UNITED NATIONS

EP

UNEP(DTIE)/Hg/OEWG.2/6

Distr.: General
14 July 2008

Original: English

United Nations Environment Programme

Ad Hoc Open-ended Working Group on Mercury
Second meeting
Nairobi, Kenya
6–10 October 2008
Item 3 of the provisional agenda*

Review and assessment of options for enhanced voluntary measures and new or existing international legal instruments

Report on current supply and demand for mercury, including projections considering the phase-out of primary mercury mining

Note by the secretariat

1. The Governing Council of the United Nations Environment Programme, in its decision 24/3 IV on chemicals management, established an ad hoc open-ended working group of Governments, regional economic integration organizations and stakeholder representatives to review and assess options for enhanced voluntary measures and new or existing international legal instruments for tackling the global challenges presented by mercury.

2. At its first meeting, the Ad Hoc Open-ended Working Group on Mercury requested the secretariat to undertake intersessional work in a number of areas in preparation for its second meeting.

3. The secretariat requested information from Governments, intergovernmental organizations and non-governmental organizations. Information submitted has been made available on the website of the mercury programme (http://www.chem.unep.ch/mercury) and has been used in the preparation of the assessment of the global supply of and demand for mercury.

4. The report provides an assessment of whether projected demand could be met if primary mining were phased out. It also provides, based on available information, a brief summary of major sources of mercury releases by country, or if unavailable, by region, drawing upon, among other sources, the atmospheric emission study that is being prepared for the Governing Council of the United Nations Environment Programme. It covers the following areas: emissions from coal-fired power plants; industrial emissions (e.g., waste combustion, non-ferrous metals and cement production); artisanal gold-mining use and emissions; and use of mercury in products and processes.

5. The report comprises an executive summary and a detailed discussion. For ease of reference, the executive summary has been reproduced in the annex to the present note. The full report, including both the executive summary and the detailed discussion, will be presented as an addendum to the present note under the symbol UNEP(DTIE)/Hg/OEWG.2/6/Add.1. Both the executive summary and the full report are being circulated as submitted and have not been formally edited.

* UNEP(DTIE)/Hg/OEWG.2/1.

K0841646 230808

Suggested action

6. The Ad Hoc Open-ended Working Group on Mercury may wish to note the findings of the report in relation to likely ongoing demand for mercury and the ability for such demand to be met from sources other than primary mining.

Annex

UNITED NATIONS
ENVIRONMENT PROGRAMME
CHEMICALS

UNEP

Meeting projected mercury demand without primary mercury mining

requested by
the Ad Hoc Open-Ended Working Group on Mercury

July 2008

Executive summary

1. Rationale for this study

The UNEP Governing Council established the Ad Hoc Open-Ended Working Group on mercury (OEWG) to, review and assess options for enhanced voluntary measures and new or existing international legal instruments to deal with global mercury problems. One of the highest priorities is reducing the supply of mercury to the global market, with a special focus on phasing out the production of new mercury (i.e., from mercury mines) because this mercury increases directly the total quantity of mercury circulating in the economy. In November 2007, the OEWG requested the UNEP secretariat to study whether future mercury demand could be met if mercury mining were to be phased out, in particular consideration of mercury mining for export, currently carried out only in Kyrgyzstan.

2. Mercury from primary mining

Kyrgyzstan is the only country currently mining significant quantities of mercury for export. China mines mercury for its own needs and does not export liquid mercury, while mercury mines in Spain and Algeria have closed, and no longer supply mercury to the global market (see table below).

Major mercury mine production, 2000-2005

Mercury mining (metric tonnes)	***2000***	***2001***	***2002***	***2003***	***2004***	2005
Spain	236	523	727	745	0	0
Algeria	216	320	307	234	90	0
China	203	193	495	612	700-1140	800-1094
Kyrgyzstan	590	574	542	397	488	304

3. Global mercury consumption

The following table shows the consumption of mercury by major uses in 2005, as well as projections of future consumption through 2015. Two future scenarios are described. The first scenario represents the highest future consumption, reflecting trends, legislation and modest initiatives that are already in place. The second scenario[1] reflects lower levels of mercury consumption in products containing mercury. These targets will depend to some extent on more progressive measures such as new political initiatives, special funding or other encouragement that has not yet been confirmed.

[1] Developed by the UNEP Global Mercury Partnership within the Reduction of mercury in product partnership area.

Global mercury consumption, 2005-2015

Application	Consumption range 2005 (tonnes)	Conservative "status quo" projections to 2015	More progressive UNEP Product Partnership targets for 2015
Artisanal mining	650 - 1000	no significant change	not applicable*
VCM/PVC	715 - 825	increase to 1250, followed by gradual decrease	not applicable*
Chlor-alkali	450 - 550	reduction of 30%	not applicable*
Batteries	260 - 450	reduction of 50%	reduction of 75%
Dental amalgam	300 - 400	reduction of 10%	reduction of 15%
Measuring & control devices	300 - 350	reduction of 45%	reduction of 60%
Lamps	120 - 150	reduction of 10%	reduction of 20%
Electrical & electronic devices	170 - 210	reduction of 40%	reduction of 55%
Other applications	200 - 420	reduction of 15%	reduction of 25%
Total consumption	3,165 - 4,365		
Recycled & recovered mercury	(650 - 830)	increase from 20% of consumption to about 28%	not applicable*
Net consumption	2,500 - 3,500		

* not covered within the products partnership

In most cases mercury consumption through 2015 is expected to decline. However, a reduction of mercury consumption in artisanal gold mining cannot be expected without a focused effort to address this use of mercury. Likewise, despite initial steps taken by the Chinese government, the consumption of mercury in the production of vinyl chloride monomer (VCM) and polyvinyl chloride (PVC) is expected to increase further before it decreases.

4. Future mercury consumption vs. mercury supply

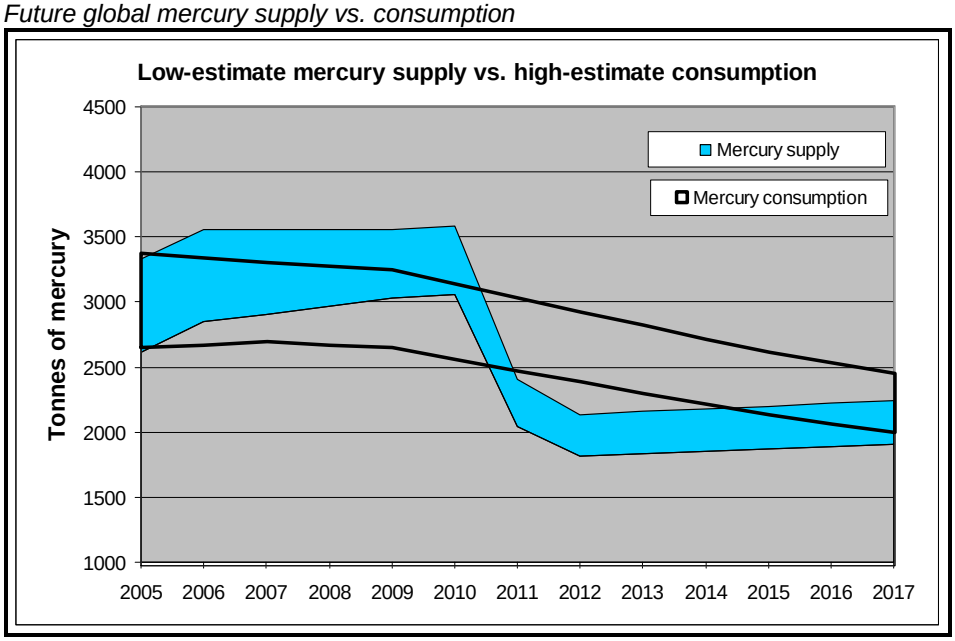
With regard to the next 10 years, this report assumes three major disruptions to mercury supplies. Most importantly, the a ban on the export of mercury from the European Union will enter into effect in 2011. This will remove from the global supply mercury mainly recovered from the EU chlor-alkali industry, as well as mercury from smelting of ores and natural gas cleaning.

The second disruption to supply is the potential phase-out of mercury mining in Kyrgyzstan. It is assumed, merely for the purpose of this analysis which requested consideration of the effects of closing all primary mercury mines, that mine production would cease in 2011. It is noted that the reserves available in Kyrgyzstan for commercial development will support production at current levels for only another 8 to 10 years, with a subsequent reduction in production even without a policy decision to close the mine.

The third disruption, included to ensure that this analysis considers the "worst case" mercury supply scenario, assumes a decline in Chinese mercury mine production from 2012, based on limited mine reserves.

These disruptions, which have an additive effect, are reflected in the following graph of future mercury supply and consumption, comparing the lower estimates of mercury supplies with the higher estimates of mercury consumption in order to visualize the "worst-case" scenario.

Future global mercury supply vs. consumption



Reflecting the various supply disruptions, this figure reveals a sharp reduction in mercury supply in 2011-2012.

However, even if this "worst case" scenario were to occur, the cumulative deficit in mercury supply compared to consumption for the entire period 2005-2017 is only 1500-1600 tonnes, or one-half of the global consumption in 2005. In the mercury marketplace, over a 10-year period, it is normal for mercury surpluses generated in some years to be stored and later retrieved when there is an insufficient supply.

Nevertheless, in the event that further mercury supplies might be required, there are other sources available to meet the deficit. Additionally, there would be some flexibility in the potential closure date of the Kyrgyzstan mine, should it be considered essential.

5. Alternative sources of mercury

There are a number of sources of mercury – other than mining – that are typically exploited to satisfy demand. The most important of these is mercury from the chlorine industry. There is a large quantity of mercury at the bottom of the production "cells" that is necessary for the mercury process to function properly. When a "mercury cell chlor-alkali" facility is closed or converted to a mercury-free process, the mercury is removed from the cells.

While not a "source" of mercury in the same sense, mercury recycled or recovered from products (thermometers, dental fillings, fluorescent lamps, batteries) and other manufacturing processes also reduces the need for newly mined mercury. Likewise, mercury may be recovered from sludges and wastes such as those generated by the chlor-alkali industry.

The largest inventory of commercially available mercury held by a single organisation is in Spain. This inventory has been accumulated over a number of years from various sources, and continues to be sold as needed to many of the long-time customers of the now-closed mercury mine.

Zinc, copper, lead and other non-ferrous ores often contain trace concentrations of mercury. Due to the high temperatures of the smelting process, trace mercury is typically emitted to the atmosphere unless it is intentionally captured before release. Because of the enormous quantities of ore processed globally, the mercury potentially available from these "by-product" sources is significant. Likewise, most natural gas contains mercury in trace quantities that is typically removed when the gas is "cleaned."

The quantities of mercury supplied by these sources are quite variable from one year to the next. Because they are so diverse, they are able to respond relatively rapidly to changing demand. At the same time, however, their diversity also makes these sources more difficult to monitor with any precision.

The following table summarises the main sources of mercury as described above. The key sources at present are mined mercury and mercury recovered from the chlor-alkali industry.

Global mercury supply, 2005

Key sources	**Mercury supply (metric tonnes)**
Mercury mining	1150-1500
By-product mercury from other ores, including natural gas cleaning	410-580
Recycled Hg from Hg-added products & processes	a)
Mercury from chlor-alkali cells (after decommissioning)b)	700-900
Stocks and inventories	300-400
Total	**2560-3380**

Notes:
a) Included in previous table to determine "net" mercury consumption.
b) "Mercury from chlor-alkali cells" is elemental mercury removed from cells after they have stopped operating.

In some cases the cost of mobilising additional mercury sources would be a major consideration. In other cases, the cost has less relevance. For example, since recycling is an increasingly viable waste treatment option, mercury recovered from waste is typically already paid for by the organisation that sends mercury waste to a recycler. On the other hand, if one were to install equipment to remove mercury from industrial flue gases for the sole purpose of increasing the mercury supply, the cost would be prohibitive.

The following table suggests that substantial additional mercury may be recoverable from various sources at an equivalent cost of up to $US 50/kg, which is considered to be close enough to the present mercury price that these sources may be considered as viable additional resources. The table also indicates further quantities of mercury that may be available at 4-5 times the present price. An increase of this magnitude occurred between the middle of 2003 and the middle of 2005, and may be seen again under expected circumstances of tightening supplies around 2011-2012.

Additional mercury recoverable from major sources at reasonable cost (tonnes/year)

Enhanced recovery of mercury from:	Mercury consumption	Already recovered as metallic mercury	Additional Hg recoverable at < $50/kg Hg	Additional Hg recoverable at $50-100/kg Hg
Artisanal mining	650-1000	~0	400-500	100-200
VCM/PVC production	715-825	350	100-150	150-200
Chlor-alkali industry	450-550	100-120	80-100	80-100
Dental amalgam	300-400	50-80	0	0
Other mercury-added products, and "other" applications	1050-1580	150-250	100-200	100-200
By-product (non-ferrous metal mining, natural gas) sources	1100-1400	400-600	50-100	100-150
Coal combustion emissions	~1500	minimal	0	0
Total			**750-1000**	**550-800**

6. Key observations

There are two key observations that stand out in particular as a result of this analysis. First, apart from the present situation in China, mercury mining is not essential. The contributions of Kyrgyzstan to the global mercury supply over many years have been important but not indispensible. The recent experience in closing both Spanish and Algerian mining operations, which represented a much larger part of the global mercury supply than does Kyrgyzstan's mine, have demonstrated that mercury demand can readily be met without primary mercury from Kyrgyzstan.

Second, experience has also demonstrated that the various elements of global mercury markets work effectively according to basic market principles. The closure of the important mercury mine in Spain, closely followed by the mine in Algeria, in 2003 and 2004 were followed by sharp mercury price increases. As a result, global mercury consumption in products decreased, while a variety of non-mining sources of mercury scrambled to meet demand. Once a new supply-demand equilibrium was achieved, the price of mercury eased somewhat, although it remained several times higher than its pre-2003 level.

As a result of the volatility surrounding these market adjustments, a greater variety and greater quantities of mercury waste are now treated for recovery than previously, more mercury-containing products are separated from the waste stream, more by-product mercury is generated, and more mercury is now held in storage to deal with future supply disruptions. In other words, the global supply of mercury has become more diverse, while the elevated mercury price (not to mention increasing awareness of environment and health concerns) continues to add pressure on mercury users to further reduce consumption and shift to viable mercury-free alternatives.