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Mercury Stewardship

Assessment of Mercury Market Policy Options

October 2003

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I. Introduction.

This report was prepared by the Markets Subgroup of the EPA/Quicksilver Caucus Stewardship Workgroup. The charge of the Markets Subgroup was to assess the implications of potential interim commodity mercury storage policies, focusing on future domestic and international supply and demand consequences of alternate policy positions. The term "interim" recognizes that environmentally protective permanent disposal options will likely be needed in the future but are not yet available, and that EPA should continue its efforts to identify such options.

As an assessment document, this report does not contain specific policy recommendations regarding alternative options for the interim storage of excess domestic mercury supplies. Instead, this report summarizes what is known about domestic and global supply and demand, identifies areas of uncertainty, and reaches qualitative conclusions about the impacts of alternate storage scenarios where the Subgroup was able to do so. As indicated in the report, some of these conclusions reflect consensus views of the participants; in other cases differing conclusions were reached by the participants and in these instances, majority and minority views are identified.

Given that mercury is an internationally traded commodity whose release into the environment has significant adverse global impacts, it is clear to the markets workgroup that international action and multilateral approaches are needed to address and resolve key issues that have been identified.

These key issues are:

1. Reduction and prevention of mercury release;
2. Government subsidies to primary mining;
3. Reduction of US and global use of mercury;
4. Obtaining better market information in order to make better technical and policy decisions, and;
5. A global excess of mercury is imminent so long-term solutions are needed. No acceptable permanent storage technologies have been developed to date.

Mercury reduction policies and programs have been and can continue to be addressed through the following:

- International Joint Commission (IJC);
- North American Commission for Environmental Cooperation (NACEC);
- New England Governors/Eastern Canadian Premiers (NEG/ECP) Regional Mercury Action Plan;
- Canada – United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes;
- Organization for Economic Cooperation and Development (OECD);
- European Union (EU);
- World Health Organization (WHO);
- United Nations Economic Commission for Europe (UNECE);
- United Nations Environment Program (UNEP), and
- United Nations Industrial Development Organization (UNIDO).

At its 22nd Session in February 2003, the UNEP Governing Council concluded that there is sufficient evidence of significant global adverse impacts of mercury and voted to establish a Mercury Programme within UNEP Chemicals.

The markets workgroup also believes that the US can and should demonstrate international leadership on mercury by immediately beginning to address these key issues on its own.

II. Summary of Consensus Issues and Conclusions by the Workgroup.

The workgroup was able to reach consensus on several issues of importance to potential US and global policy decisions for commodity mercury. These consensus issues and conclusions include the following:

1. Issue: The primary concern regarding management of commodity mercury is to prevent further releases of mercury into the environment given that mercury continues to be traded on an international basis.
   Conclusion: Management strategies should seek to maximize the net gain to human health and the environment
2. Issue: Several foreign governments subsidize the mining of virgin mercury, which distorts the mercury commodity market. These subsidies increase the abundance of available mercury, thereby softening its prevailing price, and inviting increased use, especially in developing countries.
   Conclusion: Steps to minimize or eliminate such subsidies should be encouraged.
3. Issue: Many opportunities exist to further reduce US, and especially global, use of mercury. Steps to encourage implementation of these opportunities, within the US and globally, should be a priority. Conclusion: Implement targeted action to achieve significant demand reduction at minimal costs in the following areas:
   a. Strategies to eliminate unnecessary US and global uses of mercury in products and industrial processes including, for example, use in batteries, paints, pesticides, medical devices, pharmaceuticals, and cosmetics.
   b. International capacity building initiatives to support the global transfer and adoption of mercury reduction and control technologies and management practices in, for example, the chlor-alkali industry; mining sector; mercury instrument and switch sector, and health care sector.
   c. State, national, and international commitments to encourage the use of mercury alternatives and to discourage unnecessary, new mercury uses.
4. Issue: There is little public information on mercury use and production in the US and even less for most other countries. Although sufficient data exist on large scale uses to evaluate longer-term trends in the global commodity mercury market, shorter-term year-to-year data is very uncertain and has become more so in recent years. Data on individual use categories or sectors in developing countries is sparse.
   Conclusion: Additional and improved data on both the US and the global mercury commodity market is needed to better inform and evaluate policy decisions regarding mercury management options.
5. Issue: In light of long-term trends of reduced demand for mercury and increased secondary recovery, a global excess of commodity mercury is likely within the

relatively near future, perhaps within 10 years.
Conclusion: Permanent management/disposal strategies, including new technologies for sequestrating such mercury from the biosphere will be needed. Strategies to ensure that these are developed in a timely fashion should be pursued.

III. Global Market Summary.

The following section summarizes data collected and evaluated by the workgroup on the US and global commodity mercury market.

1. **Market Attributes.** This global mercury market exhibits several important and in some ways unique attributes:
    a. Commodity mercury releases have global impacts due to atmospheric transport and mercury's persistence as an element.
    b. The mercury commodity market is driven largely by non-market forces. Mercury supply and demand are both greatly impacted by governmental actions and policies implemented to protect environmental and public health:
        i. Falling demand has been driven by many effective restrictions on manufacturing, use, and release of mercury in paints, batteries, pesticides, chlor-alkali manufacturing, and other products and processes in developed nations.
        ii. Significant secondary production of mercury is driven primarily by environmental concerns, policies, and regulations, not price of mercury.
    c. Despite falling demand, remaining mining of virgin mercury has been and continues to be subsidized. Production from such mines will therefore not be as price sensitive as production from private, non-subsidized mines. Some price sensitivity, however, is likely to exist, as production appears to have decreased as demand has decreased and sources of secondary mercury have increased.
    d. Annual data on global mercury production and use, especially for recent years, is very uncertain. Thus, although longer-term trends (decade or longer) in mercury use and production can be readily discerned, shorter-term responses of the global mercury market to potential adoption of various policy options for managing excess US commodity mercury cannot be estimated quantitatively.
    e. Additionally, data on discrete use categories or sectors in developing countries, that are individually small, but potentially significant in aggregate, is also lacking.

2. **Global and US Demand Summary.** The following summarizes key findings of the Workgroup relating to US and global demand for commodity mercury. Unless otherwise noted, these represent consensus findings of the workgroup.
    a. Since the late 1980's there has been a precipitous decline in mercury demand and use in the US and other developed countries attributable to:
        i. Governmental interventions to protect worker health and the environment, including legislative and regulatory sales and use bans on certain mercury products.
        ii. Voluntary adoption of new technologies and improved management practices for mercury in several sectors (e.g., US/EU chlor-alkali industry, health care sector, and fluorescent light manufacturers).

b. Nonetheless, significant global demand for commodity mercury remains.
c. Globally, there are many relatively easy opportunities for demand reduction, especially relating to uses in the chloralkali sector; in measurement and electrical devices; in paints, batteries, pesticides, pharmaceuticals, and cosmetics; and in the health care sector.
d. Globally, there are some use sectors that are not well understood and may not be easy to address. Examples include artisanal gold mining and cultural uses of mercury.
e. A multilateral approach is necessary to effectively curb demand. There are many opportunities as well as some *significant current and ongoing efforts* to reduce mercury use. The key potential partners include the U.S. and NAFTA trading partners, the European Union (EU), and the United Nations (UN).
f. The sensitivity of demand sectors to commodity prices are likely to vary, with some insensitive (high-end/margin uses in developed world - e.g. use in fluorescent lamps) and others potentially more sensitive (low margin uses in developing countries - e.g. use in jewelry) to price changes.

3. **Global and US Supply Summary.** There are several different potential sources of commodity mercury supply. These include primary production from mines dedicated to mercury production; byproduct recovery of mercury from mines targeting other minerals; secondary recovery from recycling of mercury containing products and wastes; mercury stocks derived from closed industrial facilities/processes; and mercury from the federal US DOD/DOE strategic stockpile. Workgroup findings pertaining to mercury supplies from these sources are summarized below.
    a. Primary Production: No US mines devoted to mercury production remain in operation. Globally, the production from the few remaining mercury mines is subsidized by their government owners- likely at a significant level.
    b. Byproduct and Secondary Production: Mercury production from mining byproduct recovery, recycling, and other waste processing is substantial both in the US and globally. This production is driven in large part by regulations in place to control environmental releases of mercury.
    c. Closed Industrial Facilities - Chlor-alkali sector: The U.S. chlor-alkali industry has committed to not building any new mercury cell facilities. Existing plants are sporadically closing depending on local market conditions (for chlorine and/or alkali products, not mercury), plant age, etc. Plants typically contain from 80-500 tons of mercury in their processing cells; closures thus result in the sale of large amounts of mercury on the international commodity market.
        i. Over the past several years, plant closures have resulted in availability of several hundred tons of mercury. Existing plants, with about 15,000 to 18,000 tons of mercury in the US and EU and perhaps twice that amount globally, are expected to close or shift production to non-mercury processes within the next 5-20 years.
        ii. The US chlor-alkali industry has indicated a willingness to transfer surplus mercury (estimated at 3,000 to 4,000 tons in total) from their facilities to a US government operated permanent mercury storage facility. Approximately 80 tons of mercury was recently kept off the

international market under a private interim storage agreement between the responsible party at the site and an environmental group.

iii. European Union facilities are estimated to contain 12,000 to 15,000 tons of mercury. EuroChlor facilities are now planning to sell this mercury as plants close, possibly brokering it through one of the remaining mercury mining companies, Almaden of Spain.

d. DOD/DOE Strategic Stockpile

i. This stockpile currently contains approximately 5,000 tons of mercury; a very large amount compared to US annual demand, which is estimated to be approximately 200 tons/year.

ii. This stockpile has been declared unnecessary to meet defense needs. Substantial sales from the US stockpile to the international mercury market were made prior to July 1994, when sales were suspended due to environmental concerns. An EIS is being developed by the Defense National Stockpile Center of the Department of Defense, Defense Logistics Agency, to assess this issue. DLA issued a Draft EIS for public comment in April 2003, and identified Alternative (2) Consolidated Storage as the preferred alternative. The public comment period on the Draft EIS closed on July 18, 2003.

4. **Supply-demand Balance**

a. US Situation

i. On average, US secondary production has been sufficient to meet domestic needs over the past decade. Depending on secondary production and demand factors, year-to-year variability in the supply-demand balance occurs.

ii. Over the past fifteen years, the US has been primarily a net exporter of mercury, with pre-1994 DOD/DOE stockpile sales accounting for a substantial portion of net exports from 1987 through 1994.

1. During this time, the US has experienced brief periods where domestic demand exceeded domestic supply. The US was a net importer of mercury 1995-1998 after stockpile sales were suspended.
2. The US was a net exporter of mercury 1999-2001 (and likely for 2002 also) as domestic demand continues to decline and domestic supply increases. Given national trends in further restricting mercury use and in expanding secondary recovery, it is likely that US domestic mercury supplies will continually exceed demand in the future without sales from the DOD/DOE stockpile.

b. Global Situation

i. Global demand for mercury remains significant. As noted earlier, many further opportunities to reduce mercury use exist.

ii. Considerable primary mercury production is currently occurring, largely, if not exclusively, from subsidized mines.

iii. The available data indicate a long-term global trend, with year-to-year variability, of decreasing use, decreasing primary production and decreasing price. This is evident in the developed world. Although data are few, use in developing nations is not likely to have followed a similar trend.
iv. Artisan gold mining is a potentially significant use of mercury in developing countries but there is no reliable data on annual consumption for this purpose.
v. The data, however, are increasingly uncertain on a year-to-year basis due to a lack of reporting requirements and a decreased number of market participants.
vi. Based on use and production trends, combined with increasing attention being focused on mercury globally, it is likely that a global situation of excess commodity mercury supply will develop in the relatively near future (5-10 years) necessitating mechanisms to safely sequester such mercury from the biosphere.
vii. At this time, there do not appear to be any technologically acceptable options for permanent storage that can safely sequester excess mercury from the biosphere. Research and development must be funded and conducted.

IV. Management Options for US Commodity Mercury in Excess of Demand - Possible Impacts on US and Global Mercury Markets.

The US currently has no federal policy on the issues of mercury stockpile sales or storage. DOD/DOE stockpile sales have been suspended since June 1994 pending the outcome of an EIS being conducted by DOD. Given the large and growing US domestic stocks and recovery, and shrinking domestic and world demand, a majority of workgroup members believe that federal policy related to mercury stockpile sales and storage is necessary and long overdue. Through adoption of a number of ECOS Resolutions, the 50 states have articulated official positions on mercury stockpile sales, storage, and related issues. The states have called for a permanent halt to US stockpile sales, development of a federal mercury storage policy and programs for public or private stocks, and development of a policy for handling chlor-alkali facility mercury. All mercury sources are addressed by the ECOS resolutions, including the US stockpile, chlor-alkali and other private stocks, subsidized primary mercury, mining byproduct mercury, and recovered secondary mercury. Copies of the relevant ECOS Resolutions can be found in Appendix XX of the QSC-EPA Mercury Stewardship Group Report.

Against this backdrop, a number of individual management options and options packages were considered by the workgroup. These primarily differed with respect to the disposition of US mercury in excess of domestic needs, in particular the large stocks of mercury contained in the federal strategic stockpile. Option packages also included efforts to further reduce global demand for mercury. US mercury supply management policy option packages that were considered include:

1) **Unrestricted sales Followed by Storage upon Cessation of Primary Mining.** All US and global commodity mercury would be available for sale without regard to source or ultimate use until global primary mercury mining has permanently ceased. Once such mining has permanently ended, provision would be made for storage of global supplies that would inevitably overtake shrinking global demand.

2) **Flexible or Contingent Interim Storage.** US commodity mercury would be stored in a manner that would allow for sales to meet legitimate domestic needs if demand exceeds secondary supplies and, in limited cases, to meet legitimate foreign demand.
    a) In order to implement this option, criteria must be developed to evaluate the need for stockpile sales. These might include: the presence and activity of *private* (unsubsidized) mercury mines, the inflation adjusted price of mercury, and the likely health and environmental impacts associated with the sale, use, disposal, and improper management of mercury sold from the stockpile.
    b) Mercury production, secondary recovery, sales, and import-export data would also need to be better tracked and perhaps managed to ensure accuracy of information needed to make decisions regarding mercury stockpile sales. Secondary mercury flows can be directed or managed to ensure legitimate use and minimize release to the market from managed stockpiles, and can also be directed or managed to reduce the production of subsidized primary mercury.

3) **Mandatory Permanent Storage Now.** All commodity mercury produced in the US would be permanently stored, irrespective of market conditions.

VI. Workgroup Positions Regarding Management Options.

All members of the workgroup believed that available data was sufficient to support the broad qualitative conclusions noted in the beginning of this executive summary. However, most members also believed that the data was insufficient to reach firm quantitative conclusions regarding shorter-term market responses to sales of excess US commodity mercury, especially under the current situation of declining demand and subsidized production. In light of this uncertainty, differing conclusions were reached by various members of the Workgroup regarding the potential impacts of various sales/storage alternatives on the global mercury market. These are briefly summarized below.

1. **Conclusions regarding potential impacts of excess domestic mercury storage/sales on global mercury use.**

    a. Most workgroup members concluded that unrestricted sales of US mercury stockpiles in excess of domestic demand at levels that would be sufficient to deflate the price of mercury would fuel exports at use-inviting prices. This would be likely to increase unnecessary or otherwise avoidable uses in developing countries, with concomitant environmental releases. Interim, managed storage would be likely to minimize this outcome.
    b. A minority believed that sales would not result in significant increases in use and release even if prices were to drop substantially, because mercury is a minor cost of the retail price of many products in which it is used.

2. **Conclusions regarding potential impacts of excess domestic mercury storage/sales on primary production.**

    a. A majority concluded that, due to the subsidized nature of remaining primary production, sales would likely achieve little if any long-term reductions in primary production. Because of declining demand and availability of other secondary sources, this group believed that flexible storage would be unlikely to lead to any significant increase in primary production. An increased global emphasis on achieving significant demand reductions through the UNEP GMA process and/or through other channels would help ensure this result.
    b. A minority believed that sales at a sufficient level would drive down primary production and lead to closures of existing mercury mines due to resulting price decreases. Conversely, this minority argued that storage of existing supplies of secondary mercury in the face of continuing global demand could lead to additional primary production, absent efforts to reduce demand for primary or secondary mercury. Under this scenario, mercury emissions from mining activities would potentially increase.

3. **Conclusions Regarding Management Alternatives.** In light of the views noted above, no consensus on best alternatives for managing excess US mercury was reached. Views of the workgroup regarding the policy option packages 1-3 noted above for managing excess US mercury are summarized below:

    a. **Unrestricted Sales Followed by Storage upon Cessation of Primary Mining.** A minority supported unrestricted sales of excess US mercury on the commodities market until primary mining permanently ceases, based on the view that associated price reductions would cause foreign governments to rethink their subsidies in support of mercury mining, leading to the eventual closure of subsidized mines.
    b. **Flexible, Contingent Interim Storage**. A majority concluded that the US should manage US commodity mercury in excess of domestic needs using a flexible approach in order to minimize increased use and consequently greater local and global mercury emissions. This approach would preserve options for the future sales or storage of excess domestic mercury by fostering flexibility to accommodate changing US and world market conditions. This option also enables policymakers to refine management options in the future, should improved data on global supply and demand impacts become available. An interim storage policy would focus on large stocks made available to the market but would accommodate mercury in small quantities as well, particularly those stocks recovered with public funds or through publicly run programs. Since there is currently no federal policy, the majority concluded that the US should develop federal policies addressing federal stockpiles and other surplus mercury, implement interim storage programs, and promote and support technology development for long-term storage and sequestration. The work group did not discuss funding mechanisms for development and operation of

interim storage facilities, but recognizes that funding mechanisms must be developed as part of the federal mercury storage policies and programs endorsed by the majority of the work group.

c. **Mandatory Permanent Storage Now.** The workgroup unanimously concluded that it would not be appropriate at this time to mandate the storage of all commodity mercury that is or would be available to the market. The Workgroup also unanimously concluded that permanent storage and disposal options would be needed at some point in the future. In particular, the workgroup unanimously concluded that it was premature at this point to begin developing permanent disposal plans or facilities, as appropriate technologies have not been developed and because this would limit US options to respond to changing market conditions. Because there are currently no appropriate technologies for permanent storage, actions must now be directed to developing these technologies, which will be necessary in the near future. The work group did not discuss funding mechanisms for R&D or operation of permanent storage facilities, but recognizes that funding mechanisms must be developed in future discussions.

VIII. Information needs.

Members of the markets workgroup agreed that better information on mercury production, consumption, and trade would be useful. Data on mercury production and use should be required and publicly available. The following areas are particularly important for addressing the world mercury market uncertainties identified in II-1:

1. Public reporting of all production, from primary mines, by-product production, and secondary recovery (from wastes, etc.), on at least an annual basis, by producer and/or country.
2. Public reporting of sales and destination countries and/or customers, by producers and brokers.
3. Mercury consumption accountability by the world chlor-alkali industry.
4. Collection and reporting of better information on other global mercury uses, including measurement and electrical devices, artisanal gold mining, and cultural uses.