**MEETING MINUTES**

**Event**: Expert Group Meeting (EGM) on the Elimination of the Use of Mercury in Chlor Alkali Chemical Processes

**Date**: 28 - 29 June 2016

**Venue:** Vienna International Centre(VIC)

**Day 1: 28 June 2016 (Meeting Room: D1377)**

**Participants (Day 1)**

|  |  |
| --- | --- |
| Name of the Participant | Affiliated Organization |
|  |  |
| Ms. Ana Garcia Gonzalez | MinAmbiente – Spain |
| Mr. Francisco Javier Carrasco Milara | MAYASA (Grupo SEPI) – Spain |
| Mr. Dolf van Wijk | WCC, Euro Chlor – Belgium |
| Mr. Martim Afonso Penna | WCC, CLOROSUR – Brazil |
| Mr. Satish Sinha | Toxics Link – India |
| Mr. Michael Bender | Mercury Policy Project – USA |
| Mr. Peter Maxson | Concorde East/West Sprl – Belgium |
| Mr. Octavio Valdivia | Cydsa Corporativo – Mexico |
| Mr. Jose de Jesus Garcia Said | Cydsa Corporativo – Mexico |
| Mr. Masaaki Okabe | Asahi Glass – Japan |
| Mr. Hiroki Iwase | Nomura Kohsan Co., Ltd – Japan |
| Ms. Natsumi Oka Antweiler | Nomura Kohsan Co., Ltd – Japan |
| Mr. Rodges Ankrah | USEPA |
| Mr. Alex Mourant | USEPA |
| Ms. Desirée Montecillo Narvaez | UNEP Chemicals and Waste Branch |
| Mr. Guillermo Castella | UNIDO – Department of Environment |
| Mr. Riccardo Savigliano | UNIDO – Department of Environment |
| Ms. Rana Ghoneim | UNIDO – Department of Energy |
| Ms. Carolina Gonzalez-Mueller | UNIDO – Department of Environment |
| Mr. Jaime Moll de Alba | UNIDO – Department of Partnerships  and Results Monitoring |
| Other Participants | UNIDO |

**Agenda (Day 1)**

|  |  |
| --- | --- |
| Time | Agenda Item |
| 9:00 – 9:15 | Welcome Speech (UNIDO) / Opening Remarks (US-EPA, UNIDO) |
| 9:15 – 9:30 | Review objectives of the EGM and other logistic information |
| 9:30 – 10:15 | Review the state of the chlor alkali Industry at the global level |
| 10:15 – 11:00 | Impacts on Environment from chlor alkali industries |
| 11:00 – 11:20 | Coffee Break |
| 11:20 – 12:00 | Successful Conversions: the WCC experience |
| 12:00 – 12:40 | Successful Conversions: the Indian experience |
| 12:40 – 14:00 | Lunch Break |
| 14:00 – 14:40 | Understanding needs: Presentation by non-WCC facilities |
| 14:40 – 15:30 | Making the Business Case for Change |
| 15:30 – 15:45 | Coffee Break |
| 15:45 – 17:30 | Identifying the Financial Resources for Change |
| 17:30 – 18:00 | Review/Summary of Proceedings |
| 18:00 | Adjourn |

**Minutes (Day 1)**

**9:00 – 9:15: Welcome Speech (UNIDO) and Opening Remarks (USEPA and UNIDO)**

Mr. Riccardo Savigliano opened the meeting by welcoming the participants in the name of UNIDO. He then passed the word to Mr. Philippe Scholtès, Managing Director of the Programme Development and Technical Cooperation Division (PTC) at UNIDO, who thanked the participants for their presence and emphasized how well the topic of the Expert Group Meeting suits UNIDO’s mandate regarding the promotion of Inclusive and Sustainable Industrial Development (ISID). Philippe emphasized the existence of new initiatives to involve investment and development banks into projects where energy benefits can be generated from a technological intervention, as in the case of the Chlor Alkali industry.

Mr. Rodges Ankrah welcomed and thanked the participants in the name of USEPA. He presented the phasing out of mercury in Chlor Alkali facilities as an achievable goal, since many plants have already undergone the necessary transition in the past. He encouraged the participants to share their knowledge on both technical and financial issues related to this transition during the meeting, and reminded everybody of the general need to communicate fairly complicated issues in a manner that can also be understood by the general public. He also stressed the importance of the issue of mercury disposal after a conversion and the need to avoid the deviation of any mercury stocks for other purposes, in particular for Artisanal and Small-scale Gold Mining (ASGM).

**9:15 – 9:30: Review Objectives of the EGM and Other Logistic Information**

UNIDO provided brief logistic information on the overall meeting management. Each participant introduced himself/herself, briefly presenting his/her organizational affiliation and his/her involvement in issues related to the phase out of mercury in Chlor Alkali chemical processes.

**9:30 – 10:15: Review the State of the Chlor Alkali Industry at the Global Level** (Moderator: Desirée Montecillo Narvaez, UNEP)

Goal and Proposed Discussion Points

The goal of this agenda item was to give the participants of the meeting an overview of the number, as well as the location of the remaining Chlor Alkali facilities, and to provide participants with the historical context regarding the development and the adaption of technologies across the sector. The proposed discussion points included:

* Obligations under the Minamata Convention;
* Mercury consumption and mercury supply to Chlor Alkali plants;
* Overview on existing plants, including number of facilities and their geographical distribution, mercury consumption, age of facility etc.;
* Review of current production practices, including global trends and industrial performances;
* Estimate of mercury stocks from conversion and decommissioning.

Presentation by the Moderator

The moderator of the session, Ms. Desiree Montecillo Narvaez presented the role of the UNEP Global Mercury Partnership as a tool to provide governments, industries and other relevant stakeholders an immediate support in their early implementation of the Minamata Convention as well as facilitate its ratification and timely entry into force.

Desiree stressed that the Chlor Alkali sector ranks amongst the eight major emitting sources of mercury according to UNEP’s 2013 Global Mercury Assessment. However, the calculation does not take into consideration mercury releases to the environment, which can be indeed quite significant.

Against this background, Desiree also pointed at Article 3 of the Minamata Convention on Mercury, which specifically refers to Chlor Alkali facilities. According to Article 3 paragraph 5b), Parties to the Convention have to ensure that excess mercury stemming from the decommissioning of Chlor Alkali facilities is disposed of in an environmentally sound manner. Besides Article 3, Article 5 of the Minamata Convention was regarded as particularly relevant to the subject of the meeting, as it deals with manufacturing processes in which mercury and mercury compounds are used and the respective phase-out dates. Annex B part I of the Convention states the phase-out date of chlor alkali production in 2025.

Furthermore, Desiree stated that the estimated total amount of mercury remaining in the about 70 mercury-based Chlor Alkali facilities still operating in the world amounts to approximately 10,500 tons. Seven thousand five hundred (7,500) tons of those are assumed to be located in countries/regions with export bans in force (e.g. EU and USA). The remaining 3,000 tons are assumed to be located in countries without export bans. In addition, an estimation of the remaining mercury-based Chlor Alkali facilities which are members of the World Chlorine Council (WCC) was provided during the meeting and updated afterwards, based on the 2015 WCC Inventory. In 2014, a total number of 44 of those facilities were counted, to decrease to 38 plants in 2015. According to UNEP’s 2013 inventory, 24 Chlor Alkali facilities with a mercury-based production process were not members of the World Chlorine Council (WCC). UNEP is updating the list of those facilities through a survey. Governments have been contacted asking for the status of non-WCC plants in their respective country. However, responses were very limited (from Romania, Morocco, Syria, Iran and Serbia). Against this background, Desiree suggested to work in cooperation with agencies involved in the Minamata Initial Assessments (MIAs), in order to achieve better results.

Group Discussion

The group discussed the different impacts from the “closure” and the “conversion” of plants. It was made clear that the closure of an operation does not necessarily mean that a whole company has to close its business. However, in both cases issues related to mercury stocks and remediation of project sites need to be considered and tackled. Further discussion on this matter was moved to the following technical sessions.

As far as the number of remaining mercury-based facilities is concerned, it was stressed that it is generally important to obtain new data to keep track of recent progress in the field. In India, for instance, the last mercury-based Chlor Alkali plant closed in April 2016. Also, the last mercury-based plant in Colombia had been shut down recently, which was not projected in the data available during the meeting but confirmed afterwards, based on the 2015 WCC Inventory. Other facilities are considering the conversion to membrane, as per the case of Cuba (non-WCC member, but assisted by ChloroSur), but the limited financial resources available are delaying the conversion to take place.

Furthermore, the group focused the discussion on the low response rate of UNEP’s survey on non-WCC facilities. It was proposed that, in future, UNEP and the Chlor Alkali Partnership could coordinate to reach out to facilities directly. This approach could increase the response rate, as one potential obstacle – a possible lack of commitment from the side of national governments – would be avoided. Again, it was pointed out that MIAs – if applicable – could help getting information on non-WCC facilities, even if this might be a lengthy process.

Finally it was pointed out that under the Convention (Article 3) only the so-called “excess mercury” is considered as waste, in the sense that it must be disposed of in accordance with the guidelines for environmentally sound management referred to in paragraph 3 (a) of Article 11.

**10:15 – 11:00: Impacts on Environment from Chlor Alkali Industries** (Moderator: Rodges Ankrah, USEPA)

Goal and Proposed Discussion Points

The goal of this agenda item was to describe the range of environmental issues to be considered both from conversion and decommissioning, with the view of highlighting energy gains that could be generated from a technological intervention. The proposed discussion points included:

* Overview of mercury releases and emission from Chlor Alkali production;
* CO2‐equivalent emissions from Chlor Alkali industries and mitigation options, including energy efficiency measures;
* ISO 50001 and applicability of energy standards to Chlor Alkali industries;
* Soil contamination due to mercury waste disposal traditionally on-site as well as cell leakage, mercury in wastewater ends up in waterways, health effects of workers and surrounding population, contribution to effects on the ecosystem, further care needs to be taken during decommissioning.

Presentation by the Moderator

The moderator of the session, Rodges, put the emphasis of his presentation on the major pathways through which mercury can unfold its contaminating impact. While mercury can be released to water and soil, it can also be emitted to the air, or contaminate the machinery with which the chemical comes into contact. When working with contaminated machinery, for example, workers health needs attention. Furthermore, the potentially improper management of mercury stocks can harm human beings and the environment, as well. In general, it has been stated that mercury can be emitted – and unfold its harmful effects – at different points in time, up to and including the waste management process.

Furthermore, Rodges stressed that both the risk that mercury leaks at all, and the volume of mercury potentially leaking, differ between the pathways. In addition, dependent on the pathway through which the mercury is leaking, it is more or less difficult to be controlled. Last but not least, climatic implications and financial requirements related to the leaking of mercury might differ from pathway to pathway.

Group Discussion (including presentations by Masaaki Okabe, Asahi Glass and Rana Ghoneim, UNIDO)

The group discussion on this agenda item started with a presentation by Mr. Masaaki Okabe, representing the Japanese company Asahi Glass Co., Ltd. Masaaki reminded the participants of the three different production methods in Chlor Alkali facilities, involving membrane cells, diaphragm cells and mercury cells. He stressed that, while caustic soda in Japan was primarily produced in mercury cell-based facilities during the post-World War II period, Japan has completed the transition to membrane cell-based facilities in the production of caustic soda already in 1999.

For individual facilities, as Masaaki explained, the conversion to mercury was clearly beneficial in economic terms. Facilities could reduce the number of hazardous chemical substances they were working with (mercury in the case of mercury cell-based plants and asbestos in the case of diaphragm cell-based plants). Facilities could also expect a reduction in energy consumption from 3,300 kWh/tNaOH (mercury cell-based plants) or 3,000 kWh/tNaOH (diaphragm cell-based plants) to 2,300 kWh/tNaOH (membrane cell-based plants), a 20%-30% reduction in energy consumption.

At the end of his presentation, Masaaki stressed that although a conversion is rational from a long-term perspective, it requires significant short term investments. Thus, facilities planning to undergo a conversion are often in need of financial support. There are multilateral schemes such as the Global Environment Facility (GEF) or the Green Climate Fund (GCF) which might be helpful in this respect, as well as national institutions and schemes, such as the Japan International Cooperation Agency (JICA), the Japan Bank for International Cooperation (JBIC), and the Joint Crediting Mechanism (JCM), in the case of Japan. Finally, energy service companies (ESCOs) can be involved in the conversion process. The actual costs of a conversion were at the heart of the discussion following onto Masaaki’s presentation. In that respect, it was explained that, in the Japanese case, the average costs for a conversion were about 700$ per ton of Cl2.

Following onto Masaaki’s presentation, Ms. Rana Ghoneim, representing UNIDO’s Energy Department presented on the potential benefits from the appropriate energy management in sectors with high energy demand like the Chlor Alkali industry. Rana indicated that the energy costs for Chlor Alkali industries represent around 50% of the total operating costs. It could be very interesting to elaborate more on the concept of energy management in the Chlor Alkali sector because of the potential large impact on operating costs. Rana stressed how a reduction in energy costs through energy optimization measures can improve the business model of a company. ISO standard 50001 has the exact scope to rationalize the energy costs and, as consequence, promote a better business model. Benchmarking energy needs for the Chlor Alkali sector would be an interesting exercise.

During the discussion it was highlighted that energy costs can even represent 60-70% of the total operating costs and that there are already efforts to define the energy benchmarking of the sector. For example, the first priority in Mexico for cost saving in industrial applications is always on the reduction of energy needs due to the high energy cost. However, it was also pointed out that, based on WCC experience, an intervention such as the technology conversion to membrane would require a very long pay-back time (15-20 years) if not supported by other financial schemes/incentives.

**11:20 – 12:00: Successful Conversions: the WCC Experience** (Moderator: Dolf van Wijk, WCC)

Goal and Proposed Discussion Points

The goal of this agenda item was to emphasize the range of issues that WCC has already tackled, and identify what aspects of the WCC experience and approach may be applicable for non- WCC facilities. The proposed discussion points included:

* Drivers;
* Factors influencing the conversion vs. closure decision;
* Conversion step by step, starting with necessary preparatory steps, such as sources of technical assistance, modifying the chemical processing flow, planning to limit downtime, equipment and site decontamination and hazardous waste disposal, etc.;
* Energy savings generated by the alternative technology(ies) and related CO2 mitigation impacts;
* Other environmental benefits;
* Lessons learned, including post‐conversion mercury management;
* Practices adopted to monitor and manage mercury stocks;
* Experience by CS in mapping technology needs for conversion.

Presentation by the Moderator

The moderator of the session, Mr. Dolf van Wijk started his presentation with an overview of the development of the Chlor Alkali industry. The first industrial examples in the Chlor Alkali sector date back to 130 years ago. In the 19th century mainly mercury cells, and to some extend diaphragm cells, were used to produce caustic soda through the electrolysis of brine, with chlorine and hydrogen emerging as byproducts. The use of chlorine was mostly related to the sanitation of drinking water and the water in swimming pools, but this usage accounts for only 5% of the total use of the substance. Other relevant markets of the products/byproducts from the Chlor Alkali industry are represented by primarily polyvinyl chloride (PVC) (1/3) and methylene diphenyl diisocyanate (MDI) for polyurethane (PU) (1/3) manufacturing.

The World Chlorine Council acts as a global network of chlorine-related industry associations and their respective member companies. WCC has gathered guidelines and best practices on its newly organized web page ([www.worldchlorine.org](http://www.worldchlorine.org)). The website also includes general information related to Chlor Alkali industries in a sub-category dedicated to the UNEP Global Mercury Partnership.

Dolf provided specific information on the experience of WCC members in phasing out of mercury from Chlor Alkali plants. Firstly, he mentioned that the experience of WCC members was that the payback time for conversion costs is usually between 15 and 19 years, and is dependent on the capacity of the plant. Secondly, with respect to the storage of excess mercury, Dolf explained that there are different solutions which are currently under discussion. This include the storage of liquid mercury in special containers stored in salt mines. He stated that salt mines are particularly suitable as the they are very dry. An alternative storage solution would be to stabilize mercury into mercury-sulfide compound, which is a solid and inert form. Thirdly, there energy efficiency gains as membrane-cell plants use less energy than mercury cell-plants. The net gains can be lower than expected, as membrane cell-plants use energy for additional processes which are not necessary in mercury cell-plans, such as the use of steam for the concentration of the soda.

Finally, as far as drivers of conversion are concerned, it was stressed that for companies, business considerations are at the fore front. On average, the cost for conversion is around USD 60M for a conversion of a 100,000 tCl2 capacity plant (average between 20 and 400,000 tCl2 capacity).

Group Discussion

When it was asked on the global status of the sector and whether there are trends in the global capacity and export of caustic soda, it was mentioned that this depends on the market. For instance, the USA does export around 80% of its caustic soda, whereas Southern American countries do not, as they cannot compete with the USA in terms of energy costs and cost of final products.

It was said that the price of conversion ranges from USD 500 to USD 1,000 per tonne capacity. How expensive the conversion is, does massively depend on electricity costs. Furthermore, it has to be taken into account that membrane cell-units need brine of higher purity, which incurs in additional costs. In general, in order to be able to pay the price for conversion, companies very often increase their capacities. In the case of CYDSA, they were thinking of increasing the capacity by about 30%, which would leave them with a payback period of about 10-15 years.

The group discussion of this agenda item ended with a treatment of the question of whether it is known what happened to the mercury from the converted plants. It was stressed that there is an export ban on mercury since 2011 in Europe and 2013 in the USA where companies need a special exemption to export mercury other than waste. Concerning the storage of excess mercury, it was noted that the option of liquid mercury stored in salt mines may be suitable only in the short term.

Finally, on the question of where the mercury is going to after conversion, the partnership could create a separate overview listing possible storage options as well as the suppliers relevant in this respect.

**12:00 – 12:40: Successful Conversions: the Indian Experience** (Moderator: Satish Sinha, Toxics Link)

Goal and Proposed Discussion Points

The goal of this agenda item was to look at the Indian experience to emphasize the interplay between financing, regulations and markets. Furthermore, it was proposed to be discussed which factors may be applicable to other non-WCC facilities. Proposed discussion points included:

* Drivers;
* Factors influencing the conversion vs. closure decision;
* Conversion step by step, starting with necessary preparatory steps, such as sources of technical assistance, modifying the chemical processing flow, planning to limit downtime, equipment and site decontamination and hazardous waste disposal, etc.;
* Energy savings generated by the alternative technology/ies and related CO2 mitigation impacts;
* Other environmental benefits if not already discussed by Asahi;
* Lessons learned, including post-conversion mercury management;
* Practices adopted to monitor and manage mercury stocks.

Presentation by the Moderator

The moderator of the session, Mr. Satish Sinha opened the session by giving a brief overview of the history of Chlor Alkali industries in India. He explained that the first shift of an Indian Chlor Alkali plant away from mercury was conducted in 1985, decades before the Minamata Convention. In India, the decision to convert was made based on potential business gains, rather than to address the negative impacts of the industry. Environmental concerns were addressed at a later stage, through the Indian government and the respective industries agreeing on a Charter on Corporate Responsibility for Environmental Protection in 2003 which guided and fostered the conversion from mercury to membrane cells.

There are several business-related drivers for conversion. Expenses for electricity can be substantially reduced after conversion, as less electricity is needed in membrane cell-based Chlor Alkali plants. In India, on average, mercury cell-based plants were run with an energy consumption of 3000 kwh/t Cl2, whereas membrane cell-based facilities only consume 2300-2400 kwh/t Cl2. Thus, average net energy savings were higher than 20% after the conversion from mercury to membrane cells. Other business-related incentives include lower regulatory pressure from running a plant based on membrane cells, as mercury management regulations are no longer applicable. In the Indian case, capacity expansion using mercury was made illegal. Therefore, capacity has often been increased after a conversion, and this is needed to reduce the payback time and make the conversion economically feasible. Thus, if a facility wanted to expand in order to increase profits, the shift to membrane cells was a pre-condition

In addition to identifying energy savings, Satish also provided numbers on the costs for India’s Chlor Alkali industries to convert to membrane cells. Average costs for the conversion of a facility with a capacity of 100 tonnes were indicated with US$ 11-12 million. Total costs for all conversions in India to mercury-free technologies are estimated at around US$ 750 million. Costs estimation related to conversion includes both capital expenses and operating costs. Satish reported that Indian companies averaged 7 years to get a return on their investment if they did not expand their capacities. With a capacity expansion of 20%, this time span decreased to 5 years.

Satish also highlighted the advantages of membrane cell-based production and addressed the issue of mercury management in India. He stated that energy savings not only imply reduced production costs, but also a reduced carbon footprint of the respective facility. Furthermore, product quality is improved, as membrane cell-based plants can produce purer versions of caustic soda, for which there appears to be a growing demand on the market. Finally, companies that moved away from mercury and switched to membrane cells have to deal with fewer toxic substances.

Group Discussion

Participants commented on the issue of the management of excess mercury in India. Satish explained that when mercury use had not yet been phased-out, the excess mercury from closures or conversions was sold to mercury-cell production facilities. As the number of mercury cell-based plants decreased in India, the need for regulation of the unused mercury increased. However, a respective regulation has not yet been put in place by the government to regulate the mercury excess.

The group discussed the reasons why some plants closed while others converted. Satish stated that only very few plants closed in India whereas the vast majority converted to membrane technology. The plants that had to close were generally based on business considerations, as they were usually old ones and in difficult financial conditions. Those that converted, on the other hand, also increased their capacity at the same time. Conversion was usually funded through loans.

**14:00 – 14:40: Understanding Needs: Presentation by Non-WCC facilities** (Moderator: Ana Garcia Gonzalez, MAGRAMA)

Goal and Proposed Discussion Points

The goal of this agenda item was to look specifically at the status and barriers from within the sector and to provide an additional perspective to the WCC and Indian experiences discussed earlier. The proposed discussion points for this agenda item included:

* Overview of existing plants: UNEP survey;
* Methodologies for assessing the technical and financial needs for conversion;
* Conversion challenges and options;
* Dealing with site contamination and waste disposal;
* Mercury stock management options.

Presentation by the Moderator

The moderator of the session, Ana Garcia Gonzalez opened the session by reminding the participants of the Supply and Storage Partnership Area’s objectives, as well as the problems to be tackled. She discussed the need to manage the excess supply of mercury from Chlor Alkali industry and to find appropriate solutions for site decontamination and the storage of both mercury stocks and mercury waste, which should be treated as close to the source as possible. She also addressed the importance of having adequate and effective legislation in place regulating how mercury is to be dealt with. Ana noted that several technologies for the stabilization of mercury are already available and improvements of those technologies are being explored.

Group Discussion (including a presentation by Mr. Octavio Valdivia, CYDSA)

The group discussion on this agenda item started with a presentation by Mr. Octavio Valdivia. Octavio started by providing the participants with general information on the work of CYDSA. He noted that CYDSA, based in Mexico, is not yet a full member of the World Chlorine Council. He informed the participants that there are currently several Chlor Alkali plants in Mexico. CYDSA acquired a facility in Santa Clara and converted the production process from a mercury to membrane cell. The site in Santa Clara was remediated by CYDSA between 2011 and 2015 at a cost of US$ 6 million.

There are two mercury-cell process plants left in Mexico. One of them is located in Monterrey, the other one is located in Coatzacoalcos. Currently, CYDSA is in the process of building a new membrane cell-based plant (Iquisa Noroeste) with the help of a long-term credit, which will allow for the closure of one of those two remaining mercury cell-based plants. The mercury cell-based plant will be closed once the new plant is completed.

Octavio highlighted the challenges which are related to the transition from mercury to membrane cells. Those challenges include: the management of mercury stocks, for which CYDSA has not yet been able to define the options; the difficulty in meeting deadlines for finishing a conversion; and issues addressing problems with site remediation. In Mexico, sites on which mercury is used are listed in a National Inventory of Contaminated Sites, which obliges the site owner to remediate. He expressed concern about a lack of governmental support or incentive structures respect? to assist with remediation, which is why CYDSA is seeking the help of international environmental funds.

In reaction to Octavio’s presentation, the group discussed the remediation of the site in Monterrey. The plant has been operated for 58 years, and the expected costs of the site remediation are assumed to be similar to the costs for the site remediation of the plant in Santa Clara. Furthermore, the group discussed remediation standards, and it was clarified that the standards depend on the location of the plant, with stricter standards for residential areas, and less strict standards for industrial areas. It was also pointed out that it is very difficult to assess the amount of mercury in contaminated soil which is to be landfilled, which has not been done by CYDSA in the case of the remediation in Santa Clara.

The group also discussed potential financing options for CYDSA. It was mentioned that there might be opportunities under GEF 7, which will start in 2018/2019. GEF is not expected to pay for conversions, but they might financially contribute to the landfilling as part of the remediation process, for example. It was also mentioned that UNIDO is currently preparing a GEF-funded project ongoing in the area of Coatzacoalcos, which is related to risk assessment and the detection of decontaminated sites.

**14:40 – 15:30: Making the Business Case for Change** (Moderator: Peter Maxson, Concorde East/West Sprl)

Goal and Proposed Discussion Points

The goal of this agenda item was to identify economic factors and benefits that a facility should emphasize in order to attract financing. The proposed discussion points for this agenda item included:

* Review take‐aways from “Cost of Conversion” report;
* Review of current and future regulatory drivers, including mercury stocks monitoring and carbon pricing;
* Identification of key variables for making financial decisions for conversions;
* Options for managing or selling mercury stocks;

Presentation by the Moderator

The moderator of the session, Peter Maxson, representing the Brussels based company Concorde East/West Sprl, started by reminding the participants of the need both to show corporations how to convert and to convince them of the necessity and the benefits of a conversion in the first place. He went on to highlight the different dimensions which have to be considered with respect to the conversion of a Chlor Alkali plant. With regards to regulations, conversion requirements are defined not only by international treaties and conventions such as the Minamata Convention on Mercury, but also domestic regulatory frameworks – be it at state or even local level. Regional regulatory frameworks such as the EU Water Framework Directive, which regulates the release of toxic materials into water, also affect the issue of Chlor Alkali plant conversions.

Peter noted several dimensions to facility conversion. The economic dimension is determined by factors like the regulatory framework for conversion, and considerations such as energy savings. . Peter mentioned the responsibility of a company towards the health of its workers as part of the social dimension of a conversion away from mercury .He also noted the existence of the technical dimension of a conversion, and as noted in other sessions an environmental dimension of a conversion, related to the management of hazardous materials and the disposal of toxic waste, for instance.

In the second part of his presentation, Peter focused on the economic dimension of a conversion. He noted that costs emerge during the planning process, the actual (re-)construction process, the decommissioning and demolition phase, and the final phase of the site clean-up. During the (re-)construction phase, for example, downtime might temporarily reduce returns He also highlight additional cost consideration related to the input and output materials of the process. For example, since a membrane-cell based process requires brine of a higher purity, the chlorine produced through this process is of lower quality than the chlorine coming out of a mercury cell-based process and requires further concentration for caustic soda production.

Peter noted that the economic benefits might be most important concern for the corporations considering conversion. Operation and maintenance costs are lower in membrane cell-based plants (as less energy and fewer personnel is needed, for example). Mercury handling, storage, reporting and waste management costs also disappear for plants which operate without mercury. Furthermore, the quality of caustic soda is higher and there are no mercury contamination concerns in membrane cell-based plants. Finally, as membrane cell facilities are relatively smaller, allowing smaller facilities to either produce the same output to increase output from same-sized facilities. He surmised that the per unit production costs for chlorine and caustic soda are lower in membrane cell-based plants than in mercury cell based plants.

Peter concluded by citing several reasons explaining why the present time is especially good for corporations to undergo conversions. Interest rates are historically low at the moment, which makes it feasible for many companies to take on a loan. Secondly, there is a wide range of bilateral and multilateral funding opportunities available today. By undergoing the conversion, corporations could expand their capacities, modernize their production processes and adapt to new market realities. The payback time of a conversion undergone today is expected to range from about 5 years in lower-cost, more flexible environments to 15 years in higher-cost, more regulated environments.

Group Discussion

The group discussion on this agenda item focused on an analysis of the development of the demand for, and the price of, mercury. In this respect, it has been stated that, within the last 10 years, the price of mercury per flask has gone up first, and then decreased until today.

The price increase which has happened in the past has been primarily attributed to the adoption of export bans on mercury. Most importantly, such bans have already come into place in the EU in 2011 and in the USA in 2013. The adoption of similar bans are now being discussed in Canada, Switzerland and Japan. It was noted that in Japan , companies currently need a special permission to send mercury out of the country.

Different causal factors have been identified for the current mercury price decreases. Increases in primary mercury mining (for example in Mexico) increases the supply of mercury on the market. It was noted that parties to the Minamata Convention will have 15 years after its coming into force to stop primary mining activities on their territory. In contrast, due to conversions to Chlor-Alkali facilities in USA, Europe and the rest of the world there will be mercury surpluses in those markets, likely decreasing the price of mercury over time. These conversions, in addition to the Conventions prohibition against building new Chlor Alkali facilities and other restrictions should further reduce the demand for price of mercury in the global market.

**15:45 – 17:30: Identifying the Financial Resources for Change** (Moderator: Alex Mourant, USEPA)

Goal and Proposed Discussion Points

The goal of this agenda item was to compile information to help determine the viability of specific facilities, weigh the options to decide between conversion and decommissioning, identify preferred funding options for their specific conditions, and establish relationships directly, through government agencies, or through regional banks or other entities. The proposed discussion points for this agenda item included:

* Discussion of current financial practices;
* Financing Conversion vs Decommissioning;
* Discussion of potential sources of financing:
* Private Banks
* Regional Development Banks
* Multilateral Development Banks
* Bilateral Aid Agencies/ Export Credit Agencies;
* Financial packaging – choosing from the range of funding options for specific facilities;
* UNIDO Experience in collaborating with financial institutions (e.g. EBRD, local banks) in the Mediterranean region;
* How to establish relationships between facilities and funding entities;

Presentation by the Moderator

The moderator of the session, Alex Mourant, representing USEPA, started by pointing at barriers to financing, which Chlor Alkali facilities that intend to abstain from the use of mercury are faced with. Firstly, moving to a membrane cell-based production process involves upfront costs of tens of thousands of US$, which might render it difficult for corporations to make the respective move. Secondly, corporations might have to consider market- or currency based risks, but also risks that are firm specific or relate to a politically unstable environment. Finally, the sound management of the mercury that was previously used in mercury cells imposes further costs on the corporation that intends to move away from mercury.

As Alex explained, the preconditions for financing the move away from mercury do also depend on whether a plant is converted or decommissioned. In the case of a conversion, there are future cash flows to be expected to come in from the membrane cell-based plant, which makes it easier for corporations to pay back debt. The closure of a plant, on the other hand, is not connected to a revenue stream. Yet, the conversion of a plant incurs opportunity costs due to production downtime which leads to temporarily reduced revenues, which is why decommissioning might be the better choice, if the respective plant is already at the end of its useful life cycle.

Given the significant costs that the conversion or the decommissioning of a facility incur, financing from third parties might help corporations to create mercury-free production processes. Third-party-financing might take on different forms, including loans, equity, mezzanine financing, credit guarantees and grants. Potential sources of those various forms of third-party-financing include private capital markets, multilateral development banks or regional development banks, bilateral aid organizations and export credit agencies such as the German Kreditanstalt für Wiederaufbau (KfW) or the US American Overseas Private Investment Corporation (OPIC), and global funds such as the Global Environment Fund (GEF) or the Green Climate Fund (GCF). In this regard, Alex finally clarified that there might be differences between private and public sources of financing. While private banks, for instance, should offer shorter tenor loans at market rates and act risk averse, multilateral or bilateral institutions can be expected to take on higher risks and to issue longer tenor credits at more favorable rates.

Group Discussion (including a presentation by Carolina González-Mueller, UNIDO)

The group discussion on this agenda item started with a presentation by Carolina Gonzalez, representing the Industrial Resource Efficiency Division within UNIDO’s Department of Environment. Carolina talked about UNIDO’s SwitchMed programme, which was created to facilitate the shift towards Sustainable Consumption and Production (SCP) in the Mediterranean Region and is an example for how UNIDO has been successfully working with financial institutions such as the European Bank for Reconstruction and Development. In addition, for instance, it has been shown how UNIDO has provided industries with technical assistance to target financing by the Morocco Sustainable Energy Financing Facility (MORSEFF).

Following onto Carolina’s presentation, the group discussed UNIDO’s experience of working with financial institutions. It has been clarified that, while relations with those institutions used to be on a project-by-project basis, UNIDO has recently started to build longer term relationships with institutions such as the World Bank. However, it has been stressed that it is not sufficient for Chlor Alkali facilities to target public institutions when looking for funding. Rather, it should be tried to create a clear commitment of the private sector to the financing of a project, as private sector interest usually signals the integrity of the project to public financial actors.

Last but not least, going back to the specific issue of the conversion or decommissioning of Chlor Alkali facilities, it has been stressed that, as specified in Article 13 of the Minamata Convention, it is not only the Global Environment Facility Trust Fund that is part of the foreseen financing mechanism to support developing country Parties and Parties with economies in transition. Rather, there is also a “specific international Programme” to be created which shall help those countries to fulfill their obligations under the Convention. However, it is not yet clear how exactly the specific international Programme will be designed.

**17:30 – 18:00: Review/Summary of Proceedings**

During this session, the main findings of the first day of the EGM were summarized, and the meeting was formally adjourned.

**Day 2: 29 June 2016 (Meeting Room: D1231)**

**Participants (Day 2)**

|  |  |
| --- | --- |
| Name of the Participant | Affiliated Organization |
|  |  |
| Ms. Ana Garcia Gonzalez | MinAmbiente – Spain |
| Mr. Francisco Javier Carrasco Milara | MAYASA (Grupo SEPI) – Spain |
| Mr. Martim Afonso Penna | WCC, CLOROSUR – Brazil |
| Mr. Satish Sinha | Toxics Link – India |
| Mr. Michael Bender | Mercury Policy Project – USA |
| Mr. Peter Maxson | Concorde East/West Sprl – Belgium |
| Mr. Octavio Valdivia | Cydsa Corporativo – Mexico |
| Mr. Jose de Jesus Garcia Said | Cydsa Corporativo – Mexico |
| Mr. Masaaki Okabe | Asahi Glass – Japan |
| Mr. Hiroki Iwase | Nomura Kohsan Co., Ltd – Japan |
| Ms. Natsumi Oka Antweiler | Nomura Kohsan Co., Ltd – Japan |
| Mr. Rodges Ankrah | USEPA |
| Mr. Alex Mourant | USEPA |
| Ms. Desirée Montecillo Narvaez | UNEP – Chemicals and Waste Branch |
| Mr. Guillermo Castella | UNIDO – Department of Environment |
| Mr. Riccardo Savigliano | UNIDO – Department of Environment |
| Other Participants | UNIDO – Department of Environment |

**Agenda (Day 2)**

|  |  |
| --- | --- |
| Time | Agenda Item |
| 9:00 – 10:00 | Identifying Environmental Challenges during conversion |
| 10:00 – 11:00 | Conversion |
| 11:00 – 11:20 | Coffee Break |
| 11:20 – 12:10 | Decommissioning |
| 12:10 – 13:00 | Ensuring responsible management of mercury stocks |
| 13:00 – 14:15 | Lunch Break |
| 14:15 – 15:30 | Developing Recommendations for Next Steps: Institutional Assistance |
| 15:30 – 17:00 | Developing Recommendations for Next Steps: Facilities |
| 17:00 – 17:30 | Closing Remarks |

**Minutes (Day 2)**

**09:00 – 10:00: Identifying Environmental Challenges during Conversion** (Moderator: Desirée Montecillo Narvaez, UNEP)

Goal and Proposed Discussion Points

The second day of the meeting was dedicated to clean-up issues. It started with this session whose goal was to identify the range and magnitude of environmental concerns related to the conversion away from mercury in the Chlor Alkali industry (stock management, dealing with contaminated machinery, addressing site contamination issues, among others). The proposed discussion points in this session included:

* Site contamination;
* Remediation challenges and available technologies;
* Worker health risks related to mercury exposures;
* Environmental risks;
* Mercury stock management;
* Integrating oversight.

Presentation by the Moderator

The moderator of the session, Desirée, started by making reference to the Minamata Convention. Desiree stated that according to Article 12, the management of sites contaminated by mercury or mercury compounds should follow an appropriate strategy developed by each Party to the Convention. Guidance should be adopted by the Parties on methods and approaches to conduct preliminary assessments to identify the nature and scope of contamination, risks to human health and environment. Site investigation should identify the nature of contamination, and feasibility studies can be used to determine what technical options are available to manage or remediate the site and make final decisions on the best approach to site management. After inventorying contaminated sites, governments should make sure that the source of the contamination is contained to prevent any further contamination, and that site remediation is done as soon as feasible to reduce exposure.

A number of methodologies are available for on- and off-site treatment, including the EU‘s relevant Best Available Techniques Reference Document (BREFs) or the USEPA‘s ‘Treatment Technologies for Mercury in Soil, Waste and Water’. Further guidelines can also be found in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

Group Discussion (including a presentation by Javier Carrasco, MAYASA)

Javier Carrasco with Minas de Almadén y Arrayanes S.A. (MAYASA) of Spain made a presentation on Article 10, which focuses on the environmentally sound interim storage of mercury other than waste mercury. MAYASA’S activities include promoting industrial, touristic and cultural projects and implementing initiatives for the development of research projects and new technologies related to mercury and other potentially toxic metals. Javier explained the mercury stabilization process and the encapsulation of the Almadén mine dump, which has at present a volume of 3.5 million tonnes, for the long term storage of mercury. The stabilization method selected is a polymeric encapsulation of mercury sulfide (HgS) in solid form with the following characteristics:

* Inert solid with low porosity and impermeable;
* 1 tonne of mercury produces 1.37 tonnes of residue (73% in mercury ) and 1 liter of mercury produces 4.10 liters of residue;
* Emits 100-150 times less mercury than cinnabar;
* The microencapsulation provides a second and additional barrier to mercury releases to the environment;
* Safer product and easier to be managed: final disposal could be possible in inert landfills;
* During the process, 100% of mercury is transformed;
* Low energy consumption.
* No water consumption, and neither effluents nor wastes are generated.

The technology for the stabilization of mercury and its polymeric encapsulation will be available on industrial size early next year.

On the remediation of contaminated sites, the experience from the old mercury mine in Almadén was presented, where the risks from the contaminated site were identified and the best strategy for the management of the site was implemented. The intervention included remodeling the slopes and the capping plate of the site, the top sealing of the slope to avoid water and material dispersion, water management system and the restoration of the vegetal layer.

During the group discussion it was clarified that the technology for the HgS polymeric encapsulation has completed the necessary tests and is ready to be implemented on a large scale, with a total capacity of 2,400 tonnes per year or approximately 5 tonnes per day, for a price of around € 2,500/t for stabilization and solidification only (excluding transport and final disposal). It was also confirmed that the material after treatment is inert and could potentially be disposed in a regular landfill. However, it is recommended to implement the final disposal in dedicated landfills, preferably aboveground for a better monitoring.

An emphasis was also put on difficulties in implementing the transportation and interim storage of metallic mercury for final disposal, as it may be regulated under policies for hazardous wastes and may require special containers for wastes. These containers will need to be decontaminated after final treatment and disposal.

In addition, the discussion focused on experiences to implement the best strategy to monitor the mercury flow and make sure that information on the management of mercury stocks is transparent and publicly available.

**10:00 – 11:00: Conversion** (Moderator: Peter Maxson, Concorde East/West Sprl)

Goal and Proposed Discussion Points

The purpose of the session was to clarify the range of issues and key concerns specifically related to mercury cleanup, storage and disposal linked to conversion. The proposed discussion points in this session included:

* Planning for conversion;
* Implementing conversion activities;
* Evaluating facilities for conversion vs new construction;
* Managing clean‐up and transfer of operations.

Presentation by the Moderator

Under the title *Mercury Cell Conversion or Decommissioning:  
clean-up and disposal issues*, Peter delivered a presentation on options for clean-up and disposal and on how to carry out each of them. In both cases, the first issue to be considered is the planning for conversion or decommissioning, which includes:

* Definition of contamination aspects, including contamination standards;
* Definition of the scope of the work;
* Identification of old disposal sites;
* Identification of contractors that will be involved;
* Identification of the sequence of the process for shutting down the facility and cleaning it up, including contingencies and buffer timing;
* Definition of the scope of the reporting;
* Estimation of costs and the funding sources.

The decision between decommissioning and conversion depends on the status of the plant, its efficiency and maintenance need. The following considerations must be taken into account:

* Mercury brine system can be reused after careful cleaning, but replace piping to avoid brine recontamination;
* Reuse of existing process piping is not appropriate;
* Cell room building structure may be in poor condition;
* Mercury contamination of existing concrete structures is common.

The main changes in converting to membrane technology affect the power supply, the electrolysis, the fine purification, the caustic soda circulation, the caustic evaporation and the secondary dechlorination.

With regard to decommissioning, the following steps must be undertaken:

* Planning;
* Setting up a working area;
* Emptying the cells and collecting the mercury;
* Dismantling, demolition and decontamination of equipment and buildings;
* Residual wastes may be stored (briefly) on site, transported and/or further treated before disposal

Group Discussion

It was indicated that in 60% of the cases, conversion is the chosen option, while 40% of the industry opt for decommissioning. The experience of WCC in this regard is that no generic assumptions can be applied when deciding between decommissioning and conversion. The decision has to be taken case by case. However, in both cases the decision will have an impact on the financial support required. Furthermore, also decontamination influences the access and nature of financial support.

Participants also noted the need to select the proper contracts to implement the mercury decontamination. Those contractors are specialized ones and are not readily available in all countries.

Discussion also covered many issues related to identification of contaminated sites, including the difficulty in some developing countries to do it in abandoned facilities and the difficulty to manage them as well as the lack in coordination of standards.

The Barcelona Convention (Mediterranean Maritime Ecosystem) was cited for its inclusion of a regional mercury planning requirement. The Barcelona Convention addresses the need to identify contaminated sites and reduce the risk for the population through best environmental practices. The convention provides guidelines for the management of these sites.

**11:20 – 12:10: Decommissioning** (Moderator: Ana Garcia Gonzalez, MAGRAMA)

Goal and Proposed Discussion Points

As in the previous session, the purpose of the third session was to clarify the range of issues and key concerns specifically related to mercury cleanup, storage and disposal, this time linked to decommissioning. The proposed discussion points in this session included:

* Identifying environmental challenges;
* Addressing site and equipment contamination;
* Technologies, modalities, costs and duration.

Presentation by Hiroki Iwase (Nomura Kohsan)

Nomura is the largest mercury-recycling company in Japan with two plants: the Itomuka Plant (Hokkaido) and the Kansai Factory (Osaka). It is certified with ISO 14001 and its activities focus on the treatment of mercury waste, the recycling of mercury and other recyclable materials, and the research on mercury stabilization.

Hiroki explained the process to treat mercury waste and recycle mercury. Once the Chlor Alkali facilities and the corresponding equipment are demolished and dismantled, the mercury waste is safely packed and sent to Nomura’s facility in Hokkaido. There, the contaminated waste is treated through roasting with a Herreshoff furnace, which is ideal for processing wastes with high mercury content such as sludge and soil. With this furnace the mercury content is vaporized and then collected in a scrubber and cooling tower. The remaining particles of mercury are captured and reprocessed again in the furnace. The waste residue is disposed in a secured landfill of 50,000 m3, located on-site. The total treatment fee is 150 JPY/kg (100 JPY = 1 USD), of which 25 JPY/kg is due to landfill disposal. The shipment fee is 150,000 JPY/5t.

The stabilization and solidification of collected mercury is currently envisaged in Japan and Nomura is currently working on this. Through a mechanochemical process mercury becomes black mercury sulfide and this substance is finally transformed into solidified blocks, which are disposed in a controlled and monitored final landfill.

Main concerns related to decommissioning are as follows:

* The high costs of transportation, treatment and construction of landfills. The on-site treatment of mercury waste would help to reduce these costs, by distinguishing the treatment methods based on the level of contamination and deciding what needs to be shipped to the facility for roasting. This would be especially beneficial for soil.
* The treatment process can take several decades.
* Stabilization technology for mercury needs to be commercially available, but at the same time, long-term research on the soundness of the technology is still required.

Group Discussion

The discussion focused on the fate of the recycled mercury and the applicability of stabilization. Nomura becomes the owner of pure mercury after the treatment process and to date the company has been selling the recycled mercury to different markets in Asia. Between 2011 and 2014, the company has obtained 380 kilograms of pure mercury out of 780 tonnes of mercury waste from domestic Chlor Alkali facilities. Once the ban of mercury’s commercialization comes into force, Nomura will be responsible for its disposal.

For this reason, research on stabilization has been undertaken by the company, focusing mainly on determining how sound the block remains in the long term, in order to store it. This is a key issue, considering both the stricter standards that will be applied in the future and the amount of excess mercury expected by 2050: for example, 8,000 tonnes in Latin America and 7,500 tonnes in Asia. Mobile technology will be developed in the coming years so as to improve treatment on-site in these and other regions.

**12:10 – 13:00: Ensuring Responsible Management of Mercury Stocks** (Moderator: Michael Bender, Mercury Policy Project)

Goal and Proposed Discussion Points

The goal of this session was to identify options and limitations for managing and tracking excess mercury. The proposed discussion points were as follows:

* Identifying changes under the Minamata Convention to managing mercury from plant conversions or closings.
* Regional vs national approaches for mercury stocks and waste management.
* Options for maintaining oversight of mercury stocks and wastes.

Presentation by the Moderator

Mr. Michael Bender is the Director of Mercury Policy Project (MPP), an NGO based in the US, whose main objectives are the promotion of policies to eliminate mercury uses, the reduction of mercury trade and the reduction of human exposure to mercury. MPP co-coordinates the Zero Mercury Working Group, a coalition of over 90 NGOs from 52 countries.

Michael stated that a global challenge linked to this coalition is the management of 10,500 tonnes of mercury from the Chlor Alkali sector in an environmentally sound manner, considering that out of this amount 7,500 tonnes are located in countries with export bans and the rest in countries without such bans.

So far, after the conversion or closing of facilities, large quantities of mercury have become available, either for its use by other facilities or for sale in the global marketplace, sometimes for use in artisanal and small scale gold mining (ASGM). The Minamata Convention has introduced changes to manage mercury obtained from these facilities, focusing mainly on the reporting of the number, types of facilities and amount of mercury used (Article 5.5.c), on the disposal of excess mercury from Chlor Alkali sector (Article 5.b) and also on additional reporting requirements (Article 21).

Under this framework, regional solutions for mercury stocks and waste management are recommended in order to reinforce national approaches. Regional plans would provide information on the technical and financial assistance needs for implementation and would result in economies of scale that can facilitate final disposal by industries. The Global Mercury Partnership, in collaboration with national governments, would facilitate the design and implementation of plans for managing excess mercury and gathering data on the capacity of national infrastructure.

Finally, some of the measures recommended by the MPP to ensure the environmentally sound management of mercury and avoid illegal trade are as follows:

* Ensure physical security of mercury stocks;
* Accept control and certification of mercury purity before disposal;
* Use crash/impact, fireproof UN-approved containers to transport waste, consistent with the Basel Convention;
* Permanent surveillance and electronic controls when moving mercury containers;
* Obligatory chemical identity check when transferring mercury ownership;
* Record keeping, which includes distinguishing between mercury commodity and waste;
* Frequent external evaluation of mercury stocks and movements, and
* Public registers to assure openness and transparency.

Group Discussion

The discussion focused on illegal mercury exports, as it was the case of the 500 tonnes of excess mercury exported from Germany to Switzerland as “waste” in the period 2011-2013. In such cases, the export ban is violated and the fate of mercury is unknown, as there is no obligation for the generator of excess mercury to know the fate of that mercury. This would demonstrate that Article 21 and all measures above stated on the tracking of mercury are crucial to ensure compliance with the Convention. Furthermore, the convenience of reporting on mercury movements in an annual or biannual basis was highlighted.

**14:15 – 17:00: Developing Recommendations for Next Steps: Institutional Assistance and Facilities** (Moderator: Peter Maxson, Concorde East/West Sprl)

In the last session, Peter helped the participants capture the main elements of the two days of discussion. The table below represents a list of main recommendations from the Expert Group Meeting and should not be considered as the final list of all what is left to do to address the Chlor Alkali sector.

|  |  |  |
| --- | --- | --- |
| **Topic** | **Tasks** | **Organization** |
| **Financing** | * Initiate dialogue with financial institutions, private entities and development banks. Development of communication material. * Investigate sources of financing (e.g. GEF, IFC, EBRD, ADB, EIB) differentiating between conversion and remediation investments. * Investigate the strategy to engage various financial options. | * UNIDO * UNIDO/USEPA * To be decided |
| **Information** | * Better information on non-WCC facilities. From MIAs. * Understanding business models: input prices, product prices, site specific market conditions, competitive situation. * Energy assessment of alternative technologies. * Information on interim storage, stabilization/solidification and final disposal. * Share with non-WCC companies guidelines for data collection. * Inventory toolkit. * Mapping of relevant regulatory frameworks and legislation. * Identification of possible storage options as well as the suppliers relevant in this respect. | * UNEP/WCC * WCC * UNIDO * Partnership Area leads * UNEP * Partnership Area leads * To be decided |
| **Planning** | * Development plans for the management of mercury. * Plans for interim storage, stabilization/solidification and final disposal. * Map the technical capacity of the country to cope with challenges (conversion, remediation, management of mercury, etc.). * Assessment of site contamination. | * Partnership Area leads * Partnership Area leads * To be decided * To be decided |
| **Capacity Building** | * Targeting governments and private sector, on the Minamata Convention and the challenges for the industry. * Data collection on the use of mercury in the sector. Foster data collection by non-WCC companies. | * Partnership Area leads * To be decided |
| **Technology** | * Conversion technology suppliers: call for expression of interest to assess capacity of supply (to be discussed with UNIDO Procurement Department). * Technology for interim storage, stabilization/solidification and final disposal. | * UNIDO * Partnership Area leads |