Proceedings of the Asia Mercury Storage Project Inception Workshop
4-5 March 2009
Bangkok, Thailand

EXECUTIVE SUMMARY

BACKGROUND:

The workshop was aimed at reducing the eventual supply of mercury to the biosphere by initiating a regional process that will support the sequestration of excess mercury in the Asian Region. The activity is part of the Norwegian funded mercury storage project being implemented by UNEP Chemicals, in response to Governing Council (GC) decision 24/3 IV that established mercury supply reduction as a global priority, and urged governments to gather information on the options and solutions for the long-term storage of mercury instead of allowing this mercury to be sold in the global marketplace. GC 25/5 decision likewise called to continue and enhance capacity for mercury storage, concurrently with the work of the intergovernmental negotiation committee (INC) to elaborate a global legally binding instrument.

The workshop was conducted by UNEP Chemicals in collaboration with the Zero Mercury Working Group. It was attended[1] by

- 19 representatives from 17 Governments (Ministries of Environment, Health, and International Cooperation from Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States of America)
- 2 representatives from the Basel Convention Regional Centers (BCRC)-China, Indonesia
- 10 representatives from 6 Non governmental organizations dealing with the sound management of chemicals-Citizens against Chemicals Pollution (CACP),Campaign for Alternative Industry Network (CAIN), Toxics Link, Greenpeace Southeast Asia, Indonesia Toxics Free Network, and Ban Toxics
- 6 representatives from 4 Intergovernmental organizations –UNIDO Regional Office in Bangkok, UNITAR Office in Bangkok, UNDP Regional Office in Bangkok, UNDP Regional Office in Colombo
- 5 resource speakers - Natural Resources Defense Council (NRDC) , Concorde East West Sprl, US Department of Defense (Defense National Stockpile Center), GRS Germany, K+ S Germany
- 4 UNEP Regional Office of Asia Pacific (ROAP) staff.
- 2 UNEP DTIE Chemicals Branch staff

Specific Objectives of the Workshop were to:

1. Review an expert report on the anticipated quantity of mercury in Asia that will require sequestration, and share information about sequestration efforts in other countries and regions.

[1] See annex 1 for detailed list of participants

2. Discuss the options and issues to be considered for long term safe storage of excess mercury and make recommendations on the next steps following the workshop such as an in depth feasibility study.
3. Organize a regional support structure such as an Advisory Committee (to be represented by an Executive Committee) that will consider the development of regional options for the sequestration of mercury such as a regional terminal storage facility for mercury, and facilitate the development of national policies consistent with the development of such a facility.

OPENING SESSION:

The welcome remarks were given by Mr. Young Woo Park, Regional Director of the UNEP ROAP. He underscored the fact that mercury is toxic and that, despite work on mercury reduction since 2001 as mandated by GC 21, levels of mercury pollution may be far from declining and still on the rise. The latest 2008 UNEP Atmospheric Report reveals that in 2005, about two thirds of the world's mercury emissions come from the Asia-Pacific region, with the highest releases from coal combustion, small scale gold mining, metals mining, and the production/use of mercury containing products. To address this regional issue, UNEP ROAP is committed to provide technical assistance to countries in the region in the INC process that will start in 2010. UNEP ROAP is likewise willing to assist countries within the region to implement the "interim activities" to reduce mercury pollution under the UNEP Global Mercury Partnership. UNEP ROAP also stands ready to assist in the upcoming negotiations. He urged government representatives to focus more on the rising trend in Asia, rather than detailed numbers on mercury supply and consumption in the region.

The opening remarks were given by Mr. Per M. Bakken, Head of UNEP DTIE Chemicals Branch, based in Geneva. He thanked UNEP ROAP for the support extended to UNEP Chemicals related activities in the region. He presented the highlights of GC 25/5 decision where a breakthrough decision was made by governments to launch an INC process to elaborate a legally binding instrument on mercury by 2013. He emphasized the interim activities to be done concurrently with the negotiation, including activities related to mercury supply in particular curbing primary mining and enhancing capacities for storage of excess mercury. While efforts are underway to address excess mercury supply in the US and the EU (i.e., export ban legislation, storage facilities), countries in the Asia Pacific need to be aware and examine options to address the excess mercury supply in the region. He challenged participants to attain the objectives set forth in the 2 day workshop. Mr. Bakken also chaired the entire workshop.

1. Situation Analysis: Mercury Flows in Asia:

The "Assessment Report of Excess Mercury Supply in Asia, 2010-2050" was presented by Peter Maxson from Concorde East West Sprl. He presented mercury supply and consumption in 2005 and projections for 2050. Assumptions for future mercury supplies to 2050 in Asia would come from primary mercury mining in China (though decreasing by 2020), chlor alkali decommissioning (phase out of Indian mercury cells in 2012 and in other countries by 2020), by product (mercury recovery from Chinese zinc smelters by 2015, Asian zinc smelters by 2020), current stocks, and recycling of mercury use in vinyl chloride manufacturing (VCM) and mercury containing products. Assumptions for mercury consumption to 2050 would be in artisanal small scale gold mining (50% reduction over 10 years then 5% per year,) in VCM (increase to 2010, stable to 2015, phase out by 2030), chlor alkali (Indian phase out by 2012, others by 2020), batteries (75% reduction by 2015 and phase out by 2025), dental uses (15% reduction by 2015

and phase out by 2050) measuring and control devices (60% reduction by 2015, and phase out fever thermometers and sphygmomanometers by 2017, and remaining demand by 2025) lamps (20% reduction by 2015 and 80% by 2050), electrical and electronic devices (55% reduction by 2015, and phase out by 2050), other applications (25% reduction by 2020, and another 50% by 2050). Under this status quo scenario, it is estimated that Asia (including China) will have a rough supply and demand equilibrium by 2017, with an accumulated storage of 5,500 tonnes of mercury from 2029- 2050. In contrast, in a restricted supply scenario where there is additional mercury storage to encourage phase out of most mercury consumption in ASM by 2030, excess Asia mercury appears from 2027- 2050 with an accumulated storage of 7,500 tonnes. Observations made were: When mercury is stored, users think about product/process alternatives, suppliers think about diverse sources, mercury price increases, and everyone thinks about ways to use less mercury. In order to influence mercury demand, measures could include product legislation and/or supply reduction. In order to reduce supply, storage of mercury should be initiated to affect price and availability, thereby encouraging reduced demand.

Issues and action points:

- China was concerned about data cited due to uncertainties in the figures for China mercury supply and demand, and promised to send more detailed comments to the report
- India confirmed phase out of mercury cells in the chlor alkali process by 2012, and indicated the need to step up the technology change over. Aside from chlor alkali, efforts are being implemented in the shift to non mercury products in the health care sector in India, with strong NGO participation.
- Bhutan clarified whether the report covered only mercury releases from intentional sources and does not include unintentional releases. This was confirmed by Mr. Maxson indicating that the report refers to mercury as a commodity and for intentional use.

2. Options for Mercury Storage – USA Approach

Information on "Managing Excess Mercury in the USA" was presented by David Lennett of the NRDC. In the USA, mercury supply comes from US government stockpiles and from civilian sources. Net exports from the USA are due to the following factors: increased attention to mercury emissions from industrial gold mining, increasing mandates to recycle mercury products, significant reduction in chlor alkali plants, and decreased demand due to phase out of mercury use in product manufacturing. Most of US mercury was exported to countries where there is significant ASM activity or traders which then ship mercury to ASM locations. The USEPA estimates 7,500-10,000 metric tonnes (MT) of mercury from civilian sources that will require storage over the next 40 years (based on expert's opinion since USEPA does not require reporting of mercury supply, trade, and demand). An interagency task force was created by the federal government, and was tasked to obtain information and review policy options. This process was overtaken by the enactment of the Mercury Export Ban of 2008 which prohibits the export of elemental mercury by 2013. After one year of enactment, the EPA will report to Congress on the need to extend coverage of the export ban on mercury compounds. Some limited exemption from the export ban is allowed, but petitions are limited to 3 years and to 10 MT. The US Export Ban provides for the establishment of a government owned site that can be used for long term management of mercury from civilian sources and the government is authorized to charge a fee for this service. The price will be set sometime in 2012. Any facility must be licensed under the hazardous waste law.

Storage method for US government mercury stockpiles was presented by Dennis Lynch of the US Defense National Stockpile Center (DNSC). Mercury is being stored in its elemental

form in 3 liter flasks and placed in warehouse facilities. In 2004, a decision was reached on the consolidation of mercury in one site, and in 2006, the Hawthorne Army Depot (Nevada) was chosen as the consolidation site. Facility upgrades were made in order to meet DNSC mercury storage standards (installation of electrical service, lighting, fire detection, security systems, flooring, and ramps). Risk analysis, regular inspection and environmental monitoring are currently being done. Mercury is stored in its elemental form and mercury compound is retorted back to its elemental from. Transport to Hawthorne site must comply with the US Department of Transportation requirements for shipment of hazardous materials. Capital cost at the Hawthorne Army Depot is estimated at 17,450,000 USD, while maintenance/recurring costs is approximately at 547,904 USD x acceleration at 3.5%/yr.

Issues and action points:

- South Korea clarified as to who owns the mercury once it reaches the government designated facility for civilian mercury. Since the mercury storage will be fee for service, the government will then own the mercury.

3. Basel Convention- Relevant Provisions

Relevant Basel Convention (BC) provisions on the environmentally sound management (ESM) of mercury waste were presented by Mr. Aboejoewono Aboeprajitno of the BCRC Southeast Asia, based in Indonesia. Mercury waste is covered under Annexes I, VIII and III (waste that is poisonous, toxic, and ecotoxic) of the Basel Convention. To achieve the goal of protecting human health and the environment from the adverse effects of hazardous waste, the mechanism employed by the Basel Convention is through the control of transboundary movement and the ESM of hazardous waste. Relevant BC provisions include waste minimization at source, disposal and ensuring the availability of disposal facilities in the country where waste is generated, allowing exports only if the state does not have the technical capacity to dispose on ESM, an authorization system for persons handling hazardous wastes, and establishing requirements for packaging, labeling and transport in conformity with international rules, standards and practices. The Secretariat of the Basel Convention together with UNEP Chemicals are working on a draft technical guidelines on ESM of mercury waste which was adopted by the BC 9th Conference of Parties. The guidelines will be pilot tested and will be available for use by Parties.

Issues and action points:

- NRDC pointed out that the Basel Convention deals only with mercury waste, but not on mercury as a commodity. The transboundary movement of mercury as a commodity may therefore not be covered under the Basel Convention.

4. Options for Mercury Storage- EU Approach

"Mercury Storage in Europe and Germany: Regulations and General Conditions" was presented by Dr. Thomas Brasser of GRS, a non profit expert and research organization in Germany. Regulation (EC) no. 1102/2008 on banning of exports and safe storage of metallic mercury has the following highlights:

- Art.1-1 Export of metallic mercury is prohibited from 15 March 2011
- Art. 1-3 Mixing of metallic mercury is prohibited from 15 March 2011
- Art. 2 Metallic mercury that is no longer used or gained from operations is considered waste and disposed of from 15 March 2011

- Art. 3 Metallic mercury as waste to be stored in salt mines or in deep underground, hard rock formations providing equivalent level of safety
- Art. 8 By 1 January 2010, examination of need for extending the export ban to other mercury compounds, need for import ban, consideration of safe disposal options.

The current practice of hazardous waste disposal in Germany is to use underground disposal sites (rock salt) and is operated commercially. The EC decision of 19 Dec 2002 also establishes the criteria (waste, geological barrier, cavities, engineered structure, technical aspects) and procedures for the acceptance of waste at landfills. The ultimate objective of underground storage is isolation of waste from the biosphere. The site specific assessment of risk requires identification of the hazard, the receptors, the pathways by which substances from the waste may reach the biosphere, and the assessment of impact of substances that may reach the biosphere. The EC decision also calls for an integrated performance assessment analysis.

Metallic Mercury is stable under the condition of repositories in salt formations. The high vapor pressure of metallic mercury poses high demands on the handling and ventilation. Conversion to mercury sulfides (cinnabarite) is feasible in order to prevent impurities. Specific waste acceptance criteria need to be determined.

The technology and operation of the Underground Waste Disposal was presented by Mr. Alexander Baart of the K + S group of companies. There are currently 2 underground disposal plants operating in Germany with the following prerequisites: a disused excavated area remote from the mineral extraction part, mine where the waste is stored must be dry and free of water, mined cavities have to be stable and must remain accessible even for a long time. A site safety assessment must be in place to include technical planning, hydro geological data, geological data, waste data, environmental impact assessment, and risk assessment. Among the various chemicals waste, mercury is one acceptable type of waste. Operation takes into account the country/generator's notification process and regulatory measures.

Issues and action points:

- On the need for pretreatment such as stabilization: The technology of stabilizing liquid mercury with sulfur is under investigation
- On storage costs: According to today's required standards, the fee would be 260 €/t, excluding packing, transport and VAT (presently 19 %, which can be recovred from the German State
- Concern about monitoring of the covered shaft and the possible accessibility of stored wastes: The wastes deposited are encapsulated in the rock salt mass. A multiple barrier system assures that hazardous substances emanating from deposited waste are sustainably kept from leaking into the biosphere. Should operation of the underground deposit cease one day, the shafts - as the sole connections between the storage chambers and the environment – will be sealed by appropriate solid materials, and a hydraulically secure closing of the mine will be undertaken. The filling of the shafts is the final and most important barrier, as it blocks the only connection to the wastes underground, thereby the stored waste will be reliably cut off from the biosphere for good.

5. Malaysia Country Experience

"Substance flow analysis of mercury in Malaysia and scheduled waste regulation in Malaysia" was presented by Hanili Ghazali of the Malaysia Department of Environment. A total

quantified release of mercury by all pathways (air, water, land, waste landfills, and other disposal sites) was presented. Unintentional releases were from coal combustion, mineral oil and natural gas and cement production while intentional releases were from gold mining and mostly from mercury containing products (thermometers, electrical switches and relays, light sources, batteries, laboratory chemicals, pesticides, biocides, cosmetics, manometers and gauges, religious rituals and folklore medicine). A significant source of mercury is from hazardous waste treatment of fluorescent lamps. Malaysia is enforcing the Environmental Quality (Scheduled Wastes) Regulations 2005, a comprehensive legislation for the management and control of toxic and hazardous waste, including mercury containing waste.

Issues and action points:

- NRDC raised concern for Malaysia's data on imports for dental amalgam in 2003-2005. Considering the possibility of dental amalgam being diverted to the mining sector, the Malaysia dental amalgam import data seems high, relative to the global mercury consumption 0f 240-300 metric tonnes in 2005. Malaysia will review and make the necessary corrections.

6. UNEP Mercury Storage Project in Asia

The UNEP project "Reduction of Mercury Supply and Investigation of Storage Solutions was presented by Desiree M. Narvaez of UNEP Chemicals. Components of the project include
a) Quantification of excess elemental mercury supply in Asia from 2010- 2050, projected to come mostly from artisanal mining, closed chlor alkali facilities, end of life mercury containing products, non ferrous metal mining such as from zinc smelting, and others
b) Identification of criteria to be scoped in the options to be analyzed in addressing excess elemental mercury. Criteria include technological requirements such as site-specific and storage requirements, need for pretreatment, transport to the facility, public health and safety, environmental concerns, political and social acceptability, financial costs, manpower, legal and regulatory requirements
c) Creation of a regional support structure/advisory committee to be represented by an Executive Committee
d) Conduct of feasibility studies and analysis of the options aimed at providing Governments an informed choice on which option to take
e) Based on preferred option, a call for specific proposals with possible funding source will be identified
More information about the project is available at
http://www.chem.unep.ch/mercury/storage/main_page.htm

7. Small Group Discussions:

Participants were grouped according to similar geography, culture, and political structure, though possibly with wide economic diversity (North Asia, Southeast Asia, and South Asia). Discussion results are summarized in Annex II.

8. Creation of a Regional Support Structure

A regional advisory body was recognized to provide advisory role to the UNEP Mercury Storage Project. This advisory body comprised of the participating countries in the region, would

be represented by an Executive Committee. Nominations to the executive committee members include India, South Korea, Papua New Guinea, Japan, Nepal, Zero Mercury Working Group. The Asia Mercury Storage Project Executive committee is tasked to

- catalyze Regional action that will address excess mercury supply in Asia
- explore options and issues in addressing excess mercury supply in Asia taking into consideration costs and benefits, social and political acceptability, technical and environmental factors, public health, infrastructure, regulatory requirements and site selection
- agree on the terms of reference of the call for proposals/feasibility studies aimed at evaluating the most suitable option for the Asian region
- communicate project issues and concerns to governments and stakeholders in the Asian region, and to convene meetings as needed to facilitate progress toward an Asian storage solution
- recommend appropriate legislation/policies consistent with the establishment of a terminal storage facility

9. UNEP Global Mercury Partnership

The UNEP Global Mercury Partnership (GMP) was initiated in 2005 through UNEP GC 23 to address global concerns about mercury pollution. Partnership was strengthened through a strong GC 24 Mandate in 2007. UNEP facilitated funding from donors to assist developing countries and countries with economies in transition in efforts to reduce mercury pollution. An Overarching Framework for the UNEP Global Mercury Partnership was launched in June 2008 and a Partnership Advisory Group established to provide oversight and promote synergies. Currently, there are 27 official Partners. The UNEP GMP is considered the vehicle for immediate actions in the delivery of UNEP GC Decision 25/5.

The overall goal of the UNEP GMP is to protect human health and the global environment from the release of mercury and its compounds by minimizing and, where feasible, ultimately eliminating global, anthropogenic mercury releases to air, water and land. Partnership activities are currently underway in the following partnership areas (with the respective partnership leads): artisanal/small-scale gold mining (UNIDO); coal combustion (International Energy Agency Coal Centre); chlor-alkali sector (USEPA); reduction in products (USEPA); fate and transport (Italy); waste combustion (Japan). The partnership areas establish specific goals and actions to address needs, have business plans that outline their workplans, and contribute to the overall goal of the UNEP GMP. Membership varies according to interest. A Partner supports the overall goal of the Partnership, commits to contribute resources or expertise towards the development and implementation of partnership activities, and networks with other organizations/agencies/ individuals.

Mercury supply and storage is currently identified as a potential partnership area. A draft business plan was proposed by UNEP in 2008. The supply and storage partnership could be the vehicle for immediate actions in this area particularly by assisting with information sharing and communication as well as collaborate on funding. This partnership area currently needs leadership in order to move forward. More information can be obtained from http://www.chem.unep.ch/mercury/partnerships/new_partnership.htm

WORKSHOP CONCLUSIONS:

The Workshop provided information on mercury supply and consumption in 2005 and projections for 2050 in Asia. While most participating countries do not have mercury national action plans in place, they confirmed that initiating storage activities in the region could contribute to demand reduction. It was recognized that Governments in the region would be open to the option of storage. The workshop also provided an understanding of the management options available such as the US above ground facility/ warehouse and the EU underground storage facility/salt mines. Export to an EU facility was also considered an option. Furthermore, insight was gained into the US and EU legislative process and the available legislation that supports the infrastructure. While substance flow analysis could be done at country level, there was consensus to address the issue of mercury storage on a regional basis.

Among the criteria to be considered in the selection of management options, participants were mostly concerned with the social and political acceptability of the infrastructure, on political stability or sustained leadership for most countries in the region, and the need to elevate the issue to a high ministerial body such as the ASEAN. Of equal priority is the issue of public health and safety as well as environmental impact. Concerns were also raised on ownership of the mercury surplus, and the preference to a centralized facility, albeit difficult to find, rather than national small facilities. Operating and maintenance costs for the facility were also a major consideration. Moreover, site specific requirements such as the regional geology, hydrology and susceptibility to natural disasters are a major concern. The "polluter pays principle" was invoked as the guiding principle in storage activities. There was agreement that a global treaty embodying concrete policies for terminal storage will ensure consistent and sustained national government policy.

The workshop provided the impetus for activities under the UNEP Mercury Storage Project, being implemented by UNEP Chemicals, with financial support from the Government of Norway. A Regional Advisory Body represented by an Executive Committee (Execom) was created. Member nominations included representatives from India, Nepal, Republic of Korea, Japan, Papua New Guinea, and the Zero Mercury Working Group. The Execom was tasked to catalyze regional action in the sequestration of excess mercury in Asia, communicate issues, and recommend appropriate legislation.

Using the criteria and the scope of issues identified in the workshop, next step of the project is the call for proposals for an options analysis and feasibility studies. Academic institutions and non government organizations preferably in the Asian region will be explored. Results of the options analysis and feasibility studies will be presented to regional stakeholders 10 months after the inception workshop.

Anticipating sustainability of mercury storage activities, the UNEP Global Mercury Partnership is envisioned as a possible mechanism for sustained efforts. A draft business plan on the Primary Mining and Storage Partnership area was drafted by UNEP and is awaiting nomination for a partnership lead in order to proceed.

Overall, the workshop is one concrete step in the GC 25/5 call to continue as part of international action of mercury, the existing work such as enhancing capacity for mercury storage. The UNEP Mercury Storage Project will be implemented concurrently with the INC process in the lead to a global mercury treaty in 2013.