

The question at issue is whether a holder of the mercury contained in those cells “discards or intends or is required to discard” that substance under Article 1(a) of the Waste Framework Directive, since holders have entered into a contractual agreement with Minas de Almadén, which will buy the surplus mercury from the West-European chlor-alkali plants and put it on the market in lieu of new production.

As the Court recently pointed out, Directive 75/442 does not provide any decisive criteria for determining the *intention of the holder* to discard a given substance or object. Nevertheless, the Court, which has been asked on a number of occasions for preliminary rulings on whether various substances are to be regarded as waste, has provided a number of indicators from which it may be possible to infer the holder's intention.³⁹

In *Vessoso and Zanetti*,⁴⁰ the question arose whether the concept of waste, within the meaning of Article 1 of Council Directives 75/442 and 78/319, as they were worded at that time, presumed that a holder disposing of a substance or an object intends to exclude all economic reutilization of the substance or object by others. In his opinion in that case, Advocate General Jacobs concluded:

“Neither definition contains any suggestion that the intention of the holder is relevant. For them to do so would, in my view, be inconsistent with the purpose of the directives, for the question whether a substance or object poses a threat to human health or the environment is an objective, not a subjective, one. It has nothing to do with the intention of the person disposing of the substance. Nor is the possibility of such a threat affected by whether or not the product can be recycled or reused. (...)”

Accordingly in my view a substance or object may constitute waste within the meaning of the directives even if it is capable of being reused and regardless of the holder's intention or purpose in disposing of it.⁴¹

In line with the Advocate General, the Court held:

³⁹ Case C-9/00 *Palin Granit*, cited above, paragraph 25.

⁴⁰ Joined Cases C-206/88 and C-207/88 *Vessoso and Zanetti*, cited above.

“Article 1 of each of those directives refers generally to any substance or object of which the holder disposes, and draws no distinction according to the intentions of the holder disposing thereof. Moreover, those provisions specify that waste also includes substances or objects which the holder “is required to dispose of pursuant to the provisions of national law in force“. A holder may be required by a provision of national law to dispose of something without necessarily intending to exclude all economic reutilization thereof by others.

The essential aim of Directives 75/442 and 78/319, set out in their preambles in the third and fourth recitals respectively, namely the protection of human health and the safeguarding of the environment, would be jeopardized if the application of those directives were dependent on whether or not the holder intended to exclude all economic reutilization by others of the substances or objects of which he disposes.

The answer to the second part of the question must therefore be that the concept of waste, within the meaning of Article 1 of Council Directive 75/442 and Article 1 of Council Directive 78/319, does not presume that the holder disposing of a substance or an object intends to exclude all economic reutilization of the substance or object by others.”⁴²

The Court has also held that the concept of waste cannot be interpreted restrictively.⁴³ Indeed, the term “discard” must be interpreted in light of the aim of the Directive. In that regard, the third recital in the preamble to Directive 75/442 states that the essential objective of all provisions relating to waste disposal must be the protection of human health and the environment against harmful effects caused by the collection, transport, treatment, storage and tipping of waste. Moreover, pursuant to Article 174(2) EC, Community policy on the environment is to aim at a high level of protection and is to be based, in particular, on the precautionary principle and the principle that preventive action should be taken.⁴⁴

In our opinion, even if one were to adopt a subjective definition of waste under EC law, the mere fact that there is a financial advantage to the holders of metallic mercury from decommissioned cells in selling the product in question on the open market, thus relieving themselves of the responsibility incumbent upon them under the polluter-pays principle, is not sufficient to exclude that substance from the waste definition. Indeed, faced with a regulatory risk at the national, EU and/or international level and the prospect of having to bear the costs of the safe disposal of metallic mercury under the polluter-pays principle, it is likely that the

⁴¹ Paragraphs 22 and 23 of the opinion.

⁴² Joined Cases C-206/88 and C-207/88 *Vessoso and Zanetti*, cited above, paragraphs 11-13.

⁴³ Joined Cases C-418/97 and C-419/97 *ARCO Chemie Nederland and Others*, cited above, paragraphs 36 to 40.

⁴⁴ See, *inter alia*, Case C-9/00 *Palin Granit*, cited above, paragraph 23.

chlor-alkali industry will try to discard the substance even before it is legally obliged to do so. Even if metallic mercury from decommissioned cells at present has a certain market value, it is likely over time that it will become an economic liability for the holder of that substance. Since the chlor-alkali industry has no further use of metallic mercury once it decommissions its cells, the holder of such metallic mercury “discards or intends to discard” it even when it sells it on the open market or to the Spanish mercury trading company, MAYASA.

5.1.4 Substances forming part of an industrial process may in certain cases constitute by-products

In *Inter-Environnement Wallonie*, the Court clarified that substances forming part of an industrial process may constitute waste within the meaning of Article 1(a) of the Waste Framework Directive. That conclusion did not undermine the distinction which must be drawn, as the Belgian, German, Netherlands and United Kingdom Governments had correctly submitted to the Court, between *waste recovery* within the meaning of Waste Framework Directive, and *normal industrial treatment of products* which are not waste, no matter how difficult that distinction may be. A substance is therefore not excluded from the definition of waste in Article 1(a) of the Waste Framework Directive by the mere fact that it directly or indirectly forms an integral part of an industrial production process.⁴⁵

However, under its recent case law, the Court has made an attempt to clarify the distinction between *waste* and *normal industrial treatment of products*, by distinguishing between *residues*, which are subject to the EC waste definition, and *by-products*, which fall outside of the scope of that definition.

In the *Palin Granit case*,⁴⁶ the Court held that, according to its ordinary meaning, waste is that which falls away when one processes a material or an object and which does not constitute the end product which the manufacturing process directly seeks to produce. Goods, materials or raw materials resulting from a manufacturing or extraction process, the primary aim of which is not the production of that item, may be regarded not as a residue but as a by-product which the undertaking does not wish to discard, within the meaning of the first paragraph of Article

⁴⁵ Case C-129/96 *Inter-Environnement Wallonie*, cited above, paragraphs 32-34.

⁴⁶ Case C-9/00 *Palin Granit*, cited above.

1(a) of the Waste Framework Directive, but intends to exploit or market on terms which are advantageous to it, in a subsequent process, without any further processing prior to reuse.

According to the Court, such an interpretation would not be incompatible with the aims of the Waste Framework Directive. There is no reason to hold that the provisions of the Waste Framework Directive, which are intended to regulate the disposal or recovery of waste, apply to goods, materials or raw materials which have an economic value as products regardless of any form of processing and which, as such, are subject to the legislation applicable to those products.⁴⁷

However, having regard to the obligation to interpret the concept of waste widely in order to limit its inherent risks and pollution, the reasoning applicable to by-products should, in the view of the Court, be confined to situations in which the reuse of the goods, materials or raw materials is not a mere possibility but a certainty, without any further processing prior to reuse, and as an integral part of the production process.⁴⁸

It therefore appears that, in addition to the criterion of whether a substance constitutes a production residue, a second relevant criterion for determining whether or not that substance is waste for the purposes of Directive 75/442 is the *degree of likelihood that that substance will be reused, without any further processing prior to its reuse*. If, in addition to the mere possibility of reusing the substance, there is also a financial advantage to the holder in so doing, the likelihood of reuse is high. In such circumstances, the substance in question must no longer be regarded as a burden which its holder seeks to discard, but as a genuine product.⁴⁹

The Court refined its analysis further in the *AvestaPolarit-case*,⁵⁰ drawing a distinction between *residues which are used without first being processed in the production process*, on the one hand, and *other residues*, on the other. The former are being used in that case as a material in the industrial process proper and cannot be regarded as substances which the holder discards or intends to discard since, on the contrary, he needs them for his principal

⁴⁷ Case C-9/00 *Palin Granit*, cited above, paragraph 35.

⁴⁸ Case C-9/00 *Palin Granit*, cited above, paragraph 36.

⁴⁹ Case C-9/00 *Palin Granit*, paragraph 37.

⁵⁰ Case C-114/01 *AvestaPolarit* [2003] ECR I-0000.

activity. Only if such use of those residues were prohibited, in particular for reasons of safety or protection of the environment, would it have to be considered that the holder is obliged to discard those residues and that they constitute waste. As regards the residues whose use is not necessary in the production process, they must in any event be regarded in their entirety as waste.⁵¹

The acceptance of the by-product theory – which has been fully embraced by the sixth and third chambers of the European Court of Justice, presumably on the initiative of the rapporteur in those cases, Judge Jean-Pierre Puissechot – has far reaching consequences. In the *Saetti and Fredani-case*⁵² the Court surprisingly held that petroleum coke, which is produced intentionally or in the course of producing other petroleum fuels in an oil refinery, and is certain to be used as fuel to meet the energy needs of the refinery and those of other industries, does not constitute waste within the meaning of the Waste Framework Directive.

In support of its finding, the Court took into account the information set out in the BAT reference document (BREF) in the field of oil and gas refining, published by the Commission in accordance with Article 16(2) of the IPPC Directive. The BREF states, *inter alia*, that petroleum coke is widely used as fuel in the cement and steel industry. It can also be used as a fuel for power plants if the sulphur content is low enough. Coke also has non-fuel applications as a raw material for many carbon and graphite products. In the case at issue, petroleum coke was used as the main component in the fuel used to power the integrated combined heat and power station, which supplied a refinery's steam and electricity needs. Since the electricity generated is greater than the refinery's consumption, given the volume of vapour produced at the same time, the surplus was sold to other industries or to an electricity company.⁵³

In those circumstances, petroleum coke cannot, according to the Court, be classified as a production residue. The Court underlined that production of coke is the result of a technical choice, specifically intended for use as fuel, whose production costs are probably lower than the cost of other fuels which could be used to generate the steam and electricity which met the needs of the refinery. Even if the petroleum coke at issue automatically results from a technique which at the same time generates other petroleum substances which are the main results sought by the refinery's management, it is – according to the Court – clear that if it is certain that the coke production in its entirety will be used mainly for the same purposes as the other substances, petroleum coke is also a petroleum product, manufactured as such, and not a production residue.⁵⁴

⁵¹ Case C-114/01 *AvestaPolarit*, cited above, paragraphs 36-38

⁵² Case C-235/02 *Saetti and Fredani* [2004] ECR I-0000.

⁵³ Case C-235/02 *Saetti and Fredani*, paragraph 41-42.

⁵⁴ Case C-235/02 *Saetti and Fredani*, paragraph 45.

Possible evidence concerning the absence of any use other than one which leads to the disappearance of the substance at issue – and even the fact that its use must involve special measures to protect the environment – were also held to be irrelevant. In the same line of reasoning, the fact that the company considered petroleum coke to be waste was not sufficient to justify the inference that the petroleum coke at issue is waste.⁵⁵ On the other hand, the Court conceded that the assessment could be different only if the refinery's management gave up the use of petroleum coke as the result of public opinion or was required to do so by a legal decision. In that case, it would be necessary to find that the holder of the petroleum coke is discarding it or intends to or is required to discard it.⁵⁶

Given this recent and rather contentious evolution in the case law of the Court, it cannot be excluded that mercury, forming part of an industrial process, may under certain circumstances be regarded as a by-product and not as waste. This will depend on the degree of likelihood that the substance will be reused, without any further processing prior to its reuse, and as an integral part of the production process of the holder of that substance.

However, this is clearly not the case with mercury from decommissioned cells in the chlor-alkali industry, except in the cases where the metallic mercury is moved to another production facility using the same technique. As the Commission has already pointed out, when the mercury cell technology is fully replaced in Europe there will be no demand for mercury in the European chlor-alkali-industry. The mercury might then be sold off to mercury-cell plants outside Europe. This would shift the problem to outside Europe. It would reduce the demand for primary mined mercury. Although the Western European Chlor-Alkali Producers have committed themselves not to sell or transfer mercury cells after plant shutdown to any third party for re-use, a similar commitment has not yet been made not to transfer the metallic mercury to their own plants in third countries which may operate under less strict environmental and/or waste law regulations.

Moreover, the by-product argument developed by the sixth and third chambers of the Court does not alter the fact that if the management of a chlor alkali plant gives up the use of the mercury cell process as the result of public opinion or is required to do so by a legal decision in accordance with the IPPC Directive, it would be necessary to find that the holder of the mercury in question is discarding it or intends to or is required to discard it.

⁵⁵ Case C-235/02 *Saetti and Fredani*, paragraph 46.

⁵⁶ Case C-235/02 *Saetti and Fredani*, paragraph 46.

5.1.5 The *effet utile* of the IPPC-directive implies that there is an obligation to discard the mercury from discarded cells from the chlor-alkali industry

As stated above, the EC definition of waste is, according to the consistent case law of the Court, not predominantly a subjective one, despite the recent evolution related to by-products. The subjective intention of the holder of a substance must be balanced against objective criteria, such as the legal framework surrounding the use and the disposal of a given object or substance, as well as its impact on human health and on the environment.

In our opinion, the requirement under the IPPC Directive to phase out the mercury-cell process in the chlor-alkali industry is, from a legal point of view, sufficient to make the general presumption that, in the event of mercury cells in a chlor-alkali plant being decommissioned, there is a *legal obligation under Community law* to discard the mercury in question.

Nevertheless, according to the Commission, the requirement under the IPPC Directive 96/61/EC to phase out the mercury-cell process in the Chlor-alkali industry *is not considered sufficient* to make the general presumption that, in the event of mercury cells in a chlor-alkali plant being decommissioned, there is an obligation to discard the pure mercury. The Commission has therefore expressed the opinion that it cannot be concluded or presumed that pure mercury siphoned off from disused electrolysis cells of decommissioned chlor-alkali plants constitutes waste for the purposes of *Community waste legislation*. Whether the decommissioned mercury is waste can only be concluded on a case-by-case basis depending on whether the plant owner *is obliged under national legislation* to discard the mercury.

The legal basis of the reasoning of the Commission is unclear, but it seems that its assertion is based on Article 9 (4) of the IPPC Directive. In accordance with that provision, when determining the permit conditions based on BAT for the individual installation, the competent authority takes into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions. It is therefore the local competent authority that decides on the specific permit conditions. In all circumstances, the permit must contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole.

The Commission's interpretation of the obligations under the IPPC Directive embraces the chlor-alkali industry's point of view, namely that the IPPC Directive for a variety of reasons stipulates that BAT for existing plants must be considered on an individual plant basis. According to Euro Chlor, decisions concerning operating permit conditions are for national authorities alone.

We do not share the interpretation that the margin of discretion left to the Member States to decide, on an individual basis, *when* existing installations should comply with the IPPC Directive, also implies a discretion for national authorities or legislators as to whether the plant owners *are obliged or not* to discard the mercury in question.

On the contrary, the requirement under the IPPC Directive to phase out the mercury-cell process in the Chlor-alkali industry is, from a legal perspective, sufficient to make the general presumption that, in the event of a chlor-alkali plant being decommissioned, there is an *obligation under Community law* to discard the mercury in question. The limited discretion of national authorities follows expressly from Article 9 (4) of the IPPC Directive, which states that in all circumstances the conditions of the permit shall contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole.

An interpretation to the contrary would undermine the *effet utile* of the IPPC Directive and will distort the internal market. Indeed, a large amount of mercury will become available through the decommissioning of the mercury-cell process in the Chlor-alkali industry. Unless this mercury is disposed of in a regulated and environmentally responsible manner, consistent with the goals of the IPPC Directive and of Article 174 EC, the decommissioning of all mercury cells in the EU may lead to over 12,000 tonnes of available mercury being sold on the open market, with the risk of being released into the global environment. If that were to be the unintended effect of the IPPC Directive and the EC waste legislation, the switch to best available techniques (BAT) in the chlor-alkali industry would actually constitute a threat to the environment.

Indeed, it is feared that large market releases of recycled mercury may make low-priced mercury more abundant on the world market and encourage more extensive or even revived

use of mercury (in certain applications) in countries with less restrictive legislation, fewer enforcement possibilities and/or special social and economic circumstances. One example might be a slow-down in efforts to use mercury more efficiently in small-scale gold mining in the Amazon and other regions of the world, which has been, at least partly, based on mercury imports from OECD countries.⁵⁷

Such a scenario would be incompatible with the objectives of the IPPC Directive. The first recital of the preamble of the Directive reiterates the objectives and principles of the Community's environment policy, as set out in Article 175 EC, which consist in particular of preventing, reducing and as far as possible eliminating pollution by giving priority to intervention at source and ensuring prudent management of natural resources, in compliance with the 'polluter pays' principle and the principle of pollution prevention.

According to the fourteenth recital of the preamble to the Directive, the full coordination of the authorization procedure and conditions between competent authorities will make it possible to achieve the highest practicable level of protection for the environment as a whole. The sixteenth recital indicates that the permit is to include all necessary measures to fulfil the authorization conditions in order thus to achieve a high level of protection for the environment as a whole. The seventeenth recital states that, in all cases, the authorization conditions will lay down provisions on minimizing long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole.

Moreover, Article 1 of the IPPC Directive states that the purpose of that legislation is to achieve integrated prevention and control of pollution arising from the activities listed in Annex I to the Directive, among which the chemical industry is included. It lays down measures designed to prevent or, where that is not practicable, to reduce emissions in the air, water and land from the abovementioned activities, including measures concerning waste, in order to achieve a high level of protection of the environment taken as a whole, without prejudice to Directive 85/337/EEC and other relevant Community provisions.

Article 3 of the IPPC Directive contains general principles governing the basic obligations of the operator. This provision states that Member States shall take the necessary measures to

⁵⁷ UNEP Global Mercury Assessment, December 2002, point 582.

provide that the competent authorities ensure that installations are operated in such a way, notably, that:

- (a) all the appropriate preventive measures are taken against pollution, in particular through application of the best available techniques;
- (b) no significant pollution is caused;
- (c) waste production is avoided in accordance with [the Waste Framework Directive]; where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of while avoiding or reducing any impact on the environment;
- (d) (...)
- (e) (...)
- (f) the necessary measures are taken upon definitive cessation of activities to avoid any pollution risk and return the site of operation to a satisfactory state.

For the purposes of compliance with Article 3, it is sufficient if Member States ensure that the competent authorities take account of the general principles set out in this Article when determining the conditions of the permit.

Article 6, paragraph 1, of the IPPC Directive, regarding applications for permits, requires the Member States to take the necessary measures to ensure that an application to the competent authority for a permit includes a description of measures for the prevention and recovery of waste generated by the installation where that is necessary.

Article 9 of the Directive contains requirements related to the conditions of the permit. Under Article 9(1), Member States shall ensure that the permit includes all measures necessary for compliance with the requirements of Articles 3 and 10 for the granting of permits in order to achieve a high level of protection for the environment as a whole by means of protection of the air, water and land. Article 9(6) further states that the permit shall contain measures relating to conditions other than normal operating conditions. Thus, where there is a risk that the environment may be affected, appropriate provision shall be made *inter alia* for definitive cessation of operations.

Under those circumstances, the fate of the metallic mercury from decommissioned cells is a key issue to be regulated by the competent national authorities upon the cessation of the

mercury cell process in a manner consistent with the objectives of the IPPC Directive and of EC Waste legislation. Since the cost of inaction by the competent authorities may lead to a significant deterioration in the environment, this would in principle indicate that the Member State concerned is outside the limits of the discretion conferred on it by the IPPC Directive.⁵⁸

Arguably, Member States may not only have the *authority* under EC waste legislation and the IPPC Directive and its permitting conditions, but are possibly even under a *legal obligation* to clarify the mercury's waste status, restrict the resale, recovery and reuse of the mercury, and direct the mercury from the chlor-alkali plants to a designated disposal facility while the mercury is still in the possession of the plant owner. Since plants must operate in accordance with the IPPC Directive by October 30, 2007, and are thus subject to the permit requirements, Member states have the authority to impose such restrictions on the fate of the mercury through the Directive after that date. A Member State which defines mercury from decommissioned cells in the chlor-alkali industry as falling outside the scope of the common definition of waste under EC law may well be in breach of its obligations under the EC Treaty.

5.1.6 Mercury from decommissioned cells in chlor-alkali plants should be classified as dangerous waste

Article 1(3) of the Council Directive 91/689/EEC of 12 December 1991 on hazardous waste,⁵⁹ as amended by Council Directive 94/31/EC of 27 June 1994 amending Directive 91/689/EEC on hazardous waste⁶⁰ (hereinafter the “Hazardous Waste Directive”) refers to the definition of waste laid down in the Waste Framework Directive, and Article 1(4) defines hazardous waste in the following terms:

“For the purpose of this Directive hazardous waste means:

- wastes featuring on a list to be drawn up in accordance with the procedure laid down in Article 18 of Directive 75/442/EEC on the basis of Annexes I and II to this

⁵⁸ See Case C-365/97 *Commission v Italy* [1999] ECR I-7773, paragraph 68 (the “San Rocco” case) and Case C-387/97 *Commission v Greece* [2000] ECR I-5047, paragraph 55.

⁵⁹ OJ 1991 L 377, p. 20.

⁶⁰ OJ 1994 L 168, p. 28.

Directive, not later than six months before the date of implementation of this Directive. These wastes must have one or more of the properties listed in Annex III. The list shall take into account the origin and composition of the waste and, where necessary, limit values of concentration. This list shall be periodically reviewed and if necessary [revised] by the same procedure,

- any other waste which is considered by a Member State to display any of the properties listed in Annex III. Such cases shall be notified to the Commission and reviewed in accordance with the procedure laid down in Article 18 of Directive 75/442/EEC with a view to adaptation of the list.”

Annex I to the Hazardous Waste Directive is subdivided into Annexes I.A and I.B. Those annexes contain 18 and 22 categories or generic types of hazardous waste respectively, listed according to their nature or the activity which generated them. Annex II lists 51 constituents of the wastes in Annex I.B which render them hazardous when they have the properties described in Annex III, which sets out 14 properties which render wastes hazardous.

Annex II of the Hazardous Waste Directive lists “mercury; mercury compounds” under heading C17 as constituents of the wastes in Annex I.B. to that Directive which render them hazardous when they have the properties described in Annex III to the Directive. Annex I.B on generic types of hazardous waste according to their nature or the activity which generates them lists, under point 27, “liquids or sludges containing metals or metal compounds” and, under point 40, “any other wastes which contain any of the constituents listed in Annex II and any of the properties listed in Annex III”.

Under heading 06 *Wastes from inorganic chemical processes*, Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste⁶¹ lists *Waste containing mercury* under Code 06 04 04*. Any waste marked with an asterisk (*) is, according to the introduction to the Annex to the Decision, considered as a hazardous waste pursuant to Article 1(4), first indent, of the

⁶¹ OJ 2000 L 226, p. 3.

Hazardous Waste Directive and subject to the provisions of that Directive unless Article 1(5) of that Directive applies.

Hence, provided that pure metallic mercury from decommissioned cells in chlor-alkali plants falls within the general definition of waste under the Waste Framework Directive, such mercury should be classified as dangerous waste.

5.1.7 Conclusions regarding the definition of waste

For the reasons set out above, we therefore conclude that it is likely that mercury from discarded cells from the chlor-alkali industry falls within the common definition of waste under EC law.

Even from a subjective point of view, the mere fact that there is a financial advantage to the holders of such mercury in selling the product in question on the open market, thus relieving themselves of the responsibility incumbent upon them under the polluter-pays principle, is not sufficient to exclude that substance from the waste definition. Even where waste has undergone a complete recovery operation as a consequence of which the substance in question has acquired the same properties and characteristics as a raw material, that substance may nonetheless be regarded as waste if, in accordance with the definition in Article 1(a) of the Waste Framework Directive, its holder discards it or intends or is required to discard it.

Under all circumstances, this issue cannot be settled by way of reference to *national legislation alone* as to whether the plant owner is obliged or not to discard the mercury in question. Such an interpretation is not in line with the requirements of clarity and uniformity which flow from the purpose of the Waste Framework Directive regarding the proper functioning of the internal market, consisting, specifically, in the avoidance of obstacles to trade and distortion of competition. First, obstacles to trade could arise if different concepts of waste were applied in the Member States, so that the same metallic mercury from the chlor-alkali industry could be regarded as a product in one Member State – and would accordingly be freed from all waste-specific controls – while that would not be the case in another Member State. Second, given that the chlor-alkali industries must assume the responsibility incumbent upon them under the polluter-pays principle, the concept of waste must be applied

uniformly in order that those industries have a level playing field in the internal market with regard to competition.⁶²

In the absence of regulatory progress and/or a common understanding among the stakeholders of the necessity to ban or at least to restrict the export of metallic mercury to third countries, national authorities, environmental interest groups and/or the chlor-alkali industries which, *under national law*, are obliged to dispose of the mercury in an environmentally responsible manner, should consider the option of instituting legal proceedings before national courts and/or before the Community courts in order to clarify whether or not mercury from decommissioned cells in chlor-alkali plants in other Member States falls within the *EC waste definition*.

Indeed, it is only once this issue is definitely settled by the European Court of Justice that it will be possible to fulfil the objectives of the above-mentioned environmental legislation, secure a level playing field on the internal market and to assess whether a ban on the export of mercury to third countries or other export restrictions can be achieved through the existing legislation, by amending that legislation, or whether a different legal basis would be necessary to achieve such restrictions.

5.2 However, mercury from decommissioned cells in chlor-alkali plants may cease to be waste once it has undergone a recovery operation

As has been pointed out above, even where metallic mercury from decommissioned cells has undergone a complete recovery operation as a consequence of which the substance in question has acquired the same properties and characteristics as “pure” or “virgin” mercury, that substance may nonetheless be regarded as waste if, in accordance with the definition in Article 1(a) of the Waste Framework Directive, its holder discards it or intends or is required to discard it. In our opinion, the chlor-alkali industry is required to discard such mercury under the IPPC Directive.

In other words, metallic mercury from decommissioned cells from the chlor-alkali industry may still be considered as waste even if it has gone through a recovery operation by being

⁶² See, to that effect, Case C-444/00 *Mayer Parry Recycling* ECR [2003] I-0000, paragraphs 77-79.

drained out of the cells to flasks. The transport of such dangerous waste would still be subject to the supervisory regime laid down by EC legislation.

However, at a given point such metallic mercury may cease to be waste once the chlor-alkali industry has discarded the substance in question and once it has been recovered by a third party. According to the case law of the Court, it follows from Article 3(1)(b) of the Waste Framework Directive and the fourth recital in its preamble that the essential characteristic of a waste recovery operation is constituted by its principal objective that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby enabling natural resources to be conserved.⁶³

In *Mayer Parry*,⁶⁴ the Court was asked to interpret the notion of recycling under the European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.⁶⁵ The Court held that waste may be regarded as recycled under that Directive only if it has been reprocessed so as to obtain new material or a new product for the original purpose. This means that the waste must be transformed into its original state in order to be useable, where appropriate, for a purpose identical to the original purpose of the material from which it was derived. In other words, metal packaging waste must be regarded as recycled where it has undergone reprocessing in the course of a process designed to produce new material or make a new product possessing characteristics comparable to those of the material of which the waste was composed, in order to be able to be used again in the production of metal packaging.⁶⁶

According to the Court, by interpreting the definition of recycling in Article 3(7) of Directive 94/62 as meaning that the reprocessing of packaging waste must enable new material or a new product possessing characteristics comparable to those of the material from which the waste was derived to be obtained, a high level of environmental protection is ensured. It is only at that stage that the ecological advantages, which led the Community legislator to accord a degree of preference to this form of waste recovery, are fully achieved, namely a reduction in

⁶³ Case C-6/00 *ASA*, cited above, paragraph 69

⁶⁴ Case C-444/00 *Mayer Parry Recycling* ECR [2003] I-0000.

⁶⁵ OJ 1994 L 365, p. 10.

⁶⁶ Case C-444/00 *Mayer Parry Recycling*, cited above, paragraph 67.

the consumption of energy and of primary raw materials (see the 11th recital in the preamble to Directive 94/62).⁶⁷

Under Directive 94/62, it is also only at that stage that the materials at issue cease to be packaging waste and the various waste controls laid down by the Community legislator accordingly lose their rationale. Since the recycling involves the transformation of the packaging waste into new material or a new product possessing characteristics comparable to those of the material from which the waste was derived, the result of that transformation can no longer be classified as packaging waste.⁶⁸

By analogy, the same reasoning may apply to the notion of a waste recovery operation under the Waste Framework Directive. Once metallic mercury from decommissioned cells in the chlor-alkali industry has undergone a waste recovery operation, and provided that the holder of that substance is not under a legal obligation to discard such a substance, it may no longer be classified as waste under EC waste legislation.

Under the current state of EC law, third party waste recovery operators are not under any legal obligation to discard recovered metallic mercury. On the contrary, the rationale of the Community legislator has been, *when this is deemed appropriate*,⁶⁹ to accord a degree of preference to this form of waste recovery in order to serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby enabling natural resources to be conserved. At latest at this point in a recovery operation carried out by third parties, metallic mercury from decommissioned cells in the chlor-alkali industry will, under the current state of Community law, cease to be classified as waste.

As the Commission stressed in its Report to the Council concerning Mercury from the Chlor-alkali Industry, mercury from decommissioned chlor-alkali plants in Europe will constitute a major source of mercury and the final fate of this mercury could, if not handled in a safe and sustainable way, be associated with considerable environmental damage in the European Union, in future Member States as well as in third countries. There is little demand for

⁶⁷ Case C-444/00 *Mayer Parry Recycling*, cited above, paragraphs 73 and 74.

⁶⁸ Case C-444/00 *Mayer Parry Recycling*, cited above, paragraph 75.

⁶⁹ Article 3(1) of the Waste Framework Directive.

mercury in the EU and North America, but there is demand globally. A continuing supply of surplus mercury will keep the price low and the use of mercury will remain attractive.

5.3 The need to regulate further the controlled disposal of mercury

Given the inherent characteristics of mercury and the risks it present for the environment and for human health, it is doubtful whether the Community legislator and national authorities should give a preference to the recovery of such material if the unintended consequence of the IPPC Directive is to release metallic mercury from decommissioned cells in the chlor-alkali industry onto the global market.

If the Community legislator were to consider it necessary to adopt general obligations concerning the controlled disposal of mercury because of the risks it presents for the environment and for human health, the correct legal basis for such an act would be Article 175 EC. Such an act would be adopted under the codecision procedure in Article 251 EC.

5.3.1 Legislative precedent: the PCB/PCT Directive

A legislative precedent to this effect is the Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT),⁷⁰ hereinafter “the PCB/PCT directive”.

Indeed, in order to dispose of PCBs because of the risks they present for the environment and for human health, the Community legislator considered that general obligations concerning the controlled disposal of PCBs and the decontamination or disposal of equipment were necessary (fifth indent of the PCB/PCT directive). The seventh indent of the Directive states that the disposal of PCBs represents a transitional and temporary problem and some Member States, which have no PCB disposal capacity, face a *force majeure* situation. Therefore, the proximity principle should be interpreted in a flexible manner so as to permit European solidarity in this area. In addition, installations should be set up in the Community for the disposal, decontamination and storage of PCBs.

⁷⁰ OJ 1996 L 243, p. 31.

According to Article 3 of the PCB/PCT Directive, Member States shall take the necessary measures to ensure that used PCBs are disposed of and PCBs and equipment containing PCBs are decontaminated or disposed of as soon as possible. By way of derogation from Article 3 of the Waste Framework Directive, Member States shall, under Article 5(1) of the PCB/PCT Directive, prohibit the separation of PCBs from other substances for the purpose of reusing the PCBs. Member States must also take the necessary measures to ensure that PCBs, used PCBs and equipment containing PCBs which is subject to inventory are transferred to licensed undertakings and that all undertakings engaged in the decontamination and/or the disposal of PCBs, used PCBs and/or equipment containing PCBs obtain permits (Articles 6 and 8 of the PCB/PCT Directive).

As will be further developed *infra*, from the perspective of project financing of investments in mercury disposal facilities on the European Union level, a legal framework similar to that provided in the PCB/PCT Directive is required.

5.3.2 The possibilities to restrict the use of mercury under the Limitations Directive for Dangerous Substances and Preparations

Some substances and preparations are subject to restrictions as regards marketing and use under the “Limitations Directive”, i.e. Council Directive 76/769/EEC of 27 July 1976 on the approximation of laws, regulations, and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations.⁷¹ Substances falling under the Limitations Directive are listed in the Annex I to that Directive which also specifies the restrictions on marketing and use applying in each particular case.⁷² The legal basis for the Limitations Directive is Article 95 EC.

Article 2 of the Limitations Directive provides, as far as is relevant:

⁷¹ OJ 1976 L 262, p. 201, as amended by Council Directive 89/677/EEC of 21 December 1989 amending for the eighth time Directive 76/769/EEC, OJ 1989 L 398, p. 19.

⁷² Annex I after amendment by Council Directive 83/478/EEC of 19 September 1983 amending for the fifth time Directive 76/769/EEC, OJ 1983 L 263, p. 33.

“Member States shall take all necessary measures to ensure that the dangerous substances and preparations listed in the Annex may only be placed on the market or used subject to the conditions specified therein.”

Where a substance is not already listed in Annex I, the name of the substance and the desired limitations on marketing and use are added through proposals to the Council and the Parliament to amend the Directive. Where a substance is listed and the requirement is to change the limitations already in place, this is done by a Commission Directive adapting the existing limitations to technical progress.

The Limitations Directive has been amended on several occasions. A number of dangerous substances and preparations have been added to Annex I, and further restrictions have been placed on the use of substances and preparations covered by that Annex.

Point 19 of Annex I of the Limitations Directive contains to date the following provisions related to the use of mercury:

“Mercury compound

May not be used as substances and constituents of preparations intended for use:

(a) to prevent the fouling by micro-organisms, plants or animals of:

- the hulls of boats,
- cages, floats, nets and any other appliances or equipment used for fish or shellfish farming,
- any totally or partly submerged appliances or equipment;

(b) in the preservation of wood;

(c) in the impregnation of heavy-duty industrial textiles and yarn intended for their manufacture;

(d) in the treatment of industrial waters, irrespective of their use.”

Article 2a, which was inserted by Directive 89/678, provides:

“Amendments required to adapt the Annexes to technical progress, with regard to substances and preparations already covered by [Directive 76/769], shall be adopted in accordance with the procedure laid down in Article [29] of Directive 67/548/EEC, [⁷³] as last amended by Directive [92/32/EEC⁷⁴].”

The procedure laid down in Article 29 of Directive 67/548 as amended follows the system set out in Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission.⁷⁵

In accordance with that Decision, Article 29 provides that the Commission is assisted by a committee composed of representatives of the Member States and chaired by a representative of the Commission. The Commission submits to the committee a draft of the measures to be taken and adopts them if agreed to by the committee. If the measures envisaged are not agreed to by the committee, or if no opinion is delivered, the Commission submits a proposal to the Council, which then acts by qualified majority.

In preparation of a potential further amendment to the Limitations Directive, the Commission services have been investigating potential regulatory action on products containing mercury. In September 2001, the Commission’s Enterprise Directorate General engaged Risk & Policy Analysis Ltd (RPA) to conduct a scoping study on Mercury, which was completed in August 2002. The consultant was required to estimate releases of mercury to the environment and associated risks to the environment and human health from the use of mercury in a number of specific applications, i.e. dental amalgam, batteries, measuring instruments (such as thermometers and manometers) and lighting. It does not appear that risks associated with metallic mercury from decommissioned cells in the chlor-alkali industry fell within the scope of the study.

The report, *Risks to Health and the Environment Related to the Use of Mercury Products*⁷⁶, assessed the use of mercury in these specific applications within the European Union,

⁷³ Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances, OJ, English Special Edition 1967(II), p. 234.

⁷⁴ Council Directive 92/32/EEC of 30 April 1992 amending for the seventh time Directive 67/548/EEC, OJ 1992 L 154, p. 1.

⁷⁵ OJ L 184, p. 23.

performed a life-cycle assessment and estimated releases from these products. Environmental concentrations and human exposures to mercury and its compounds from the use of these products were then predicted using the European Union System for the Evaluation of Substances, EUSES.⁷⁷ Based on the results of the predicted exposures and effects of mercury on humans and the environment, the report concluded that significant risks to the environment and human health are unlikely to result from the mercury-containing products under study. According to the report, the overall risk to the environment and to human health from the mercury under study appeared to be insignificant and, furthermore, decreasing due to the continuing substitution of mercury.

In a summary and preliminary conclusions from this report, the Commission's Enterprise Directorate General concluded in May 2003 that as no risk was identified, a marketing and use restriction on the Community level was considered as disproportionate.⁷⁸ The Commission announced that it would review the overall situation as regards mercury in the context of its Strategy on mercury, scheduled to be submitted to the Council in 2004.

However, in an Opinion of the Scientific Committee on Toxicity, Ecotoxicity and the Environment (CSTEE)⁷⁹ on the above-mentioned report, the Scientific Committee's resulted in the following overall conclusions and recommendations by the CSTEE:

- The EUSES model is not adequate for the prediction of environmental and human exposures to mercury and its compounds from the products under study; therefore, no conclusions are possible based on the report.
- The incomplete comparison of predicted mercury concentrations with measured data on mercury concentrations further reduces the confidence in the conclusions made in the report.

⁷⁶ RPA Final Report: J372/Mercury.

⁷⁷ Council Regulation (EEC) No 793/93 of 23 March 1993 on the evaluation and control of the risks of existing substances, OJ 1993 L 84, p. 1, implemented by Commission Regulation (EC) No 1488/94 of 28 June 1994 laying down the principles for the assessment of risks to man and the environment of existing substances in accordance with Council Regulation (EEC) No 793/93, OJ L 161, p. 3.

⁷⁸ Accordingly, a legislative proposal to restrict the marketing and use of thermometers containing mercury, which was listed in the Indicative list for other institutions of actions adopted by the Commission for 2003 of the Commission's 3-month rolling legislative and work programme for 2003, seems to have been withdrawn from the legislative and work programme for 2004.

⁷⁹ Adopted by the CSTEE during the 40th plenary meeting of 12-13 November 2003.

- On the regional and continental scale, an assessment of the contribution of the products under study in the report may be made based on a comparison of emissions from the products under study with total mercury emissions from all sources.
- Regarding local emissions, the risk assessment should rely on measured data.

Within the existing legislative framework in Community law, the Limitations Directive is probably the most effective legal basis for restricting the use of metallic mercury within the Community. This would probably require an amendment to Annex I of the Limitations Directive. In that case, and in compliance with Article 95 EC, the codecision procedure with the European Parliament is applicable. The Economic and Social Committee has to be consulted.

Legislative precedents to that effect are that the re-use and the placing on the secondary markets have already been regulated for, *inter alia*, PCB and creosote.⁸⁰ Other examples of restrictions on industrial use are hexachloroethane,⁸¹ Short Chain Chlorinated Paraffins (SCCP)⁸² and nonylphenol, nonylphenol ethoxylate.⁸³

By introducing a general ban on the use of mercury within the Community, the holders of that substance would, in all likelihood, also be required to dispose of it under the EC waste legislation.⁸⁴ Thereby, the existing export ban under the Waste Shipment Regulation would be applicable.

5.3.3 The sectorial approach

⁸⁰ Commission Directive 2001/90/EC of 26 October 2001 adapting to technical progress for the seventh time Annex I to Council 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 (creosote), OJ 2001 L 283 p. 41.

⁸¹ Commission Directive 2001/91/EC of 29 October 2001 adapting to technical progress for the eighth time Annex I to Council 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 (hexachloroethane), OJ L 286, p. 27.

⁸² Directive 2002/45/EC of the European Parliament and of the Council of 25 June 2002 amending for the twentieth time Council Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations (short-chain chlorinated paraffins), OJ 2002 L 177, p. 21.

⁸³ Directive 2003/53/EC of the European Parliament and of the Council of 18 June 2003 amending for the 26th time Council Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations (nonylphenol, nonylphenol ethoxylate and cement), OJ 2003 L 178, p. 24.

⁸⁴ See, to that effect, Case C-114/01 *AvestaPolarit*, cited above, paragraph 38

To date, and in the absence of a general framework on the use of mercury, the Community legislator has instead adopted a sectorial approach in order to regulate the use and disposal of products, substances and waste containing mercury. This relates, *inter alia*, to electrical and electronic equipment,⁸⁵ end-of life vehicles,⁸⁶ batteries and accumulators⁸⁷ and plant protection products.⁸⁸

However, the sectorial directives do not seem to afford a suitable legal basis for addressing the environmental issues arising from the safe disposal of metallic mercury from decommissioned cells from the chlor-alkali industry.

5.3.4 Upcoming legislative initiatives under the Water Framework Directive

One of the purposes of 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 policy⁸⁹ (hereinafter the “Water Framework Directive”) is to contribute to achieving the objectives of relevant international agreements, including those which aim to prevent and eliminate pollution of the marine environment.

This is done, *inter alia*, by Community action under Article 16(3) of the Water Framework Directive in order to cease or phase out discharges, emissions and losses of “priority hazardous substances”, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances.

⁸⁵ 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 (the “RoHS Directive”), OJ 2003 L 37, p. 19, 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 2003 L 37, p. 24.

⁸⁶ Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, OJ 2000 L 269, p. 34.

⁸⁷ Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances, OJ 1991 L 78, p. 38.

⁸⁸ 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 1978 L 33, p. 36, as amended, *inter alia*, by 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 1991 L 92, p. 42.

⁸⁹ OJ 2000 L 327, p. 1.

Mercury and its compounds have recently been included in the recently adopted list of priority hazardous substances as point 21 of Annex X to the Water Framework, which draws up a list of priority substances in the field of water policy.⁹⁰ Mercury is thus subject to cessation or phasing-out of emissions, discharges and losses within 20 years after the adoption of measures.

The fourth indent of Decision No 2455/2001/EC establishing that list states that for substances occurring naturally or produced through natural processes, such as cadmium, mercury and polycyclic aromatic hydrocarbons (PAHs), complete phase-out of emissions, discharges and losses from all potential sources is impossible. When the relevant individual directives are drawn up, this situation must be properly taken into account and measures should aim at the cessation of emissions, discharges and losses into water of those priority hazardous substances which derive from human activities.

Under Article 16 (1), the European Parliament and the Council shall adopt specific measures against pollution of water by individual pollutants or groups of pollutants presenting a significant risk to or via the aquatic environment, including such risks to waters used for the abstraction of drinking water. With respect to those pollutants, measures shall be aimed at the progressive reduction and, for priority hazardous substances, as defined in Article 2(30), at the cessation or phasing-out of discharges, emissions and losses. Such measures shall be adopted acting on proposals presented by the Commission in accordance with the procedures laid down in the Treaty. According to Article 16(6) of the Water Framework Directive, the Commission shall submit proposals for control for these substances.

In this respect, the Water Framework Directive – read in conjunction with Article 9 (4) of the IPPC Directive, which states that in all circumstances the conditions of a plant permit shall contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole – may constitute an alternative legal basis for further regulating metallic mercury from decommissioned cells in the chlor-alkali industry.

⁹⁰ Decision No 2455/2001/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 and amending Directive 2000/60/EC, OJ 2001 L 331, p. 1.

6 EXPORT RESTRICTIONS OF MERCURY IN EC LAW

In order to assess the possibilities to restrict or ban the export of mercury, it is necessary to classify that substance under the EC waste legislation. If the substance constitutes waste, it is governed by the Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community,⁹¹ as amended by Council Regulation (EC) No 120/97 of 20 January 1997⁹² (hereinafter the “Waste Shipment Regulation”).

Since mercury as such does not constitute waste, it would be necessary to find another legal basis under EC law in order to restrict or ban the export of mercury to third countries. This could be achieved, *inter alia*, by including metallic mercury in Annex I to Council Directive 76/769/EEC of 27 July 1976 on the approximation of laws, regulations, and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations⁹³ and in one of the Annexes to 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.⁹⁴

6.1 Under the Waste Shipment Regulation

As pointed out above, there is a strong likelihood that mercury from discarded cells from the chlor-alkali industry falls within the common definition of waste under EC law. The Waste Shipment Regulation lays down rules governing, *inter alia*, the monitoring and control of shipments of waste between Member States and to third countries.

The Waste Shipment Regulation contains a ‘green list of wastes’ (Annex II), an ‘amber list of wastes’ (Annex III) and a ‘red list of wastes’ (Annex IV). Under the Regulation, ‘mercury waste and residues’ are listed in Annex III under code AA100 ex 2805 40 on the ‘amber list of waste’.

⁹¹ OJ 1993 L 30, p. 1.

⁹² OJ 1997 L 22, p. 14.

⁹³ OJ 1976 L 262, p. 201, as amended by Council Directive 89/677/EEC of 21 December 1989 amending for the eighth time Directive 76/769/EEC, OJ 1989 L 398, p. 19.

⁹⁴ OJ 2003 L 63, p. 1.

Title IV of the Regulation lays down the rules applying to exports of waste out of the Community. Export of such waste from the Community to non-OECD countries, whether for recovery or for disposal purposes, is banned under Articles 16 and 14 of the Waste Shipment Regulation.

Indeed, exports of waste intended for disposal are prohibited, except to EFTA countries which are parties to the Basel Convention (Article 14 of the Waste Shipment Regulation). Exports of waste listed in Annex V to the Regulation intended for recovery are prohibited, except those directed to OECD countries, third countries which are parties to the Basel Convention or countries which have concluded a bilateral agreement with the Community (Article 16 of the Waste Shipment Regulation). Under Article 18(1) of the Waste Shipment Regulation, all exports of waste to ACP States are prohibited.

Where waste is exported from a Member State to a third State under the provisions of the Waste Shipment Regulation, the notifier must apply for authorisation to the competent authority of dispatch. Waste may not be shipped to a third State until the competent authorities of destination or dispatch have acknowledged receipt of the application for authorisation of the shipment. Waste which does not comply with the provisions of the relevant measures regarding its shipment must be returnable to the notifier or, if this is not possible, otherwise disposed of or recovered in an environmentally sound manner.

Annex V of the Waste Shipment Regulation consists of three parts, whereby parts 2 and 3 only apply when part 1 is not applicable. Consequently, to determine if a specific waste is covered by Annex V of Council Regulation (EEC) No 259/93, one must first check whether the waste features in part 1 of Annex V.

Part 1 is divided into two sub-sections: List A enumerating wastes which are classified as hazardous for the purposes of the Basel Convention and therefore are covered by the export ban and List B enumerating wastes which are not covered by the export ban. Mercury is listed under List A, heading *A1 Metal and metal-bearing wastes* under the following positions:

A1010 Metal wastes and waste consisting of alloys of any of the following:
(...)

– Mercury

A1030 Wastes having as constituents or contaminants any of the following:

– Mercury; mercury compounds

A1180 Waste electrical and electronic assemblies or scrap (...) components such as (...) mercury-switches, glass from cathode-ray tubes and other activated glass and PCB capacitors, or contaminated with Annex I constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B, B1110) (...)

Furthermore, mercury is explicitly excluded from List B (Annex IX to the Basel Convention), under the heading *B1 Metal and metal-bearing wastes*, in the following terms:

B1010 Metal and metal-alloy wastes in metallic, non-dispersible form:

— Precious metals (gold, silver, the platinum group, but not mercury)

B1090 Waste batteries conforming to a specification, excluding those made with lead, cadmium or mercury

B1150 Precious metals and alloy wastes (gold, silver, the platinum group, but not mercury) in a dispersible, non-liquid form with appropriate packaging and labelling

In other words, as long as mercury constitutes waste under EC waste legislation, there is already an export ban in place under Community law. The problem, as pointed out above, is that metallic mercury from, *inter alia*, decommissioned cells in the chlor-alkali industry may cease to be waste after a recovery operation carried out by a third party, whereupon the export ban no longer applies.

As has been pointed out by representatives of the above-mentioned environmental interest groups, this loop-hole may be remedied by the Community legislator during the current

review of the Waste Shipment Regulation, by expressly adding mercury from decommissioned cells in the chlor-alkali industry to Annex V the Regulation. This express inclusion in Annex V should have the twofold effect of clarifying the status of such mercury as “waste” and controlling its export to developing countries, thereby preventing further global damage through the reuse of the waste.

6.2 Under the Convention on the control of transboundary movements of hazardous wastes and their disposal (Basel Convention)

By Council Decision of 1 February 1993 on the conclusion, on behalf of the Community, of the Convention on the control of transboundary movements of hazardous wastes and their disposal (Basel Convention),⁹⁵ the Basel Convention was approved on behalf of the European Economic Community.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted on 22 March 1989, strictly regulates transboundary movements of hazardous wastes and establishes obligations for its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.

The main principles of the Basel Convention are:

- transboundary movements of hazardous wastes should be reduced to a minimum consistent with the environmentally sound management thereof;
- hazardous waste generation should be reduced and minimised;
- hazardous wastes should be treated and disposed of as close as possible to the source of generation; and
- efforts should be made to assist developing countries and countries with economies in transition in the environmentally sound management of hazardous and other wastes generated by them.

The Basel Convention provides a comprehensive framework for ensuring the environmentally sound management of hazardous wastes, which includes a control regime for the monitoring and control of transboundary movements of such wastes. Restrictions imposed on

⁹⁵ OJ 1993 L 39, p. 1.

transboundary movements include a prohibition on shipments to non-Parties and the need to receive a written confirmation accepting the import from the relevant authorities in the country of import.

A decision to amend the Convention was adopted in September 1995 in order to ban exports of hazardous wastes for final disposal, recovery or recycling from countries listed in a new Annex VII (Parties and other States which are members of OECD, EC, and Liechtenstein) to non-Annex VII countries.

According to Article 1, paragraph 1 (a) of the Convention, any waste containing or contaminated by mercury or its compounds is considered a hazardous waste and is covered by the provisions of the Convention.

More precisely, Annex VIII provides a list of wastes characterized as hazardous wastes under the Basel Convention Article 1.1(a), not precluding the use of Annex III (list of hazardous characteristics) to demonstrate that a waste is not hazardous. Hazardous wastes containing mercury may be found under the following Annex VIII categories (the list below should not be considered exhaustive):

A1010 - Metal wastes and waste consisting of alloys of any of the following:
(...), Mercury, (...);

A1030 - Wastes having as constituents or contaminants any of the following:
(...), Mercury; mercury compounds, (...);

A1150 - Precious metal ash from incineration of printed circuit boards not included on list B;

A1180 - Waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B B1110);

A4020 - Clinical and related wastes; that is wastes arising from medical, nursing, dental, veterinary, or similar practices, and wastes generated in

hospitals or other facilities during the investigation or treatment of patients, or research projects

According to Convention obligations, the transboundary movements of mercury containing wastes that can be considered falling within the scope of the Basel Convention must be controlled. This applies to hazardous wastes containing mercury that are exported for reuse, recovery, recycling and/or for final disposal.

In addition, the general obligations of the Basel Convention concerning the need to manage hazardous wastes in an environmentally sound manner applies to such wastes, including those not being shipped abroad for recovery or disposal operations but which must be managed locally (examples include hazardous wastes from the chlor/alkali process, gold mining, discarding of end-of-life equipments, etc).

6.3 Under regulation No 304/2003 concerning the export and import of dangerous chemicals (implementing the Rotterdam Convention)

On 11 September 1998, the Community signed the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, adopted on 10 September 1998 (hereinafter the “Rotterdam Convention”).

The objective 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 chemicals⁹⁶ is to implement the Rotterdam Convention, to promote shared responsibility and cooperative efforts in the international movement of hazardous chemicals in order to protect human health and the environment from potential harm, and to contribute to their environmentally sound use.

Another objective of the regulation is to ensure that the provisions of Council Directives 67/548/EEC and 1999/45/EC regarding the classification, packaging and labelling of chemicals dangerous to man or to the environment when they are placed on the market in the European Community shall also apply to all such chemicals when they are exported from the

⁹⁶ OJ 2003 L 63, p. 1.

Member States to other Parties or other countries, unless these provisions would conflict with any specific requirements of those Parties or other countries.

6.3.1 The Rotterdam Convention

The objectives of the Rotterdam Convention are:

- To promote shared responsibility and co-operative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm; and
- To contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export, and by disseminating these decisions to Parties.

The Convention establishes the principle that the export of a chemical subject to the Convention can only take place with the Prior Informed Consent (PIC) of the importing party. It establishes procedures for formally obtaining and disseminating the decisions of importing countries as to whether they wish to receive future shipments of specified chemicals and for ensuring compliance with these decisions by exporting countries. It also contains provisions for the exchange of information among Parties about potentially hazardous chemicals that may be exported and imported.

The Convention establishes a specific procedure to identify and include chemicals in the Convention based on actions taken by Parties to ban or severely restrict the use of a pesticide or industrial chemical, or where a Party experiences problems with a severely hazardous pesticide formulation under conditions of use. The Convention initially covers 22 pesticides (including five severely hazardous pesticide formulations) and five industrial chemicals, but many more are expected to be added in the future.

For each chemical subject to the Convention, a “decision guidance document” (DGD) containing information concerning the chemical and the regulatory decisions to ban or severely restrict the chemical for health or environmental reasons and information on alternatives is circulated to importing countries. These countries are given nine months to respond concerning the future import of the chemical. The response can consist of either a

final decision (to allow import of the chemical, not to allow import, or to allow import subject to specified conditions) or an interim response. Decisions by an importing country must be trade-neutral (i.e. apply equally to domestic production as well as to imports). The decisions of the importing country Parties are circulated semi-annually via a PIC Circular, and exporting country Parties are obligated under the Convention to take appropriate measure to ensure that exporters within their jurisdiction comply with the decisions.

The Rotterdam Convention's provisions apply to two categories of chemicals: pesticides and/or industrial chemicals. At present, inorganic mercury compounds, alkyl mercury compounds, alkyl-oxyalkyl compounds and aryl mercury compounds used as pesticides are covered by the Convention. It does not apply to these mercury compounds if they are intended for industrial use. The Convention does not make any specific recommendations with regards to reducing or eliminating use of these mercury compounds as pesticides; however, it ensures that international trade does not take place if an importing Party decides to prohibit use of these compounds as pesticides in the country.

6.3.2 Regulation 304/2003

In its initial proposal, the Commission proposed to use Article 133 EC as a legal basis for the Regulation. However, the Council and the European Parliament considered that Article 175(1) EC was more appropriate than Article 133 EC, given that the aim of the Rotterdam Convention, and therefore of the implementing regulation, was essentially to protect human health and the environment. Such a change in the legal basis involved the codecision procedure rather than the consultation procedure.

Regulation (EC) No 304/2003 lists mercury in the following annexes:

Annex I, part 1 List of chemicals subject to export notification procedure:
Mercury compounds#

Annex I, Part 3 of that annex lists chemicals subject to the PIC procedure under the Rotterdam Convention. It comprises, under the category "Pesticide", mercury compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds.

Annex V Chemicals and articles subject to export ban (Article 14 of the Regulation): Cosmetic soaps containing mercury.

The procedure for updating the Annexes to the Regulation, except Annex V, is prescribed in Article 22 of the Regulation.⁹⁷ As the Commission has already pointed out in its report to the Council, provided that the necessary criteria are fulfilled, metallic mercury could be proposed for inclusion in Annex III to the Rotterdam Convention for the application of the Prior Informed Consent (PIC) procedure to certain hazardous chemicals and pesticides in international trade; it could also be added to Annex I to Regulation (EC) No 304/2003. This would aim at a situation in which companies trading in metallic mercury were more informed about its potential impacts. An obstacle to a successful amendment is that another party to the Convention from another geographical region has to notify metallic mercury as well. According to Euro Chlor and representatives of the chlor-alkali industry, this would be an acceptable means for monitoring commercial trading in metallic mercury.

A more ambitious alternative from an environmental perspective would be to include metallic mercury in Annex V to Regulation (EC) No 304/2003. According to Article 14(2) of Regulation 304/2003, chemicals and articles the use of which is prohibited in the Community for the protection of human health or the environment, as listed in Annex V, shall not be exported. Precedents to that effect are that Polychlorinated biphenyls (PCBs) and Cosmetic soaps containing mercury are already listed under Annex V. Since Annex V is not listed under the applicable procedure for modifying the Annexes under Article 22, an amendment to the Regulation under the normal codecision procedure would be required.

7 PROJECT FINANCING OF INVESTMENTS IN MERCURY DISPOSAL FACILITIES

As the Commission has already stressed, from an environmental perspective final disposal of surplus mercury would be the optimal solution considering that appropriate methods are not yet fully developed and costs are relatively high. The ‘polluter pays’ principle might be applied and could be linked to project financing of investments in mercury disposal facilities.

⁹⁷ Commission Regulation (EC) No 1213/2003 of 7 July 2003 amending Annex I to Regulation (EC) No 304/2003 of the European Parliament and of the Council concerning the export and import of dangerous chemicals, OJ L 169, p. 27.

7.1 Pre-requisites for project financing

In order for a project to qualify for a project finance structure, the following key components are required:

- Private Ownership/operation of facility is permitted;
- Ownership/operation may be transferred to lenders in case of default;
- Adequate revenues must be secured for a substantial period of time;
- The technology to be used must be proven and can be relied upon;
- The project will be operated by a reliable operator;
- The facility and the project has a well defined scope;
- The construction, ownership and maintenance of the facility do not conflict with any laws or regulations including, but not limited to, environmental laws.

7.2 Is project financing of mercury waste disposal facilities feasible?

Assuming that there exists proven technology that may be relied upon in the disposal of mercury in Europe, and assuming further that a reliable operator could be found which would manage a facility of this kind, project financing of a mercury disposal facility would seem to be feasible provided that an adequate revenue flow can be generated and secured.

Apart from certain restrictions that could require special licenses or concessions relating to the handling and treatment of hazardous waste and other environmentally dangerous products, laws and regulations relating to the ownership and operation of mercury disposal facilities would not seem to preclude a project financing structure. The free movement of goods within the EU under the EC treaty and pursuant to EC waste legislation should not constitute an obstacle to securing the necessary and safe transportation of mercury waste from one source within a Member State to a mercury disposal facility in another Member State. Finally, the currency of any revenues generated within the EU would not appear to preclude a project finance structure.

As will be elaborated in greater detail below, the only aspect that seems not to be present, and the absence of which would preclude a project financing structure of a mercury definitive storage facility, is the possibility of securing an adequate revenue flow over an extended period of time.

7.3 Pre-requisites that are currently missing

Two major components for securing robust and reliable revenue flow seem to be missing – (i) a market and (ii) the incentives to enter into long-term contracts or other means to secure a long-term revenue flow.

7.3.1 Creating the market

A market structure would be based on the assumption that there is a market for the service to be provided by the facility. We understand that such market does not exist today but could very well be created through the imposition of a legal regime, at national or at EU level, that prohibits recycling and exports of mercury to third countries and that imposes an obligation on the industry to arrange and pay for appropriate disposal of mercury under the 'polluter pays' principle. Presumably, the industry would not have any interest in investing in mercury disposal facilities and would be willing to outsource this service to other interested parties.

7.3.1.1 Exclusive rights at the national level

In *Dusseldorp*,⁹⁸ the Court held that the grant of exclusive rights for the incineration of dangerous waste on the territory of a Member State as a whole must be regarded as conferring on the undertaking concerned a dominant position in a substantial part of the common market.⁹⁹ Although merely creating a dominant position is not, in itself, incompatible with Article 82 EC, a Member State breaches the prohibitions laid down by Article 86 EC in conjunction with Article 82 EC if it adopts any law, regulation or administrative provision

⁹⁸ Case C-203/96 *Dusseldorp and Others* [1998] ECR I-4075

⁹⁹ Case C-203/96 *Dusseldorp and Others*, cited above, paragraph 60.

which enables an undertaking on which it has conferred exclusive rights to abuse its dominant position.¹⁰⁰

In that case, the Court also considered that an export ban on certain waste, even though the quality of processing available in another Member State was comparable to that performed by the national undertaking, had the effect of favouring the national undertaking by enabling it to process waste intended for processing by a third undertaking. It therefore resulted in the restriction of outlets in a manner contrary to Article 86(1) EC in conjunction with Article 82 EC.

It follows from the case-law of the Court that Article 86(2) EC may be relied upon to justify a measure contrary to Article 82 EC, adopted in favour of an undertaking to which the State has granted exclusive rights, if that measure is necessary to enable the undertaking to perform the particular task assigned to it and if it does not affect the development of trade in a manner contrary to the interest of the Community.¹⁰¹

In *Almelo*,¹⁰² the Court held that restrictions on competition from other economic operators must be allowed insofar as they are necessary in order to enable the undertaking entrusted with such a task of general interest to perform it. In that regard, it is necessary to take into consideration the economic conditions under which the undertaking operates, in particular the costs which it has to bear and the legislation, particularly concerning the environment, to which it is subject.¹⁰³

The Court implicitly accepted in *Dusseldorp* that the management of particular waste may be considered as service of general economic interest. In *Sydhavnens*,¹⁰⁴ the Court explicitly acknowledged that the management of particular waste may properly be considered to be capable of forming the subject of a service of general economic interest, particularly where the service is designed to deal with an environmental problem.¹⁰⁵

¹⁰⁰ Case C-203/96 *Dusseldorp and Others*, cited above, paragraph 61.

¹⁰¹ Case C-203/96 *Dusseldorp and Others*, cited above, paragraph 65; see also, to that effect, Case C-320/91 *Corbeau* [1993] ECR I-2533, paragraph 14, and Case C-159/94 *Commission v France* [1997] ECR I-5815, paragraph 49.

¹⁰² Case C-393/92 *Almelo*, ECR [1994] I-1477.

¹⁰³ Case C-393/92 *Almelo*, cited above, paragraph 45.

¹⁰⁴ Case C-209/98 *Sydhavnens Sten & Grus* [2000] ECR I-3743.

¹⁰⁵ Case C-209/98 *Sydhavnens Sten & Grus*, cited above, paragraph 75.

In that case, the Court held that the grant of an exclusive right over part of the national territory for environmental purposes, such as establishing the capacity necessary for the recycling of building waste, does not in itself constitute an abuse of a dominant position.¹⁰⁶

The Court also pointed out that it follows from the combined effect of paragraphs 1 and 2 of Article 86 EC that paragraph 2 of that provision may be relied upon to justify the grant by a Member State, to an undertaking entrusted with the operation of services of general economic interest, of exclusive rights which are contrary to, in particular, Article 82 EC. The condition is that the performance of the particular task assigned to such undertaking can be assured only through the grant of such rights and provided that the development of trade is not affected to such an extent as would be contrary to the interests of the Community.¹⁰⁷

In other words, even if the grant of an exclusive right led to a restriction of competition in a substantial part of the common market, such grant could be regarded as necessary for the performance of a task serving the general economic interest.¹⁰⁸ Granting exclusive rights at a national level to set up a mercury disposal facility, particularly where the service is designed to deal with an environmental problem, is thus in line with the case-law of the Court.

7.3.1.2 A licensing system at Community level

A difficulty that would arise is to what extent a company investing in a mercury disposal facility could expect to enter into long-term contracts with the chlor-alkali industry. This would be the case if the company obtained a license to definitively store mercury, but such license would presumably only be valid in the Member State where such license has been issued, whereas the market presumably would be the EU as a whole.

Ideally, an EU license regime would need to be implemented with identical requirements being imposed in all Member States in order to secure a level playing field for all interested parties investing in mercury disposal facilities in the EU. As has been pointed out above, the PCB/PCT Directive constitutes a legislative precedent to this effect.

¹⁰⁶ Case C-209/98 *Sydhavnens Sten & Grus*, cited above, paragraph 68.

¹⁰⁷ Case C-209/98 *Sydhavnens Sten & Grus*, cited above, paragraph 74.

Indeed, in order to dispose of metallic mercury, because of the inherent risks it presents for the environment and for human health, the Community legislator would have to consider that general obligations concerning the controlled disposal of metallic mercury were necessary. Since it would not be cost-efficient for all Member States to establish mercury disposal facilities, the proximity principle should also in this case be interpreted in a flexible manner so as to permit European solidarity in this area. Under such a scheme, Member States should take the necessary measures to ensure the disposal of used metallic mercury. By way of derogation from Article 3 of the Waste Framework Directive, Member States should also prohibit the recovery or separation of metallic mercury from other substances and from decommissioned cells for the purpose of reusing it. Member States would also have to take the necessary measures to ensure that metallic mercury is transferred to licensed undertakings and that all undertakings engaged in the disposal of mercury obtain permits.

In the absence of such an EU license regime, investors and the industry are faced with the risk and the possibility of other mercury treatment facilities being constructed in other Member States in which the costs of disposing of mercury are substantially lower due to the specific legal requirements in that Member State.

From the investor perspective, this is a clear risk which is difficult to mitigate since it requires long-term contracts that are difficult to obtain. The industry would be careful to avoid long-term contracts since other opportunities could arise that, from a cost perspective, might be more attractive. If the investment in a mercury disposal facility requires a substantial investment, the risks involved would most probably seem prohibitive. In other words, no investments would be made in such facilities.

Furthermore, in order to create a market within the EU, a comprehensive regime is required whereby any “leakage” of mercury to third countries is prohibited. We will not address the specific requirements of such a regime but, in order to protect the interest of an investor that is interested in investing in a mercury disposal facility within the EU, such a regime and the enforcement of the specific regulations are critical elements for any project financing. If enforcement cannot be relied upon, or the regime contains loopholes that would enable a

¹⁰⁸ Case C-209/98 *Sydhavnens Sten & Grus*, cited above, paragraph 81.

substantial “leakage” of mercury to third countries, project financing would not be possible since the market would be too unreliable.

7.3.2 Creating a long-term revenue flow

The investor in a mercury definitive storage facility needs long-term revenues in order to make any project finance structure possible. There are, in principle, two ways of securing such long-term revenue flow.

7.3.2.1 Public Procurement and State-Financed Service Fee

A Member State may procure mercury disposal services through public procurement. The company that intends to invest in, construct and operate a mercury disposal facility and that is awarded the contract through a public procurement procedure would receive a concession to operate such facility within a certain geographical area for a limited but extended period of time. The Member State would provide a structured fee for the provision of such services and presumably, the party that offers the lowest fee while still being able to fulfil the minimum requirements set forth in the procurement would be awarded the contract. Through a structured fee that would be payable throughout the concession period, the investor would obtain the secure revenues that would make a project finance structure possible. In fact, with this structure, project finance would probably be a rather feasible venture.

The advantage of such a structure is that the existence of a State-financed structured fee would provide comfort to lenders. Lenders (and the investors) would not have to consider the credit risk of the industry as such. The disadvantage of such a structure is that a single Member State might not have enough mercury to create a sufficiently robust revenue flow and the Member State would be unwilling to finance the definitive storage of mercury from other Member States without being compensated therefor by the EU or the other Member States. Another disadvantage of this structure is that it would require the involvement of the Member State in the financing, although the Member State (or the EU as the case may be) may require a fee to be paid by the industry to the Member State for providing this service under the 'polluter pays' principle.

7.3.2.2 *Long-term Off-take Agreements*

Another method of obtaining a robust and reliable revenue stream would be through long-term (10-25 years) off-take agreements between the industry and the company investing in the mercury disposal facility. This structure is most commonly used in project financing of large-scale power projects in less developed markets, but could of course be used in financing mercury disposal facilities.

The advantage of this structure is that no procurement is necessary since the supplier of the services is not given any exclusive rights to a specific market. However, the drawback and disadvantage is that the company, having invested in the mercury disposal facility, will be exposed to the credit risk of the clients and the market risk as a whole. A strong incentive must exist for the industries to enter into long-term off-take agreements with the company investing in the mercury disposal facility and the volume of discarded mercury must be known in advance. Furthermore, the volume of potential competitors possessing the capacity to dispose of the mercury should also be known and, perhaps, be regulated such that only a number of facilities are constructed. Without a long-term off-take agreement that at least covers the term of the loans, project finance will not be an option unless the disposal of mercury has substantial growth potential and the obligation to dispose of the mercury at a facility within the EU remains unchanged throughout the investment period.

Unlike project finance of power projects, lenders would most probably be very concerned about the risk of a change in law to which any project based on this structure would be exposed. A market that is entirely based on regulations is very vulnerable to changes in such regulations.

7.3.2.3 *The Euro Chlor – MAYASA agreement may constitute an obstacle to project financing of a mercury disposal facility*

As pointed out above, Euro Chlor has signed an agreement with the state-owned *Miñas de Almadén y Arrayanes SA* - MAYASA of Spain, one of the world's most important mercury producers and marketers. We have not been able to consult these agreements since they are covered by commercial confidentiality. It is therefore outside the remit of the present legal

opinion to make an assessment of the position of *Minas de Almadén y Arrayanes SA* under EC competition rules, in particular Articles 81, 82 and 87 EC.

We have consequently not considered the validity of the contractual relationships between Minas de Almadén and the members of Euro Chlor under Articles 81 and 82 EC, insofar as they may or may not directly or indirectly fix trading conditions, limit production, make the conclusion of contracts of sale of mercury subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts, or constitute an abuse of a dominant position. According to representatives of the chlor-alkali industry, the agreement between MAYASA and Euro Chlor has been notified to the Commission for a negative clearance under Article 81 EC, and the Commission is reported to have requested further information on the agreement(s). The outcome of those proceedings is to date not known.

Nor have we made any assessment as to whether alleged state aids granted to MAYASA or its holding company are compatible with the common market, to the extent they may distort or threaten to distort competition by favouring certain undertakings or the production, recycling or disposal of mercury, insofar as it affects trade between Member States. It is also unclear whether or not the subsidies from the Spanish State have been notified to the Commission under Article 87 EC and whether Minas de Almadén is operating within the framework of EC waste legislation.

However, these issues are relevant with respect to the possibilities to promote project financing of investments in mercury disposal facilities. It is sufficient to note that both the state aid involved and the contractual relationship between Minas de Almadén and the European chlor-alkali industry may create barriers to the entry into long-term contracts with the chlor-alkali industry by other companies that wish to invest in mercury disposal facilities.

8 CONCLUSIONS

To conclude, provided there is a political will at Community level, there are various legal bases within the existing framework for restricting metallic mercury from decommissioned cells of chlor-alkali plants from reaching the global market. There is a strong likelihood that mercury from discarded cells from the chlor-alkali industry already falls within the common

definition of waste under EC law. Further regulatory action is nevertheless needed to restrict the possibilities to recover the metallic mercury.

In the absence of regulatory progress and/or a common understanding among the stakeholders of the necessity to ban or at least to restrict the export of metallic mercury to third countries, national authorities, environmental interest groups and/or the chlor-alkali industries which, *under national law*, are required to dispose of the mercury in an environmentally responsible manner, should consider the option to institute legal proceedings before national courts and/or before the Community Courts. This would clarify whether or not mercury from decommissioned cells in chlor-alkali plants in other Member States falls within the *EC waste definition*.

It is only once this issue is definitely settled by the Court that it will be possible to assess whether a ban on the export of mercury to third countries can be achieved through the existing Waste Shipment Regulation, by amending that regulation or by using a different legal basis.

However, it must be stressed that the classification of mercury from decommissioned chlor-alkali cells as waste does not solve the problem of exports to third countries. Indeed, such mercury may, at a certain given point in time, cease to be waste once it has undergone a recovery operation by a third party. The EC waste legislation should therefore under all circumstances be supplemented with restrictions on the marketing, use, recovery and the export of metallic mercury.

If the Community legislator were to consider it necessary to adopt general obligations concerning the controlled disposal of mercury because of the risks it presents for the environment and for human health, the correct legal basis for such an act would be Article 175 EC. Such an act would be adopted under the codecision procedure in article 251 EC. A legislative precedent to this effect is Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT).¹⁰⁹

A sectorial approach does not seem to be a suitable legal basis for addressing the environmental issues arising from the safe disposal of metallic mercury from decommissioned

¹⁰⁹ OJ 1996 L 243, p. 31.

cells from the chlor-alkali industry. Nevertheless, the upcoming legislative initiatives of the Water Framework Directive, read in conjunction with Article 9 (4) of the IPPC Directive, which states that in all circumstances the conditions of a plant permit must contain provisions on the minimization of long-distance or transboundary pollution and ensure a high level of protection for the environment as a whole, may constitute an alternative legal basis for regulating metallic mercury from decommissioned cells in the chlor-alkali industry.

Under all circumstances, since mercury as such does not constitute waste, it is necessary to find another legal basis under EC law in order to restrict or ban the export of mercury to third countries. A ban could be achieved, *inter alia*, by including mercury in Annex I of Council Directive 76/769/EEC of 27 July 1976 on the approximation of laws, regulations, and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations.¹¹⁰

By introducing a general ban on the use of mercury within the Community, the holders of that substance would, with all likelihood, also be required to dispose of it under the EC waste legislation. Thereby, the existing export ban under the Waste Shipment Regulation would be applicable.

Another alternative from an environmental perspective would be to include metallic mercury in Annex V to 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.¹¹¹ According to Article 14(2) of Regulation No 304/2003, chemicals and articles the use of which is prohibited in the Community for the protection of human health or the environment, as listed in Annex V, shall not be exported. Precedents to that effect are that Polychlorinated biphenyls (PCBs) and Cosmetic soaps containing mercury, which are already listed under Annex V. Since Annex V is not listed under the applicable procedure for modifying the Annexes under Article 22 of the Regulation, an amendment to the Regulation under the normal codecision procedure would be required.

¹¹⁰ OJ 1976 L 262, p. 201, as amended by Council Directive 89/677/EEC of 21 December 1989 amending for the eighth time Directive 76/769/EEC, OJ 1989 L 398, p. 19.

¹¹¹ OJ 2003 L 63, p. 1.

A more limited approach would be to restrict the export of mercury to third countries by requiring Prior Informed Consent (PIC) by the recipient state. This could be achieved by including mercury in another of the Annexes to Regulation No 304/2003.

Assuming that there exists proven technology that may be relied upon in the disposal of mercury waste in Europe, and assuming further that a reliable operator could be found which would manage a facility of this kind, project financing of a mercury waste disposal facility would seem to represent a feasible alternative, provided that an adequate revenue flow can be generated and secured.

Apart from certain restrictions that could require special licenses or concessions relating to the handling and treatment of toxic waste and other environmentally dangerous products, laws and regulations relating to the ownership and operation of mercury disposal facilities would not seem to preclude a project financing structure. The regulated movement of goods within the EU under EC waste legislation should not be an obstacle to guaranteeing the necessary transportation of mercury waste from one source within a Member State to a disposal facility in another Member State. Finally, the currency of any revenues generated within the EU would not appear to preclude a project finance structure.

The only matter that seems not to be in place, and the absence of which would preclude a project financing structure of a mercury waste disposal facility, is the possibility of securing an adequate revenue flow over an extended period of time. An export ban on mercury to third countries at the EU level and a ban on recovery therefore seem to constitute conditions *sine qua non* for the realisation of project financing of a mercury disposal facility in Europe.

Stockholm, March 9th, 2004

Ulf Öberg

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
1 Congress Street, Suite 1100
BOSTON, MA 02114-2023

August 1, 2002

Patricia H. Duft
Staff Vice President, Legal Dept.
Mallinckrodt, Inc.
675 McDonnell Blvd.
St. Louis, MO 63134

Re: Regulatory Interpretation Regarding Mercury From the HoltraChem Manufacturing Company Facility in Orrington, Maine

Dear Ms. Duft:

This is in response to your request for a regulatory interpretation dated May 10, 2002 regarding mercury from the HoltraChem Manufacturing Company facility in Orrington, Maine.

SUMMARY OF REQUEST

You report that there is approximately 84 tons of free-flowing elemental mercury currently being stored in Orrington. The mercury previously was used in mercury cells at the HoltraChem chlor-alkali facility during the production process to manufacture chlorine. For economic reasons, the HoltraChem Manufacturing Company ceased operations at the Orrington facility in September 2000, and the mercury has been stored on site since that time.

According to your letter and a materials Profile submitted with your letter, the mercury is more than 99% pure. Subsequent to your letter, this purity level has been confirmed by having a sample of the mercury analyzed by an independent laboratory, showing a purity level of 99.994%. You note that in the chlor-akali facility process, the mercury did not chemically react with any of the other materials. It thus did not become contaminated with other materials, and also was not used up or depleted. But for the closure of the plant, it could have continued to be used, as is, in the manufacturing process.

As a prior site owner, Mallinckrodt, Inc. currently is carrying out certain RCRA corrective action remediation activities at the HoltraChem facility. The continued storage of the mercury on site is impeding Mallinckrodt's ability to continue these activities.

The mercury has been offered for sale to Mercury Waste Solutions, Inc. ("MWS"). MWS is in the business of reselling mercury in commerce. You report, however, that pursuant to Agreements planned to be signed by MWS and the Natural Resources Council of Maine ("NRCM"), the mercury temporarily will be stored at MWS's facility in Union Grove,

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Wisconsin rather than immediately being resold as a product. According to drafts of the Agreements submitted to the EPA on August 1, 2002, the mercury will be stored for at least four years. At the end of the four-year period, MWS and NRCM may continue the storage on an annual basis, not to exceed a total storage period of eight years. At the request of the NRCM, MWS has agreed that if during the period of storage, there is a change in current law, regulations and/or policy, and a mercury retirement policy is established, MWS will sell the mercury to the United States government or another entity in accordance with the retirement policy. However, MWS has reserved the right to sell the mercury in commerce at the end of the first four year storage period, if MWS determines that it could be adversely impacted by major changes in cost structure or regulations by continuing to store the mercury. In any event, unless there is a change in law, regulations and/or policy, MWS has the right, and intends, to sell the mercury in commerce by no later than the end of the eight year storage period. The mercury does not need to be reclaimed by MWS prior to reselling it as a product since it is already greater than 99% purity. MWS has no plans to refine the mercury to further increase the purity, at this time.

You request a regulatory interpretation as to whether the mercury may be handled as a product, rather than as a hazardous waste under the federal regulations promulgated pursuant to the Resource Conservation and Recovery Act ("RCRA"). Although you believe that the mercury is a product, you note that MWS is a licensed hazardous waste storage facility, and has agreed to store the mercury in accordance with safe handling requirements. According to the draft Agreements submitted to the EPA, the mercury will be stored in containers which will be inspected daily to ensure their integrity, inspected weekly with full documentation, and monitored by mercury vapor analyzers to ensure proper containment. You further note that the mercury will be transported from Maine to Wisconsin by a licensed hazardous waste transporter.

RESPONSE

Maine and Wisconsin both have been authorized by the EPA to administer State hazardous waste programs. Thus whether the mercury is a product or hazardous waste must be determined in accordance with Maine law which applies until the mercury leaves Maine and in accordance with Wisconsin law which will apply once the mercury reaches Wisconsin. However, the EPA is responding to your regulatory interpretation request in order to provide you with guidance regarding the federal hazardous waste regulations, since the federal regulations set the requirements which all States must follow at a minimum.

EPA Region I is responding to your request because whether a material is a hazardous waste must initially be determined by the generator where the material is generated, and the mercury has been generated in this Region. However, since the plan is to ship the mercury to a facility within EPA Region V, we have consulted with that EPA Region and with the Office of Solid Waste at EPA Headquarters prior to sending you this response.

In response to your request, we agree, first, that mercury which is at least 99% pure is of product quality. The EPA consistently has stated that 99% pure mercury is of product quality because it is reusable as is, or requires only further refining (e.g., to 99.99% purity), rather than more substantial reclamation, to be reusable. See Letter from Matthew A. Straus, EPA Office of Solid Waste, to D.F. Goldsmith Chemical and Metal Corp. dated January 21, 1986; Letter from Matthew A. Straus, EPA Office of Solid Waste, to Bethlehem Apparatus Company, Inc., dated May 30, 1986; Letter from David Bussard, EPA Office of Solid Waste,

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to Appropriate Technologies, II, Inc., dated March 19, 1991. Thus the HoltraChem mercury appears to be of product quality.

Although the HoltraChem mercury was used in an industrial process, we agree that it has retained its status as a commercial chemical product rather than becoming a spent material. Under the federal regulations, a spent material is “any material that has been used and as a result of contamination can no longer serve the purpose for which it was produced without processing.” 40 C.F.R. § 261.1(c)(1).

While the HoltraChem mercury has been used, neither contamination with impurities nor any other factor or circumstance has caused this mercury to become unsuitable for commercial purposes or to need reprocessing. Thus the mercury has not become “spent.”

As a commercial chemical product, the HoltraChem mercury is not subject to regulation as a hazardous waste under the federal regulations so long as it is not “discarded.” Commercial chemical products being stored for the purpose of disposal are considered to have been “discarded” and thus are subject to regulation. See 40 C.F.R. § 261.2(b)(3). However, commercial chemical products being stored in order to be recycled as products are not considered to have been “discarded,” unless they are burned for energy recovery or used in a manner constituting disposal. See id. § 261.2(c). See also 40 C.F.R. § 261.33.

Whether the HoltraChem mercury when shipped to MWS will become “discarded” depends upon the particular arrangement made with MWS. Based on your representations regarding the terms of agreement, and our review of the draft Agreements, it appears that the mercury will retain its product status under the federal regulations when being stored by MWS, unless and until a determination is made that the mercury will be “retired.”

The key element of the arrangement (as represented by you and reflected in the draft Agreements), that will give this mercury continued product status, is that MWS has the right, and intends, to sell the mercury for commercial purposes at the end of the storage period, unless there is a law, regulatory and/or policy change. That the mercury might be retired if there is a law, regulatory and/or policy change simply means that the mercury may become “discarded” at a future point; it does not make the mercury a hazardous waste at this point. That the mercury may be stored for as long as eight years prior to being resold also does not remove its product status, in the particular circumstances of this case. In other circumstances, the EPA might question the legitimacy of a claim that commercial chemical products being stored long-term without being sold are products. In this case, however, there is a commercial market for mercury such that the HoltraChem mercury could be immediately resold. It will be stored only in response to the concerns of environmental organizations, in order to help promote an environmental purpose. We do not think that RCRA should be interpreted to impose greater regulation on a company which plans to sell a product (absent a law, regulatory and/or policy change) after promoting an environmental purpose than would be imposed in the absence of carrying out the environmental purpose.

In answering your inquiry, we have assumed that the HoltraChem mercury is a secondary “material” potentially subject to regulation under RCRA, since the mercury was used in an industrial process. However, so long as it is recycled back into commerce or stored in order to be recycled back into commerce, the mercury (even if a secondary material) will remain classified under the federal regulations as a non-regulated product. See 40 C.F.R. § 261.2(c). So long as the mercury retains its product status, it will not be subject to any RCRA

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regulatory requirements under the federal regulations. In particular, the limitations on storage time set by RCRA section 3004(j), 42 U.S.C. § 6924(j), and 40 C.F.R. § 268.50 will not apply. The speculative accumulation provisions in 40 C.F.R. § 261.2 also will not apply, since commercial chemical products are not subject to these speculative accumulation requirements. See id., Table 1.

We recognize that the Maine Department of Environmental Protection has determined that the HoltraChem mercury is a hazardous waste under Maine State law. The State acted pursuant to its authority under RCRA to impose requirements which go beyond the minimum federal hazardous waste requirements. However, Maine's interpretation does not set a precedent for interpreting the federal RCRA regulations. The federal and Maine RCRA regulations are worded quite differently. Maine generally regulates as a waste any substance or material which is "unwanted" by the generator of the material "whether or not such substance or material has any other or future use." Maine Hazardous Waste Management Rules, Chapter 850, section 3A.

In contrast, as noted above, under the federal regulations, when a commercial chemical product is unwanted by the generator, it may nevertheless be handled as a product, providing that it is being recycled for another or future commercial use. There thus is no inconsistency between classifying the mercury as a hazardous waste under Maine law and classifying it as a product under the federal regulations.

As a result of the Maine classification, the HoltraChem mercury will need to be handled as a State-only hazardous waste until it leaves the State of Maine. It will need to be shipped to the State of Wisconsin under a hazardous waste manifest using a licensed hazardous waste carrier. As a licensed hazardous waste storage facility, MWS will need to sign on the manifest that it has received this hazardous waste. However, once MWS has received and signed for the mercury, it will then be able, according to the federal regulations, to convert the mercury back to product status.

Our determination that the HoltraChem mercury may be handled as a product is subject to the following important qualifications. First, it is of course based on all of the representations contained in your letter being accurate. Second, as indicated above, the actual determination of whether the mercury will be a product or a hazardous waste when stored in the State of Wisconsin needs to be made in accordance with Wisconsin law. We suggest that Wisconsin State authorities be contacted in advance of any shipment to that State, to obtain their interpretation. As noted above, a State has the right to impose requirements which go beyond the minimum federal hazardous waste requirements. Third, even if State hazardous waste regulatory requirements are determined not to apply to the storage of this mercury in Wisconsin, it is imperative that the mercury be safely stored. Among other things, poor management of the mercury could suggest that the mercury was not being carefully handled as a valuable product and thus could call into question its classification as a product. For this reason as well as safety reasons, we support the plan to include, in the Agreements with MWS, specifications regarding how the mercury will be stored.

Finally, if and when a decision is made to retire the mercury (including if there is storage for the purpose of retirement), further guidance from the EPA and the relevant State authorities should be sought. As indicated above, under current federal RCRA regulations, mercury being retired or stored for the purpose of retirement would need to be handled as a hazardous waste.

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I hope that this answers your questions and that the important task of removing this mercury from the HoltraChem facility now moves forward. Should you have any further questions or concerns, please feel free to contact me at tel: 617-918-1631 or Jeffry Fowley in our Office of Regional Counsel at tel: 617-918-1094.

Sincerely,

Marvin Rosenstein, Chief
Chemical Management Branch

cc: Robert Dellinger, EPA Office of Solid Waste
Robert Springer, EPA Region V
Michael Ellenbecker, Wisconsin DNR
Scott Whittier, Maine DEP