Commodity-Grade Mercury Stakeholder Meeting

Holiday Inn Capitol, Washington, DC
September 20, 2007

The Environmental Protection Agency (EPA) held its final Commodity-Grade Mercury Stakeholder Meeting at the Holiday Inn Capitol Hotel in Washington, DC on September 20, 2007.

Ms. Wendy Cleland-Hamnett, USEPA Office of Pollution Prevention and Toxics, opened the meeting shortly after 8:30 a.m. and welcomed the meeting participants.
Ms. Cleland-Hamnett indicated that the meeting, designed to provide the federal government with individual stakeholder input on options for managing non-federal stocks of commodity-grade mercury, represented the fourth and final meeting in the Agency's series of meetings on the topic. She also noted that the stakeholders' input was a valuable component in helping the EPA uphold its commitment to working with other federal agencies to assess options for managing non-federal commodity-grade mercury supply as outlined in its 2006 publication *EPA's Roadmap for Mercury*.

The vast majority of surplus mercury in the U.S., Ms. Cleland-Hamnett said, is owned and managed by the Department of Defense (DOD) and the Department of Energy (DOE), each of which has adopted a policy of continuing to store rather than sell the mercury. A number of stakeholders, she added, have urged the government to take the lead on developing solutions for managing surplus non-federal stocks of mercury in addition to managing the federal stocks. The non-federal stocks, she indicated, are currently managed by a variety of independent entities and can result from the closing of chlor-alkali facilities, state and local mercury product recycling programs, and mercury captured as a byproduct of industrial processes.

Ms. Cleland-Hamnett explained that EPA, with the help of its federal partners, coordinated the series of stakeholder meetings. with the expectation that the stakeholders (comprised of individuals from academia, non-governmental organizations, industry, and state governments) would provide the federal government with individual input on a range of options and an assessment of these options for managing the non-federal stocks of mercury. The charge to the stakeholders is twofold, she said. The first question for consideration by the stakeholders is, How should the various non-federal stocks of commodity-grade mercury be managed in both the short and long-term? The second question to be addressed is, How do current and future supply and demand affect the determination for each of the various stocks?

The first meeting in the series was held in May 2007, Ms. Cleland-Hamnett explained. At the first meeting, the stakeholders discussed the supply of and demand for mercury and provided background information on domestic and global demand as well as the international context surrounding supply and demand issues. The second meeting was

held in June 2007. At the second meeting the participants began discussing storage and alternatives to storage. In July 2007, a two-day public meeting was convened in Denver, Colorado. The Denver meeting included a robust discussion of issues related to mercury, international primary and artisanal mining, and international and domestic byproduct mercury from gold mining. At the Denver meeting, the stakeholders also heard more details on domestic storage requirements and the cost of storage associated with the federal stockpiles of mercury. At today's meeting, the stakeholders will have an opportunity to hear presentations on private sector storage options and costs, updated data on supply, and alternatives to an export ban. Discussion of a set of questions will follow. For the last portion of today's meeting, each stakeholder is invited to provide a summary of his input on options for non-federal mercury.

Ms. Cleland-Hamnett indicated that next steps in the process included development of a summary for the meeting, as well as a consolidated summary of all four meetings. She stated that the stakeholders would be provided with the summaries for their review to ensure that all the information presented was captured correctly. Then, using the final consolidated summary, the federal partners will work collaboratively to create a paper for consideration by an interagency workgroup that will look at various options for storing surplus mercury. Ms. Cleland-Hamnett said she expected that report to be completed in November 2007.

Following her presentation, the following questions/answers/comments were asked. Questions are denoted by a "Q," an "A" denotes Answers and a "C" denotes Comments.

Q: (*A representative from industry*) Where does the paper go?
A: (*EPA*) It will go to the interagency workgroup and they will see if they can reach agreement on action that the USG will take or a range of options that can be taken. The overview summary will go to the stakeholder group and EPA will use it to create a report with options for USG discussion.

Q: (*A representative from a non-governmental organization*) Is there a timeline for this?
A: (*EPA*) The interagency meeting will be in the October-November timeframe.

Q: (*A representative from a non-governmental organization*) Will additional input from this group be solicited?
A: (*EPA*) No.

Q: (*A representative from a non-governmental organization*) Is there something coming up in regards to new legislation?
A: (*EPA*) We are only tasked with providing technical assistance.

Following the question and answer session, Ms. Cleland-Hamnett introduced Ms. Sheila Canavan, USEPA, who served as the meeting facilitator.

Ms. Canavan welcomed the meeting participants and reiterated that the day's meeting would serve as the last opportunity for the stakeholders to meet as a formal group. She

also noted that the final minutes from the meeting would be placed on EPA's mercury website. Next, Ms. Canavan asked the stakeholders to introduce themselves by stating their name, title, and organization. Following the shareholder introductions, Ms. Canavan announced that numerous federal experts were attending the meeting and would be available to answer questions throughout the day. She asked the federal experts to introduce themselves, followed by EPA staff self-introductions. Finally, members of the audience were asked to introduce themselves and place their names on the sign-in register.

Ms. Canavan reminded the stakeholders of the stated objectives articulated by Ms. Cleland-Hamnett:

- How should the various non-federal stocks of mercury be managed both in the short-term and long-term?
- How do current and future supply and demand affect the determination for each of the various stocks?

She also reminded the stakeholders that EPA was interested in their individual input. After reminding the group that the comment docket would remain open until September 30, 2007, she provided an overview of the day's agenda. Finally, Ms. Canavan reminded the meeting attendees that members of the press were welcome to attend the meeting and therefore the attendees' comments could appear in the media.

Updated Supply Data and Sources of Mercury
Maria Doa, Office of Pollution Prevention and Toxics, EPA

In response to a request from the last stakeholder meeting to provide improved data on mercury supply, Dr. Maria Doa presented information on the current U.S. domestic and import supply sources. She indicated that the EPA, with the help of various stakeholders, prepared the presentation.

Dr. Doa cited the following domestic supply sources of commodity mercury in the U.S.: 1) byproduct from gold mining, 2) product recycling and waste recovery, 3) closing/retrofitting chlor-alkali plants, 4) import of commodity-grade mercury, and 5) import of calomel (mercury chloride). For each of the cited supply sources, Dr. Doa indicated the total annual supply, sources, trend, regulatory setting, and remaining supply data, as applicable.

When describing the estimated quantities of commodity-grade mercury in the U.S. in 2005 and 2006, Dr. Doa noted that the data on imported elemental mercury did not include calomel because there was uncertainty regarding that number. She said that she is following up with the Census Bureau to get a better handle on this issue.

In regards to the supply source of byproduct mining, Dr. Doa was informed by stakeholder Dr. Glenn Miller that the total annual supply should be 118 metric tons of

commodity-grade mercury for 2006 (not 114 metric tons). He indicated that the number varies approximately 10-15 metric tons per year.

As part of her presentation, Dr. Doa also addressed the issue of reservoirs of elemental mercury (potential sources of available mercury) and discussed future trends. In closing, Dr. Doa showed a summary chart depicting projections of U.S. mercury supplies from 2006 through 2014. In response to the chart, Mr. Art Dungan indicated that there are currently two chlor-alkali plants scheduled to close in 2008 and one in 2009, which would leave 4 plants remaining.

Following Dr. Doa's presentation, the following questions/answers/comments were noted:

Q: (*A representative from a non-governmental organization*) What was the source of the recycling number?
A: (*A representative from EPA*) The number came from two retorters.

Q: (*A state representative*) Is it correct that in 2007, 408 metric tons from the chlor-alkali industry were sold?
A: (*A representative from industry*) We can't answer specifically. If it hasn't been sold already, I assume it will be on the market shortly.

Q: (*A representative from academia*) If nothing is done in the next four to five years, won't the problem just go away?
A: (*A representative from industry*) At some point the plants will close and the remaining plants will run until the end of their economic life or until a law prohibits that.

Q: (*A representative from a non-governmental organization*) What is the percentage breakdown of recovered material? How much is recycled product versus how much is waste?
A: (*A representative from industry*) The vast majority is in flasks in elemental form and some could be from products that are decommissioned. Once in a while you get some from a soil spill, but I think the majority is elemental mercury. It comes from decommissioned products, e.g. from laboratories.

C: (*A representative from academia*) Barrick Gold Corporation generates around 90 tons per year, which is 75% of the total. That supply will be constant for awhile. They plan to stop mining in 2015 but continue operating until 2029/2030. That will be the bulk of byproduct mercury in Nevada.
C: (*A representative from industry*) Extraction from the ground will continue until 2015 but processing will continue to generate mercury byproduct until the stockpiles are depleted.
Q: (*A state representative*) Is part of the 118 tons retorted?
A: (*A representative from academia*) It is the majority of it (75% of total mercury byproduct production).

Q: (*A representative from academia*) How much does Barrick produce per year?
A: (*A representative from industry*) We would have to do a conversion.

Q: (*A representative from a non-governmental organization*) Can you elaborate on trends in the reservoirs are going? We know that mercury from dental amalgams is emitted from crematories and that the rate of cremations is increasing in comparison to burials. A certain percentage of dental amalgam is going into wastewater systems. Amalgam will be a larger portion of the reservoir in the future.

A: (*A representative from EPA*) Recovery of dental amalgam is increasing. Yes, the rest goes to POTWs.
C: (*A representative from a non-governmental organization*) Unfortunately, there is some resistance from the American Dental Association, so if the EPA could take more of a leadership role in this area, it would be great.

C: (*A representative from industry*) In the presentation, the numbers on calomel imports are probably too high. My company gets only about 30 tons from Canada and 20 from Europe per year so I'm surprised to see the number. I'm not aware of others who are processing calomel. There is generally 30-50% water by weight in the calomel.
C: (*A representative from EPA*) The issue of the water content makes the reporting uncertain.

Q: (*A representative from academia*) Where does byproduct calomel come from?
A: (*A representative from industry*) There is a smokestack process called Norzinc. There are something like 30 or 40 of these operations.

Q: (*A representative from a non-governmental organization*) I noticed that there was no mention of coal-fired power plants. What portion is recovered versus going to fly ash?
A: (*A representative from EPA*) The mercury concentrations are low.
Q: (*A representative from a non-governmental organization*) Is it true that if you are using ACI?
A. (*A representative from EPA*) Yes.
A: (*A state representative*) I agree, the concentrations are low. Recovery is not a good option; fly ash is landfilled. A report from New Jersey found low mobility of mercury from fly ash.

C: (*A representative from a non-governmental organization*) I take issue with the comment that reservoirs are not economically recoverable. Pollution prevention is driving this and I suggest that part of the presentation be revised. Under the heading "Reservoirs Potentially Recoverable," I would alter the bullet that reads, *significant portion of product, amalgam reservoirs is not economically recoverable; unclear whether technological, state regulatory changes will affect this,* to add "voluntary initiatives and/or federal initiatives."

C: (*A representative from industry*) In looking at the last slide, the majority of trends will be from chlor-alkali plants. It is not correct to include imports in the domestic supply.

Mercury comes into the U.S. and is re-exported. If there is an export ban, we likely won't see those imports as they occur now.
C: (*A representative from EPA*) The chart is intended to show data in the absence of future policy changes.
C: (*A representative from industry*) If you need to store it, it becomes a different story.
C: (*A participant from academia*) So this is a benchmark. If there is a market, then it is a reasonable forecast.

Q. (*A representative from EPA*) If there is a storage policy, would it affect the mercury you import under your stewardship program?
A: (*A representative from industry*) It depends on what eventuates with an export ban. If the storage is prohibitively expensive or disallows exports then imports won't continue.
C: (*A participant from academia*) There will be a world market for mercury for some time so mining companies that now import mercury into the U.S. may move it into foreign markets.
C: (*A representative from industry*) If there is a viable solution to retire mercury at a reasonable cost in this country, we prefer that, from a product stewardship standpoint and a business standpoint.
C: (*A representative from industry*) Other mining companies say they want land disposal.

C: (*A representative from EPA*) We will modify the presentation so this additional input can be included.

C: (*A representative from academia*) The demand side is the other side.

Q: (*A representative from industry*) What about U.S. demand over five to 30 years? We are not on pace to do 100 tons like last year. It's hard to predict operations that move from U.S. to overseas. Non-necessary use of mercury is down because we now import the mercury products. The compact fluorescent light bulb is one example. Dental amalgam is imported into the U.S. from Europe.

Q: (*A representative from academia*) Do we have good number on how much the U.S. actually uses? It's fuzzy.
C: (*A representative from industry*) It will be fuzzy. I think demand will fall from 100 tons to 50 tons per year for total use.

Q: (*A representative from EPA*) Is part of the issue that there are more state laws that affect use?
C: (*A state representative*) The restrictions will decrease demand. I would point out that state legislation is focusing on the sale of the products, whether made in the U.S. or imported.

C: (*A representative from a non-governmental organization*) A national mercury phase out campaign would make demand fall. The benefit is where there are multinationals, they cut out flow for the rest of the world. I think there is enough information to generate

trends. Mark Smith said a report is coming out next month with estimates of reduced mercury products in Northeastern.

Q: (*A representative from academia*) We've talked about storage of elemental mercury in flask-based storage what is the goal of landfill disposal?
A: (*A representative from industry*) The goal is change it so it is acceptable for land disposal. It can be done in Canada but not in the U.S. Sequestration for me is long-term storage as well as landfill.

Private Sector Storage and Costs of Private Sector Storage
Tim Lehman, Office of Pollution Prevention and Toxics, EPA

At the last stakeholder meeting EPA was asked to give cost estimates for private sector storage. A subgroup comprised of David Lennett, Edward Balistreri, Bruce Lawrence, Brad Buscher, Dennis Lynch, William Fortune, and Joseph Pollara was formed. In addition, other members of the stakeholder panel contributed to compiling the cost estimates. Mr. Lehman informed the audience that the subgroup looked at two different scenarios when generating the cost estimates: 1) a storage facility where the facility is rented, and 2) a storage facility that is a new construction on purchased land. For each scenario, the subgroup estimated unit costs for mercury storage and total costs. Mr. Lehman explained that the subgroup utilized various assumptions when deriving the cost estimates that centered around five unique areas: 1) methodological assumptions, 2) facility assumptions, 3) regulatory/insurance assumptions, 4) financial assurance assumptions, and 5) general assumptions. After discussing each assumption, Mr. Lehman cited various limitations and then discussed the cost estimates compiled by the subgroup. Among the factors that would influence costs were the actual design and construction of buildings and the need for more advanced security measures to ensure national security. As part of his presentation, Mr. Lehman also addressed one-time. Finally, Mr. Lehman presented per-pound and total costs for the storage of 7,500 and 10,000 tons of mercury respectively. He cautioned that the estimates should not be compared directly to estimates of annual per-pound storage costs presented by the DOD for the operation at Hawthorne, Nevada, because DOD's costs do not include fixed and capital costs. Following his presentation, Mr. Dennis Lynch indicated that the numbers presented by Mr. Lehman were consistent with the total costs experienced by the DOD.

Following Mr. Lehman's presentation, the following questions/answers/comments were noted.

Q: (*A representative from a non-governmental organization*) The closure costs are part of the total estimate. Can you elaborate and comment on the even probability across the scenarios?
A: (*A representative from EPA*) We didn't use probabilities. It's hard to predict scenarios. If a facility has to close, e.g., bankruptcy, but mercury doesn't move, then annual costs may change but the one time cost won't apply again. Also, if land has to be sold and mercury has to be moved to a nearby facility, then you would have annual costs

and one time costs (minus the financial assurance costs). If the decision is to stabilize, there is a cost for that.
C: (*A representative from a non-governmental organization*) I would appreciate seeing the details on that estimate.
C: (*A representative from industry*) I pulled the estimate for stabilization out of the air during a phone conversation. It seemed like a reasonable number to me.

C: (*A representative from industry*) We still need to look at storage in perpetuity, not just 40 years, so a trust fund might be needed. You may have to relocate or rebuild a facility. We need to also look at a fixed quantity of mercury per year going into a facility. The costs may go down over time as the quantity of mercury entering the facility goes down.
Q: (*A representative from academia*) If I don't want to show any liability and I want to buy my way out of this, it may require legislation. How much can I pay to have it sequestered? My second question is if there is an assumption that it is a long-term storage, what about private/public options—if we recognize it as a public good to have it sequestered and look at building only, would it reduce the cost?
A: (*A representative from EPA*) If you took the financial assurance out, it would lower the cost.
C: (*A participant from academia*) It doesn't make difference if it's public or private.
C: (*Facilitator*) If the government has a contactor and has to replace the contractor then the cost might be the same.
C: (*A representative from EPA*) The government wouldn't put money aside in a trust fund.

Q: (*A state representative*) Since closure cost is a driver, what are the assumptions if you have bankruptcy from an entity? Are you taking into consideration new permits, a new Environmental Impact Statement (EIS) process?
A: (*A representative from EPA*) We didn't look at the bankruptcy scenario. The EIS process was taken into consideration. However, based on the subgroup's recommendation, we have opted not to include the EIS costs for private storage.

C: (*A state representative*) What did you factor in in terms of the interim costs? Coming from a state that has taken over a facility, our costs were higher. You might not want to assume costs are the same. Temporary control costs could be higher.

C: (*A representative from industry*) If I bring it in and pay $1 to $4 per pound, most of the money should go into a trust fund so money is always there versus going towards the operation for the permanent management of the site.

Q: (*A representative from academia*) What about annual unit costs regarding regulatory compliance and staff? It doesn't seem like $2-3K per year is enough to pay anyone's salary.
A: (*A representative from EPA*) We used the OSW Cost Compendium.

Q: (*A state representative*) Did you look at a range of security costs? How much of an impact would a higher level of security be?

A: (*A representative from EPA*) We haven't done that yet. We are talking about writing it up in a report and even perhaps doing a sensitivity report if people think it would be worthwhile.
C: (*A state representative*) I think it would be.

C: (*A representative from a non-governmental organization*) Transportation could also be a variable. You need to include the possibility that the mercury may not go to a retorter first. If the mercury is going to long-term storage, it may not need to be high grade.
C: (*A representative from industry*) I don't know if location matters. The important thing is to get the band roughly correct. The next step is to go forward with a sensitivity analysis for labor and materials, and transportation. I would also do a sensitivity analysis around construction, a sensitivity analysis on the economies of scale. It's not important to replicate a government facility because a private facility would operate differently.
Q: (*Facilitator*) Do you want to look at a smaller facility?
A: (*Panel)* Yes. (Various members also indicated they wanted to look at the issue of transportation).

C: (*A representative from academia*) Generally speaking you don't have to take the 40 years of storage cost right up front. The cost up front may be much higher because more mercury is coming in for storage initially.

C: (*A representative from industry*) I think 200-300 tons will enter storage each year. It will take approximately 10 years to fill up the facility, so the costs are higher up front. I also think you should exclude the rental options and assume you will have to build a facility.

C: (*A representative from industry*) Instead of building a facility all at once, you could build as the demand for storage space grows.

C: (*A representative from a non-governmental organization*) When you do the sensitivity analysis, present contribution to cost for the different elements.
C: (*A representative from academia*) I think a further analysis for the sake of refining the estimates is a little ambitious. We have such a wide range, it may not be useful until policy decisions are made.

C: (*A representative from industry*) I think it's important to do the analysis because it is for private sector storage.

Q: (*A representative from a non-governmental organization*) Is it possible to use federal facilities? I wondered if you have thought of obstacles to each of these options.
A: (*A representative from EPA*) We have not done that here.

An Export Ban and Alternatives – Mercury: The Good, the Bad, and the Export Ban
Dr. Edward Balistreri, Colorado School of Mines

Dr. Edward Balistreri stated his finding that government purchase and sequestration is a better policy than an export ban. An export ban could harm the domestic environment. There are two public goods: keeping mercury off the global market, and sequestering it to protect the domestic environment. A lot of the mercury that is seen in the market is what he calls a "free resource," he said, because regulations require that it be brought to commodity levels. Dr. Balistreri also stated that mercury demand is on a steady decline and a lot of this has been brought about by regulation but also by the high price of mercury. So conversely, he argued, in an identical regulatory environment where mercury was cheaper he would expect to see a higher demand. In his model, however, he said he was willing to accommodate a zero price response as a reasonable assumption. Dr. Balistreri provided results of his simulations and sensitivity analyses. Finally, he demonstrated how the computer models worked to illustrate how different views about the world could be accommodated.

In closing, Dr. Balistreri said that having a quantitative framework is useful because it puts things in perspective. He felt that Mr. Lehman's estimate for sequestration costs at $600 per metric ton was reasonable, but he said it was pocket change for the government. Private parties should be worried if they had to pay that sequestration cost but from the U.S. public's perspective and from a public policy perspective, it is not a high cost. He felt that having a rational public policy can get mercury off the world market and that although the export ban may be a good policy in some regards, it is not the best policy. He also informed the audience that his paper is posted on his website at http://www.mines.edu/~ebalistr/

Following Dr. Balistreri's presentation, the following questions/answers/comments were noted:

Q: (*A representative from academia*) Is there another example where a commodity export ban has been put in place where there is an excess amount of that commodity?
A: (*A participant from academia*) I'm sure there are examples, but I can't think of one off the top of my head. These inelastic curves are not all that rare in economics. There is nothing being presented here that is radical to economic theory.

C: (*A representative from academia*) You made a point that what we do may not have the resulting effect we want to see. The problem we have to address is how to get mercury out of places that are not handling it correctly; an export ban would accomplish this, but you say it may not do much. So EPA needs to look at keeping mercury out of artisanal mining and other inappropriate uses. I think we can make an important statement that we will not export mercury but have to work with other countries to negotiate what they are willing to do.

C: (*A participant from academia*) The work UNIDO does will do more perhaps to curb artisanal mining than our policy.

Q: (*A representative from academia*) Are there numbers on small spills and how much they cost? How much yearly is spent on them?

A: (*A representative from EPA*) In Washington, D.C., a school cleanup of 250 milliliters of mercury cost millions of dollars. We could get the exact number and share it with everyone.
C: (*A state representative*) It can range from thousands to millions of dollars and that is for the ones that do get cleaned up. This begs the question what happens to those that don't get cleaned up.

C: (*A representative from a non-governmental organization*) If you put an economic "X" on the lands destroyed by artisanal mining, it supports Ed's position even more.

Q: (*A representative from EPA*) What about elasticity and artisanal mining? I'm tying to put this in context from the information we got from Kevin Telmer.
A: (*A participant from academia*) Mr. Telmer was arguing that if they have a certain process they will be conserving mercury. But I would argue that if you look at different processes, and some are more conservative than others, the artisanal miners do respond to price so if it costs a lot, they will keep it in the mining process longer and conserve it.

Q: (*A representative from academia*) Is EPA looking at policy options other than an export ban?
A: (*EPA*) The interagency group is only looking for stakeholder input at this stage..

C: (*Arnold Kuzmack, EPA to Dr. Balistreri*) It would be great if you could translate your work into a formula for a non-economist.

C: (*A participant from academia*) I would remind people that sequestration is different from an export ban. An export ban is the wrong way to go.

Q: (*A state representative*) What if you try to discriminate between sources? Once mercury has gone through a process do you know the source it came from? Is this enforceable?
A: (*A participant from academia*) A tracer could be put in the mercury but it's not a good idea to go down that path.

Q: (*A representative from academia*) If the ban goes in place, and we import products from China, will that be considered—if the mercury is mined someplace else? How much of the U.S. consumption comes from other places?
A: (*A representative from industry*) It's impossible to tell. I get and sell mercury from all over the place. China has a policy to offset its mining.
C: (*A representative from academia*) There is mercury that is mined in China that ends up in the U.S. We need to consider if this will be part of the import/export ban.

Q: (*A representative from academia*) Where did the budget come from to clean up the school Maria mentioned?
A: (*A representative from EPA*) It was not from the EPA budget. The Washington, D.C. schools handled it.

Panel Discussion on Supply and Demand and Sources of Mercury

1. ***Should there be different strategies for short-term and long-term management of non-federal stocks of mercury?***

Short-term:

C: (*A representative from industry*) In the short-term there should be a solution for storage and no export ban.
C: (*A representative from industry*) I would echo that.
C: (*A representative from industry*) I agree with that too. I hope the legislation has flexibility over time so if there is a safe way to landfill in the future it should be an available option going forward.

C: (*A representative from a non-governmental organization*) An export ban should go into place, with a storage solution, and it would be a great incentive for finding a solution. There is nothing to stop people from managing and properly storing their mercury that is not a waste on their own site.

C: (*A representative from a non-governmental organization*) The European Union is moving in a clear direction and the U.S. administration says we need a sequestration option. They need to move forward and recognize the global significance of this issue. All things need to be happening simultaneously.

C: (*A representative from academia*) Short-term can be defined as one to two years. I would argue that 40-year storage is the same as in perpetuity and should allow for an extension for longer length of time if needed.

C: (*A state representative*) Different strategies are needed if we are going to get at the chlor-alkali mercury because it will be available in the short-term. An appropriation or incentive to get mercury from them in the short-term is needed for them to sequester it—one to five years is my definition of short-term in regards to this issue.

C: (*A representative from industry*) Depending on mercury mining, there may be one solution for excess mercury in the short term and another scenario for long-term.

C: (*A representative from industry*) If we take it out of circulation then we have to find a repository for it.

Long-term:

C: (*A representative from industry*) It is the responsibility of the government for reasons stated earlier, not private enterprise.

C: (*A representative from industry*) The federal government is the best option to accept mercury and should be prepared to take liability for ownership in the long-term and this

will create incentive for companies that want to store it here. Sequestration should be at a reasonable cost to the private sector and imports should be allowed to keep coming in.

C: (*A representative from academia*) There needs to be a repository for privately-generated mercury.

C: (*A representative from academia*) There are a couple of ways to pursue this, federal versus privately run, and there are different ways to store it. You can have models on how to store it (a 40-year plan) and then see which model is best for long-term sequestration as a permanent solution. Different facilities may require different solutions.

C: (*A representative from industry*) Whether private or federal, the liability needs to be long-term and financially viable. In the long term the revenue will dry up and expenses will rise. You need a nest egg to pay for it.

C: (*A representative from industry*) I think we need to move towards an end game--permanent disposal and research and development into mercury stabilization. This issue should be considered for a federally-funded program.

2. What impacts would restrictions on international trade in mercury have on the management of non-federal stocks?

C: (*A participant from academia*) Currently excess supply of mercury is absorbed by the world market. If there is an export ban, we would have to manage that surplus.

C: (*A representative from academia*) If you have to pay to get rid of mercury, then that may reduce the number of recyclers. The export ban may be a disincentive for recycling. It may take more agency involvement for recycling to be encouraged.

C: (*A participant from academia*) There are state requirements for recycling but it's clear that not everything that can be recycled is recycled.

C: (*A state representative*) The price of recovered mercury is not what's driving recyling and other initiatives. If it costs $50-$100 per pound for a school clean-up program, and we have to pay another $5-$10 dollars, it won't significantly impact the program. The costs of sequestration would not significantly affect these program costs.

C: (*A participant from academia*) If you take away the value proposition of the end stream, then the value proposition will get readjusted, either by law or voluntary recovery, but it will push the cost up. We have to consider if we can recover the marginal costs. Making it up in volume doesn't really work here.

C: (*A representative from industry*) We want to avoid the expediting of landfilling mercury. We have to look at closing some of the exemptions. Also consider if we will ban the ownership of commodity-grade mercury itself.

C: (*A representative from academia*) In Nevada, the recycling program for mercury is not good.
C: (*A state representativ*) At state levels the trend is for increased recovery.

C: (*A representative from industry*) It's not clear what an export ban will look like so if it equates to an import ban then we have consequences that don't align with the intent of the ban.
C: (*A representative from a non-governmental organization*) Mercury that is imported to the U.S. gets processed a little bit, a recycler makes money, and then it moves on—absent sequestration, I don't see how it is a huge environmental benefit.

C: (*A representative from industry*) With sequestration, companies may want to import mercury so they can sequester it as opposed to keeping it offshore.

C: (*A state representative*) When we talk about incentives for recycling, the proposal needs to be done at a federal level because state by state they just take it out of our state and we can't enforce the requirements. It needs to be a regulatory federal requirement because the state programs vary too much.

C: (*A participant from academia*) The service of waste management may be a retort service. This is separable from the value of the mercury. So, if I charged $100 for someone to take the dirt and distill the mercury out, the mercury is still part of the $100. When you can't sell the mercury, they may charge me $101.

Q: (*A representative from EPA*) Is the issue of recycling more a question of it being a service?
A: (*A participant from academia*) It is a component, but one among other components.

Q: (*Facilitator*) What about prior informed consent? The Rotterdam Convention requires those who send material to inform the country of receipt of what is in the material.
C: (*A representative from a non-governmental organization*) There are other international trade options including import bans of other countries, treaties, prior informed consent, or global bans on primary mining.
A: (*A participant from academia*) If we didn't need to get all exports off market we could have an export tax.

C: (*A representative from industry*) You can try to get mercury going only to legitimate processes, but there are different suppliers around the world so if you are not supplying to them then someone else probably is.

C: (*A representative from a non-governmental organization*) There have been attempts to restrict the sale of mercury to legitimate uses, for example in Brazil it is illegal to sell to artisanal miners for gold extraction, yet the miners are using mercury. The world experience has been poor in attempts to channel mercury into legitimate uses.

C: (*A participant from academia*) The chlor-alkali industry would like the USG to take the mercury and its liability.

Q. (*Facilitator*) Should some mercury sources be managed differently than others?

A: (*A representative from industry*) All mercury should be treated the same.

A: (*A representative from academia*) You should have a hierarchy, e.g. you want to encourage recycling of products that can cause spills. Need to give incentives to recyclers.

A: (*A state representative*) If you discriminate between sources, how do you enforce it since you don't always know the origin?

C: (*A representative from academia*) If we import products with mercury from China, we are encouraging them to use mercury and to mine mercury. We should consider this.

C: (*A representative from a non-governmental organization*) Private and government sides should encourage alternatives to using mercury in artisanal mining.

3. ***How would changing the nature of the trade restrictions change the impact?***

Ms. Canavan indicated that this topic had been sufficiently addressed in previous meetings and therefore did not need to be answered again.

4. ***How would trade restrictions affect the stocks of mercury, including primary mining of mercury, and the use of mercury in artisanal mining?***

C: (*A representative from industry*) There is likely to be some effect but I don't know what it will be.

C: (*A participant from academia*) It's an empirical question. I believe if the price goes up enough people will start extracting it.

C: (*A state representative*) In California they mine mercury in our streams, but we have a difficult time getting that data.

C: (*A representative from EPA*) I asked Mr. Telmer this question in Denver and he said some would occur but it would be relatively small.

C: (*A participant from academia*) We need information on artisanal gold miners and the elasticity of their response to changes in the price of mercury. If mercury has a high price over time we will get higher leakage rates.

C: (*A representative from industry*) In conjunction with an export ban policy, we need support from government to encourage transfer of technologies.

Individual Stakeholder Feedback

Ms. Canavan invited the stakeholders to provide a five-minute summary of their views on management of commodity-grade mercury.

C: (*A representative from a non-governmental organization*) (Participant provided his summary in written form which is included as Attachment 1).

C: (*A representative from industry*) In principle I don't oppose a ban or attempt to reduce mercury getting into the market but we should take into consideration all reasonable outcomes that may result. An export ban should not precede a long-term solution. For the long term, the federal government is the best party to take the mercury and that would get it out of the marketplace. The USG should store the mercury and take the liability to increase incentives for companies to store mercury at a reasonable cost. Long-term storage should allow the retirement of mercury that is imported from other countries. Federally funded research and development on stabilization technologies is needed. The idea of enhanced visibility in the supply chain would improve upon mercury stewardship globally. Monitoring is needed to evaluate the policy to understand its effects like primary mercury mining. Long-term storage should encourage recycling and use of mercury from air pollution control devices.

C: (*A representative from industry*) There is no oversupply of mercury in the global market (taking into account the European ban on import/export of mercury). So if we take the DOD supply, DOE, and others we get 13,242 tons. I have been in touch with brokers in China who say they can get permits to import mercury. In the Pacific Rim and China they consume or will allow 400 tons to be imported, (the price you charge has to be less than their production cost), Vietnam imports 130 tons a year, Australia 30 tons, for a total of 560 tons; the remaining 40 tons can be consumed by U.S. or rest of the world with the exception of South America, Indonesia, and Africa (where artisanal mining occurs). There is an annual demand of 600 tons per year (non-artisanal). You can sell 600 tons per year with 13,242 tons over 40 years. At the current price of $3 per pound you amass $87 million. When mercury is mined, about four percent is lost through smoke stacks. The result of exporting is 530 tons which are not released because you are not mining.

C: (*A representative from academia*) Mercury is not mercury, the source is important. We need to encourage recycling with financial incentives, because it eliminates human exposure. Federal agencies should accept and store the mercury; but in the long term, taxpayers should not pay the environmental liability costs of large firms but should pool resources to store in private storage facilities. Inspection and monitoring should be implemented. DOD has a model and others may be more cost-effective but storage protocols will be needed. EPA has an opportunity to limit the deterioration of the environment. The monetary value of mercury as a commodity is minor in comparison to the reputation of the U.S.

C: (*A representative from industry*) From the point of view of a manufacturing sector that produces mercury- containing products, the companies need a reasonably-priced source of commodity-grade mercury to meet demand. Mercury-containing products are declining and will continue to decline with or without regulatory restrictions. The products are still with us for now (e.g., thermostats, relays, switches), so there is a need to recycle and keep recycling as a viable option. If policy disrupted recycling, we'd have a hard time explaining why. As for long-term storage and sequestration, I think it makes sense to have a situation/solution in place for sequestration before a ban is in place. Using a ban as a tool to force a solution could backfire.

C: (*A representative from industry*) The government is the proper place for the sequestration of mercury on a long-term basis. A public-private arrangement could happen although unsure whether Mercury Waste Solutions would want to be involved. A GoCo might be the way to go and they already exist. I would not be in favor of a ban that doesn't consider long-term storage of this element. If the government takes the mercury, we won't need to make commodity mercury a RCRA waste. If we consider an export ban it should coincide with a ban on mercury bearing wastes, so we avoid a huge export of waste to be retorted in other countries and then sold. To the extent there are best management practices, they should be investigated. It is important that the locations of facilities take into account security measures. There should be a requirement to track movements of elemental mercury and mercury products and develop proper packing standards.

C: (*A state representative*) I think the federal government, with state governments, need to continue to address the phase-out of mercury in products, both voluntary and regulatory. There needs to be strong support for collection and recycling of mercury-containing products. There needs to be federal legislation requiring recycling and preventing mercury- containing products from being landfilled. EPA and other agencies should be aggressively involved in international dialogue to prevent uses of mercury in environmentally damaging ways around the world. The U.S. should serve as a leader promoting technology transfer. With regards to storage, I think the short-term issue should be addressed with conversion and closing of chlor-alkali plants, because it's a significant quantity potentially releasable to the market. For the short-term, the federal government has storage facilities so we should look at incentives for the chlor-alkali industry to get the mercury to federal storage facilities. In the long-term, consider private, public/private or public. There likely will be some merit in public/private storage because of the private involvement. There has to be flexibility in terms of storage options. And we should not forgo continued research to immobilize the mercury for the long-term. EPA should lead this research effort. EPA needs to advocate and have a policy for good data collection regarding where it is being used in products, and import/export, and research in terms of technology to immobilize for the long-term.

C: (*A representative from industry*) For more than five years, the chlor-alkali industry has endorsed the USG setting up long-term storage of mercury. And now it looks like it is going to happen and we agreed to participate in discussions of an export ban. It is essential that a ban be accompanied by a permanent storage strategy in place. There

needs to be an equitable policy for handling excess mercury, regardless of source. Retirement is a sound public policy and the public should bear a portion of the cost because it is a public good.

C: (*A participant from academia*) I think we need to hold mercury off the market. I think we need to take the approach from the perspective that for the public good, mercury needs to be pulled off the market. Sequestration costs are $100K per year. If the government had to buy it, it would be more than $1 million or not much more and I think you could buy it for pennies on the dollar. I think it's worthwhile to take one more step back to reconsider this. If we have a multilateral project we could remove more mercury with better outcomes than an export ban. No export ban. If there is an export ban, new virgin mercury will be mined. There is still a lot of primary mining out there. The government should fund programs to decrease global demand.

C: (*A representative from a non-governmental organization*) There is near-consent that mercury should be sequestered. With the current practice of exporting mercury, this pollutant cycles back to affect us and our economic interests, including fishing. When EPA weighs its options they should recommend the least harmful approach. Long-term sequestration is good public policy, and so is an export ban on federal and non-federal supplies of mercury. As for long-term above ground storage, I hope for safe treatment options in the future. It is not clear that a U.S. government solution is the answer. There is nothing unique in principle about this material and I could argue that EPA could regulate the storage of these materials. It could be argued that EPA already has authority under RCRA to regulate mercury. Generators of this material must pay their share of long-term storage costs and must remain liable. What source should supply demand? Any domestic source is okay, but EPA might want to look into encouraging the voluntary recycling of mercury. Management of mercury is the cost of doing business. I think that overall we have more agreement than disagreement around the table so EPA has a starting point.

C: (*A state representative*) The states' interest are environmental and public health. There should be no liability for the states for mishaps or financial issues. We support long-term retirement and the government is responsible (but not necessarily the only player) and we support recycling. States support long-term stabilization as the long-term solution.

C: (*A representative from academia*) Mercury sequestration is a new concept and I am not aware of another example of a metal we have decided to take off the market. Management using a permanent repository for up to 40 years has been demonstrated; it can be done relatively safely. However, the development of a permanent repository needs to be tied to public education on long-term issues of use and management of mercury. We need to get mercury out of artisanal mining. Merely taking our mercury out of the world market is not sufficient to get mercury out of artisanal mining. Whatever sequestration is done should also allow for the sequestration of imported mercury. This should be a federal program. Anything beyond 40 years is long-term. All mercury is ultimately a public liability that requires federal oversight. I suggest the mercury be on

land controlled by the federal government. EPA is a world leader, with the European Union, and a statement needs to be made that we will manage surplus mercury and we don't want it released into the ecosystem except in well-managed ways. Making this statement internationally is important. Finally, there is significant merit to buying mercury instead of having an export ban.

C: (*A state representative*) We need to implement states activities to address demand in the states. The Quicksilver Caucus put out a document on managing commodity-grade mercury. Our state is in a position to tackle many issues addressed by this committee. We will submit to EPA our written comments. The Federal government should take responsibility for long-term storage. There are numerous options. We don't have a position on who should pay and manage, although states should have a role in siting, permitting, and monitoring to be sure storage is done safely and securely. We would like to see incentives to sequester mercury soon rather than later. There is an accountability issue. With respect to trade restrictions, we feel they are appropriate but need provisions for necessary uses. We should consider not just market-based mechanisms, for example technology transfer is important to reduce mercury on the global front. There is a real need to track supply and demand better and do analyses.

Public Comment

Ray Grazick, Northeast Lamp Recycling in Connecticut, read a letter from Paul Abernathy, Executive Director of the Association of Lighting and Mercury Recyclers that was addressed to Dr. Maria Doa. In the letter, which was distributed to the stakeholders, Mr. Abernathy indicated that he believed there are 100-200 tons per year of recovered mercury from recycling (not including volumes being reported by Bethlehem Apparatus). This letter has been placed in the public docket.

Closing Remarks

Ms. Canavan reminded the group that the comment docket would remain open until September 30, 2007. Dr. Doa informed the stakeholders that they could also email written versions of their final comments/feedback if they desired. Ms. Cleland-Hamnett reminded the stakeholders that the meeting summary and the consolidated summary of all the stakeholder meetings would be sent to them for review, after which the federal partners will work collaboratively to create a paper for consideration by an interagency workgroup that will look at various options for managing surplus mercury. She thanked the panel of stakeholders for the informative discussions that occurred over the day and over the course of the series of meetings and thanked the federal partners and the EPA staff for their work in putting the meetings together. After these closing remarks, the meeting adjourned.

Attachment 1 –Feedback From a Representative From a Non-governmental Organization
(Unedited)

A representative from a non-governmental organization
Sept. 20, 2007

I would like to thank EPA and the interagency panel for the opportunity to participate on this important panel on the management of surplus mercury.

Before responding to several of the questions posed by EPA, I would like to preface my remarks with a recap of a few key observations, particularly related to artisanal and small scale gold mining.

- First, as we have heard throughout these meetings, reductions in Hg use in industrial countries have led to surplus mercury supplies
- Approximately 80% of all Hg used today is in developing countries
- Excess Hg is readily available to developing countries w/latest "gold rush" driving demand

While we have heard some of this during our last meeting, I think it worthwhile repeating that at least 100 million people in over 55 countries depend on artisanal and small-scale mining (or ASM) for their livelihood, mainly in Africa, Asia and South America. ASM produces 20-30% of the world's gold, or approximately 500-800 tonnes per year. It involves an estimated 10-15 million actual miners, including 4.5 million women and 1 million children.

ASM is the cause of a disproportionate part of the environmental and social problems in developing countries. ASM produces atmospheric mercury emissions of around 300 metric tons per year worldwide (GMP, 2006). Mercury can be carried long distances in the atmosphere and deposited, methylated and taken up in the food chain far from its source.

Studies show that ASM workers have high mercury levels in both hair and urine through both vapor inhalation and handling of mercury, resulting in severe health impacts including intoxication. In one case study by the UNIDO Global Mercury Project, approximately half of the miners were found to be intoxicated with mercury. Intoxication can result in muscular atrophy, seizures and mental disturbances. Even in low doses, methylmercury causes neurological problems, and is especially serious for women, leading to sterility, spontaneous abortions and/or transfer of methylmercury to the fetus.

However, there is evidence that a higher price of mercury encourages miners to adopt better techniques to prevent these losses, e.g. use of retorts, amalgamation of concentrates instead of whole ore, use of mercury-free technologies.

So on to the responding to some questions.

What are your projections on how the future global supply and demand for mercury may affect the domestic and international stocks?

The main changes in the international Hg market are the gradual overall decrease in global demand and the shift of demand from more developed to less developed countries. With regard to supply, there will be a significant decrease by 2011 in the amount of Hg coming out of Europe. Otherwise, the main shift is away from Hg mining, and toward increased reliance on secondary and recycled sources. Large users of mercury will probably make an effort to increase their strategic stocks in case of supply disruptions as we approach 2011—perhaps some 20-40% more stocks than they already have. The mercury will be readily available between now and 2011. The general impact on prices over the next 5 years will likely manifest itself in less volatility than during the past 3 years, but there may be a continual gradual decrease in prices –even if, as anticipated, global demand actually decreases gradually.

How may future Hg supply and demand trends affect US and international stocks?

There is no clear and consistent relationship between supply, demand and stocks of Hg either in the U.S. or overseas. Mercury producers and brokers try to keep Hg supply on hand that is sufficient to handle their known customers, plus a surplus to deal with unforeseen circumstances. However, during periods of exceptional price volatility, or during periods where there is reason to suspect a sustained increase or decrease in the market price, producers and brokers may adjust their stocks accordingly in order to take advantage of these price trends.

How will different strategies for dealing with U.S. Hg exports influence short or long term management of US Hg stocks?

If the US chooses to ban Hg exports, those companies that presently import mercury will no longer be able to do so. The only options for US-management will be storage and limited US market for it. The number of players will major players will decrease. Demands for additional short-term storage will not be great, and recycling will continue to be utilized as a management option. Over the longer term the cost differential between storage and export will largely determine the eventual disposal of US Hg stocks. If the US chooses not to ban Hg exports, ignoring the potential leadership role on the issue, a very small number of US companies will continue to import and export Hg. With regard to modest impacts on management, recycling and other aspects of short-and long term Hg stock management.

How will international trade in Hg influence US Hg management options?

International trade in Hg, especially the possibility of US exports, will probably lead to somewhat increased recovery in the US, especially if the market price of Hg rises

further—and marginally less disposal. As discussed, the main influence on these management options will be dictated by the world market price of Hg.

In summary, a combined storage and export ban requirement in the US will reduce mercury pollution and exposure both at home and abroad, and will also, along with the EU, send a market signal that mercury is a dangerous neurotoxin that should not be allowed to be traded like potato chips. Instead, it should be taken off from the marketplace and permanently stored until a sequestration technology, complete with the necessary long term durability testing, is developed and proven to be safe and secure over the long term.

-end-