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Item 3 of the provisional agenda*

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

**Report on the organization into clusters and annotation of response
measures that were developed at the first meeting of the Ad Hoc
Open-ended Working Group on Mercury**

Note by the secretariat

1. Annex I to the report of the first meeting of the Ad Hoc Open-ended Working Group on Mercury (document UNEP(DTIE)/Hg/OEWG.1/6) included revised tables 4.1–4.7 from the study on options for global control of mercury. As noted in annex II to that report, the secretariat was requested, among other tasks, to undertake the following intersessional work in preparation for the second meeting with regard to the response measures included in annex I to the meeting report:

“(d) In relation to the analysis and grouping of response measures, to organize response measures within each strategic objective according to the following clusters:

1. Inventories and knowledge building;
2. Targets and time tables;
3. BAT/BEP¹ and product standards/restrictions;
4. Financial considerations and capacity building;
5. Technology transfer;

Response measures would be annotated to indicate those that could, in principle, be implemented at the national level* and those that would benefit from a coordinated international framework, whether through voluntary arrangements or legally binding instruments;

1. BAT/BEP = Best Available Techniques/Best Environmental Practices

* Such indication would consider the capacity of countries to implement response measures.”

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

2. No definition was provided for the five cluster areas specified in paragraph 1, above. The secretariat consulted the secretariats of the Strategic Approach to International Chemicals Management and those of the Basel, Stockholm and Rotterdam conventions to assess the experience gained in developing and implementing those agreements. Based on the comments received, the secretariat developed and applied the following criteria to organize into clusters the response measures within each strategic objective in tables 4.1–4.7:

(a) Inventories and knowledge-building response measures refer to the development, use and distribution of inventories, basic knowledge and general information; public awareness activities; and general distribution activities for technical information;

(b) Targets and timetables response measures refer to the setting of targets and schedules for reduction and elimination of mercury uses or releases from specific products, processes or human activities. This cluster does not include response measures that refer to the setting of mercury emission or content limits for specific sources, media or products. Such measures were considered to be risk management actions and are included in the BAT/BEP and product standards/restrictions cluster;

(c) BAT/BEP and product standards/restrictions response measures refer to the development and application of BAT/BEP or other technical guidance to activities and processes involving elemental mercury, mercury-containing products and mercury-contaminated materials; and risk management actions that address any aspect of the life-cycle of elemental mercury, mercury-containing products and mercury-contaminated materials;

(d) Financial considerations and capacity-building response measures refer to establishing or enhancing countries' capacity to implement mercury response measures; and general aspects related to financing the implementation of proposed mercury response measures, including the involvement of intergovernmental organizations and multilateral and bilateral development cooperation agencies. This cluster does not include response measures that refer to the use of economic instruments as an aspect of a control measure (e.g., tax measures to curb uses or releases of mercury), since such measures were considered to be risk management actions and are included in the BAT/BEP and product standards/restrictions cluster;

(e) Technology transfer response measures refer to the introduction of new or improved technologies, such as those to prevent, reduce or control pollution, into industry sectors or geographic areas where they had not yet been applied (e.g., developing economies).

3. Once the response measures had been organized into the five clusters specified in paragraph 1 above, the secretariat assessed which measures could be implemented at the national level and which would benefit from a coordinated international framework, whether through voluntary arrangements or legally binding instruments. The results of these assessments are displayed in tables 4.1–4.7 in annex II to the present document, while annex I includes an overview of the numerical distribution of the response measures by cluster group for each strategic objective within each table.

4. A response measure was considered to be able to be implemented at the national level if, in principle, a country could implement it based on the type of policy or political decisions that would normally be taken at the country level. This type of response measure is identified with an X in the "National" column in the tables.

5. A response measure was considered to be "international" if implementation would require the cooperation of a country with at least one other country. A response measure that requires the action of a regional or global intergovernmental organization was also considered to be "international". These two types of response measures are identified with an X in the "International" column in the tables.

6. The secretariat assessed whether "National" measures would benefit from a coordinated international framework, whether through voluntary arrangements or legally binding instruments and concluded that they would likely benefit from such a framework. It is well recognized that there are many technical, economic and other benefits that result from implementing concerted global approaches for such activities as knowledge and information development and sharing, monitoring and surveillance, development of BAT/BEP and control measures and trade measures. This is particularly true where concerted action at the country level is required to prevent or reduce the production, use and release of toxic chemicals that cause human and environmental exposure to such chemicals at the regional and global levels as a result of their long-range transport in environmental media.

7. The "National" response measures in the tables resemble the types of activities that Governments are undertaking in implementing existing regional and global agreements on chemicals, such as the Basel, Rotterdam and Stockholm conventions. Since all the "National" measures in the

tables would benefit from a coordinated international framework, however, no annotation was made as it would not have added any value to the annotation process. Thus, in reviewing the table, it should be noted that implementation of each measure with an X in the “National” column would likely benefit from a coordinated international framework.

8. In determining whether a specific response measure should be identified as “National” or “International” in nature, the secretariat was unable to take into account whether countries, intergovernmental organizations or other players would have sufficient human and financial resources or adequate policies, programmes, legislation, regulations or mandates to implement the measure.

9. In preparing tables 4.1–4.7, the secretariat made only minor edits to the text of the response measures that were developed at the first meeting of the Working Group, to avoid altering the sense or intent of the measures. The tables reflect the following changes that were made to the text that appeared in annex I of the meeting report:

(a) Tables 4.1 and 4.3 in annex I of the meeting report both include the same entries for response measures for artisanal and small-scale mining. In preparing the present document, such measures were deleted from table 4.1;

(b) Sixteen response measures were moved from where they were located in the meeting report and placed within the tables under a pertinent strategic objective (e.g., measures on coal, wastes and commercial uses of mercury now appear in tables 4.1, 4.2 and 4.3, respectively). Each deletion is shown using strikethrough text (e.g., ~~mercury~~) and inserted text is underlined (e.g., mercury). Footnotes are inserted at the sites of both deletion and insertion to clarify the source and destination of each response measure that was moved;

(c) Following the deletion of the artisanal and small-scale mining measures from table 4.1, and the transfer of three response measures on chloralkali and vinyl chloride monomer (VCM) production to table 4.3, the title of table 4.1 was revised to reflect that it now includes only those response measures that are intended to effect the reduction of atmospheric mercury releases from human activities that involve mercury-contaminated materials (i.e., coal and biomass, among others);

(d) In its current form, table 4.3 includes only measures that consider the commercial uses of mercury in products and processes;

(e) As response measures pertaining to stockpiles and wastes are mentioned in tables 4.2, 4.4 and 4.5, it may be useful to introduce definitions for these terms to ensure that they are used consistently. The following definitions are offered for consideration and are included in a footnote in table 4.5:

- (i) A “stockpile” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner still has a commercial use;
- (ii) A “waste” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner no longer has a commercial use.

Thus a supply of elemental mercury may be viewed as a stockpile only as long as there is, or is likely to be, a commercial use: the moment the owner decides that there is no longer a commercial use, the mercury has been deemed to be a waste.

Suggested action

10. The Ad Hoc Open-ended Working Group on Mercury may wish to draw on the report in considering the need for, and relative priority of, individual measures for including within the options to be forwarded to the Governing Council.

Annex A

Numerical distribution of response measures in tables 4.1–4.7, sorted by their respective strategic objectives and cluster groups

Tables and respective strategic objectives	1 ¹	2 ²	3 ³	4 ⁴	5 ⁵	Totals
Table 4.1: Reduce atmospheric emissions of mercury contaminants from human sources						
1. Reduce mercury emissions from coal usage.	1	1	11			13
2. Reduce mercury emissions from industrial processes, including by-product production, contamination of component materials and heat production.	1	1	11			13
Table 4.2: Find environmentally sound solutions for the management of waste containing mercury and mercury compounds						
1. Reduce generation of wastes that contain mercury.	1		6	1		8
2. Promote separate collection and treatment of mercury-containing wastes.	1		11	1		13
3. Reduce mercury emissions to air from medical, municipal, and hazardous waste incinerators and reduce migration and emission of mercury from landfills.	2		16			18
Table 4.3: Reduce global mercury demand related to use in products and production processes						
1. Reduce mercury use in artisanal and small-scale gold mining (ASM).	3	1	9	4		17
2. Reduce mercury consumption in vinyl chloride monomer (VCM) and chloralkali production.			6			6
3. Reduce mercury use in products, including packaging.	3		13			16
4. Reduce mercury use in dental practice.	3		7			10
Table 4.4: Reduce global mercury supply						
1. Reduce supply from mining and extraction of virgin mercury and other ores.			4			4
2. Reduce mercury supply from decommissioned chloralkali cells and other products and processes.			3			3
3. Reduce mercury supply from stockpiles.	1		2			3
4. Reduce international trade in mercury.	3		6			9
Table 4.5: Find environmentally sound storage solutions for mercury						
1. Reduce releases from stored mercury and mercury wastes.			4			4
2. Manage existing stockpiles of mercury and mercury-containing wastes to prevent environmental contamination.	3		8			11
Table 4.6: Address the remediation of existing contaminated sites affecting public and environmental health						
1. Prevent mercury contamination from spreading.	4		2			6
2. Control and remediate contaminated sites.	2		16		1	19
Table 4.7: Increase knowledge on areas such as inventories, human & environmental exposure, environmental monitoring & socio-economic impacts						
1. Increase knowledge and capacity on mercury among States.	20		1	7		28
2. Increase knowledge and capacity among individual mercury users.	6			2	1	9
Totals =	54	3	136	15	2	210

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- 1 Inventories and knowledge building.
 - 2 Targets and timetables.
 - 3 BAT/BEP and product standards and/or restrictions.
 - 4 Financial considerations and capacity-building.
 - 5 Technology transfer.

Annex B

Tables 4.1–4.7, as revised by the secretariat in response to the request of the Open-ended Working Group at its first meeting

Table 4.1: Reduce atmospheric emissions of mercury from human activities involving mercury-contaminated materials ⁶				
Strategic objectives ⁷	Clusters	Available response measures ⁸	National	International
1. Reduce mercury emissions from coal usage.	1. Inventories and knowledge-building	13. Establish monitoring and reporting programmes.	X	
	2. Targets and timetables	1. Establish mercury emissions reduction targets and timetables.	X	
	3. BAT/BEP and product standards/restrictions	2. Establish mercury emissions limits (end of pipe control).	X	
		3. Improve energy efficiency in products and processes to lessen demand for electricity and need to combust coal in electricity generation.	X	
		4. Promote the development and use of cost effective non-mercury catalyst in VCM production.⁹		
		4. Use low-mercury alternatives to coal, such as natural gas and petroleum coke, to generate power during production processes.¹⁰	X	
		5. Improve energy conversion efficiency to reduce coal combustion (e.g., housekeeping, maintenance, optimizing boilers).	X	
		6. Transition to other energy sources (e.g., renewables) to reduce coal combustion.	X	
7. Pre-treat coal before combustion to reduce mercury in flue gas emissions.	X			
8. Use high rank (low mercury content) coals to decrease mercury emissions.	X			

6 Response measures that address the commercial uses of mercury and that appeared table 4.1 of annex I of the report of the first meeting (document UNEP(DTIE)/Hg/OEWG.1/6), were moved to table 4.3 in the present document. Consequently, the title of table 4.1 has been revised to reflect that it now includes only those response measures intended to effect the reduction of atmospheric mercury releases from human activities that involve mercury-contaminated materials (coal and biomass, among others).

7 Annex I of the meeting report included identical text for artisanal and small-scale gold mining in both strategic objective 2 of table 4.1 and strategic objective 1 of table 4.3. In the present document, the information has been removed from table 4.1 and appears only in table 4.3. Consequently, strategic objective 3 of table 4.1 in the report now appears as strategic objective 2.

8 The numbering of response measures in tables 4.1–4.7 is the same as that used in annex I of the meeting report unless otherwise indicated in the footnotes.

9 This measure addresses the use of mercury as a catalyst in vinyl chloride monomer production. It was misplaced under strategic objective 1 of table 4.1 in annex I of the meeting report. It was moved to table 4.3 under strategic objective 2, where it now appears as measure 4.

10 This response measure refers to the use of coal: it was moved here from strategic objective 2 of table 4.1, where it was measure 7.

Table 4.1: Reduce atmospheric emissions of mercury from human activities involving mercury-contaminated materials ⁶				
Strategic objectives ⁷	Clusters	Available response measures ⁸	National	International
		9. Establish mercury-specific BAT standards for emissions control devices to capture mercury in flue gas.		X
		10. Use air pollution control technologies for other criteria pollutants to capture mercury in flue gas.	X	
		11. Promote the development and use of mercury-specific and cost-effective control techniques.	X	
		12. Promote the development and use of cost-effective multipollutant (e.g., “zero or low emissions”) control techniques.	X	
	4. Financial considerations and capacity-building			
	5. Technology transfer			
3.2. Reduce mercury emissions from industrial processes, including use as a catalyst, by-product production, contamination of component materials and heat production.	1. Inventories and knowledge-building	16. Establish monitoring and reporting programmes.	X	
	2. Targets and timetables	1. Establish mercury emissions reduction targets and timetables.	X	
	3. BAT/BEP and product standards/restrictions	2. Establish mercury emissions limits (end of pipe control).	X	
		3. Phase out industrial processes based on mercury catalysts (chlor/alkali and vinyl chloride monomer production).¹¹		
		4. Achieve greater efficiencies in mercury use through best practices in vinyl chloride monomer production.¹¹		
		5. Use low-mercury limestone (e.g., in cement production) and coal ¹² as feedstock.	X	
		6. Ensure the reuse of any mercury contaminated by-products or waste materials in an environmentally sound manner.	X	
		7. Use low mercury alternatives to coal, such as natural gas and petroleum coke, to generate power during production processes.¹³		
		8. Require leak detection and monitoring equipment.	X	
9. Use existing control techniques and devices such as gas stream cooling, activated carbon absorbers, scrubbers and mist eliminators to reduce mercury releases to air during manufacturing processes.	X			

11 Measures 3 and 4 of strategic objective 2 in table 4.1 were moved to strategic objective 2 of table 4.3 (reduce mercury consumption in vinyl chloride monomer (VCM) and chloralkali production), where they now appear as measures 5 and 6, respectively.

12 The reference to coal is deleted here as it is already captured in response measure 8 of strategic objective 1 in table 4.1.

13 Measure 7 was moved to table 4.1, strategic objective 1 (coal usage), where it now appears as measure 4.

Table 4.1: Reduce atmospheric emissions of mercury from human activities involving mercury-contaminated materials ⁶				
Strategic objectives ⁷	Clusters	Available response measures ⁸	National	International
		10. Require facilities to treat flue gas with activated carbon filters and BAT controls.	X	
		11. Recover mercury present in filters and wastewater from catalysts used in processes and from residual sludge; ensure environmentally sound management (e.g., terminal storage).	X	
		12. Require mercury-specific controls and separation processes to remove mercury vaporized during thermal processes.	X	
		13. Require capture of mercury vapour during thermal processes for handmade and industrial gold jewellery making.	X	
		14. Leach mercury out of ores prior to any thermal process or choose ores with low mercury content.	X	
		15. Use biomass fuels with low mercury content in all applications.	X	
	4. Financial considerations and capacity-building			
	5. Technology transfer			

Table 4.2: Find environmentally sound solutions for the management of wastes containing mercury and mercury compounds

Strategic objectives	Clusters	Available response measures	National	International
1. Reduce generation of wastes that contain mercury.	1. Inventories and knowledge-building	2. Promote awareness and education at all levels on the hazards of mercury-containing products and waste.	X	
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	1. Substitute products and processes for those using or containing mercury: where this is not possible, use labelling and establish limits for mercury content.	X	
		3. Promote recovery of mercury from waste products and sludge through, e.g., retort and distillation, followed by sound terminal storage.	X	
		4. Use wastes with relatively low and stable mercury content as feedstock for other processes, e.g., fly ash for cement production.	X	
		5. Use mercury-free dental amalgams such as composites, gallium or gold-silver amalgams.¹⁴		
		6. Promote “green products” beyond national boundaries and producer countries; apply equal standards to export products.		X
		7. Minimize transboundary movement of near-end-of-life equipment containing mercury.		X
		8. Institute regional mechanisms for controlling transboundary movement of waste containing mercury. Strengthen capacity of port authorities to regulate mercury waste.		X
	4. Financial considerations and capacity-building	9. Establish mechanisms for funding of/support for cleaner technologies by establishing credit schemes for investment.	X	
5. Technology transfer				
2. Promote separate collection and treatment of mercury-containing wastes.	1. Inventories and knowledge-building	5. Increase vendor knowledge of mercury-containing products and wastes and of proper methods for their disposal.	X	
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	1. Develop labelling requirements for all mercury-containing products to alert consumers to mercury content.	X	
		2. Ban disposal in the general waste stream of products that contain mercury by designating mercury and mercury-containing wastes, compounds and products as hazardous wastes.	X	
		3. Develop and implement necessary regulatory instruments.	X	
	4. Install amalgam filters, traps and removal systems in dental sinks and drains to prevent mercury from entering wastewater and sewer lines.¹⁵			

14 Measure 5 was moved to table 4.3, strategic objective 4 (dental practices), where it now appears as measure 8.

15 Measure 4 was moved to table 4.3, strategic objective 4 (dental practices), where it now appears as measure 9.

Table 4.2: Find environmentally sound solutions for the management of wastes containing mercury and mercury compounds				
Strategic objectives	Clusters	Available response measures	National	International
		6. Require vendors of mercury-containing products to “take back” and properly dispose of or recycle products after their useful life; promote extended producer responsibility/product stewardship.	X	
		7. Develop programmes to create easily accessible mercury product collection centres for consumers and medical centres.	X	
		8. Support existing work under the Basel Convention, e.g., collaboration with UNEP Chemicals on the development of technical guidelines on the environmentally sound management of mercury waste and e-waste partnerships. Consider potential partnership with the Basel Convention having regard to its mandate and work.		X
		9. Develop interim storage guidelines for collection centres of mercury-containing products regarding collection and transportation to final disposal or recycling facilities.	X	
		10. Require mercury gathered at dental clinics to be disposed of in terminal storage facilities. ¹⁶		
		11. Establish criteria and thresholds for defining or characterizing mercury-containing wastes as hazardous wastes; develop hazardous waste management guidelines for these wastes.	X	
		12. Promote the environmentally sound management of mercury recovered from chloralkali plants.	X	
		14. <u>Promote safer methods of disposal and collection of mercury products.</u> ¹⁷	X	
		15. <u>Require all obsolete products containing mercury (e.g., pesticides) to be stored under environmentally sound conditions or treated at recycling facilities that will ensure terminal storage of recycled mercury.</u> ¹⁸	X	
		4. Financial considerations and capacity-building	13. Strengthen capacity-building and technical assistance for management and disposal of mercury-containing waste, in particular for small island developing States.	
5. Technology transfer				
3. Reduce mercury emissions to air from medical, municipal, and hazardous waste incinerators and reduce migration and emission of mercury from landfills.	1. Inventories and knowledge-building	2. Promote awareness and education at all levels on the hazards of mercury-containing products and waste.	X	
		18. <u>Require listing of all mercury-containing hazardous waste sites.</u> ¹⁹	X	
	2. Targets and timetables			
		3. BAT/BEP and product	1. Eliminate mercury as completely as possible from the waste stream.	X
	3. Sort wastes to reduce mercury content prior to incineration or landfill.		X	

16 Measure 10 was moved to table 4.3, strategic objective 4 (dental practices), where it now appears as measure 10.

17 Measure 14 refers to disposal and collection of mercury products: it was moved from strategic objective 3 of table 4.3, where it was measure 12.

18 Measure 15 refers to storage of mercury-containing wastes: it was moved from strategic objective 2 of table 4.5, where it was measure 7.

19 Measure 18 refers to mercury-containing hazardous waste sites: it was moved from strategic objective 2 of table 4.6, where it was measure 12.

Table 4.2: Find environmentally sound solutions for the management of wastes containing mercury and mercury compounds

Strategic objectives	Clusters	Available response measures	National	International	
	standards/restrictions	4. Levy disposal and production fees on products that contain mercury to encourage reduction in their use.	X		
		5. Prevent combustion of wastes with high mercury concentrations.	X		
		6. Take major steps to stop open burning of wastes as per BAT/BEP guidelines of the Stockholm Convention.	X		
		7. Apply BAT/BEP to combustion and landfill.	X		
		8. Implement mercury-specific BAT/BEP controls and use existing air pollution control devices to reduce mercury content in flue gas and emissions.	X		
		9. Establish waste management guidelines, including leachate collection and treatment technologies, for terminal storage and disposal of mercury-containing wastes in hazardous waste landfills/dumpsites; landfills/dumpsites must be environmentally sound and operated under strict control rules.	X		
		10. Monitor and collect leachate from general landfills and introduce wastewater cleansing processes to remove mercury.	X		
		11. Discard mercury and wastes containing mercury in environmentally sound terminal storage facilities.	X		
		12. Rapidly cover or seal working surfaces of landfills with soil to prevent evaporation and direct release of mercury to atmosphere.	X		
		13. Require regular landfill inspections and employee training.	X		
		14. Create disincentives to poor landfill management by establishing comprehensive liability and compensation rules.	X		
		15. Implement the Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Wastes adopted by the Conference of the Parties to the Basel Convention at its eighth meeting, in order to reduce wastes.		X	
		16. Promote and expand the use of alternative environmentally-friendly health-care waste disposal methods.	X		
		17. Develop and apply BAT/BEP guidelines for managing landfills and other storage facilities. ²⁰		X	
		4. Financial considerations and capacity-building			
		5. Technology transfer			

²⁰ Measure 17 refers to landfills and storage facilities: it was moved from strategic objective 1 of table 4.6, where it was measure 7.

Strategic objectives	Clusters	Available response measures	National	International
1. Reduce mercury use in artisanal and small-scale gold mining (ASM).	1. Inventories and knowledge-building	11. Train and raise awareness among miners and local gold shop owners and operators to inform them of dangers surrounding mercury use and available mercury-free alternatives.	X	
		12. Strengthen, support and encourage the involvement of civil society to engage fully in support and awareness-raising on ASM on the risks involved and prevention measures that need to be undertaken when handling mercury.	X	
		14. Develop non-binding PIC system under which countries report data on mercury imports and exports to UNEP to address data concerns raised by countries and provide additional tools to countries wishing to better control mercury trade flows.²¹		
		15. Enhance regional data activities on mercury trade flows.²¹		
		17. Conduct inventory of mercury sources and institute arrangements to regulate the import/export and handling of mercury between States.²¹		
		20. Raise awareness among gold consumers about environmental risks of ASM.	X	
	2. Targets and timetables	1. Enhance high-level visibility of the issue through development and adoption of specific reduction goals as part of a wider UNEP-led BAT/BEP and goal-setting process.		X
	3. BAT/BEP and product standards/restrictions	2. Establish an institutional framework that will provide for full support from government and related stakeholders to small-scale miners.	X	
		3. Develop environmental and mining guidance for the elimination and/or minimization of mercury consumption based on successful experiences which can be adapted to particular countries, including BAT/BEP.		X
		4. Eliminate whole-ore amalgamation by introducing methods and educating miners to use mercury-free concentration prior to amalgamation.	X	
		5. Reduce mercury losses during amalgamation of concentrates and when condensing gold from amalgam by introducing better mercury capture and recycling processes, including the use of retorts.	X	
		6. Introduce mercury-free mining practices where practical, particularly where ore concentration could preclude mercury use.	X	
		7. Promote and make easily accessible alternative capture methods and introduce incentive schemes for ASM to adopt alternative capture methods.	X	
		10. Support municipal or privately owned amalgamation centres where miners can bring gold ore for closed loop mercury amalgamation by technicians with proper controls.	X	

²¹ Measures 14, 15 and 17 were moved to table 4.4, strategic objective 4 (reduce international trade in mercury), where they now appear as measures 5, 6 and 7.

Table 4.3: Reduce global mercury demand related to use in products and production processes					
Strategic objectives	Clusters	Available response measures	National	International	
		13. Institute mechanisms that will limit the supply of mercury through new or existing international instruments (e.g., through the Rotterdam Convention by including mercury in the list of PIC chemicals) and increasing the capacity of member States to formulate and enforce mercury import regulations. ²²			
		16. Enhance enforcement of customs control, including through Green Customs		X	
		21. Increase “green gold” marketing and develop methods to identify sustainably mined gold.	X		
	4. Financial considerations and capacity-building		8. Enhance UNIDO retort/training efforts leveraging private sector interests.		X
			9. Make all ASM formalized and legally acceptable and formulate mechanisms to support them socially, economically and technically both at the national and international levels through an adequate and legally binding framework.		X
			18. Finance organizations and countries should engage in and strengthen partnership with countries in addressing and supporting the activities of ASM and the control of mercury use.		X
			19. Introduce microcredit programmes to facilitate the ability of poor miners to purchase cleaner technologies.	X	
5. Technology transfer					
2. Reduce mercury consumption in vinyl chloride monomer (VCM) and chloralkali production.	1. Inventories and knowledge-building				
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	1. Promote the development of a non-mercury catalyst for the acetylene process used in VCM production, which is available, technically and economically viable and environmentally sound.	X		
		2. Develop economically viable and environmentally sound alternative sources of ethylene for VCM production.	X		
		4. <u>Promote the development and use of cost-effective non-mercury catalysts in VCM production.</u> ²³	X		
		<u>Achieve greater efficiencies in mercury use through best practices in VCM production.</u> ²⁴	X		
		5. <u>Phase out industrial processes based on mercury catalysts (chloralkali and VCM production).</u> ²⁵	X		
3. Require conversion from the mercury cell process to membrane or non-asbestos diaphragm processes which are both economically and technically feasible for use in chloralkali production.	X				

22 Measure 13 was moved to table 4.4, strategic objective 4 (reduce international trade in mercury), where it now appears as measure 8.

23 Measure 4 refers to use of mercury in VCM production: it was moved from strategic objective 1 of table 4.1, where it was measure 4.

24 Measure 6 refers to use of mercury in VCM production: it was moved from strategic objective 2 of table 4.1, where it was measure 4.

25 Measure 5 refers to use of mercury in chloralkali and VCM production: it was moved from strategic objective 2 of table 4.1, where it was measure 3.

Table 4.3: Reduce global mercury demand related to use in products and production processes				
Strategic objectives	Clusters	Available response measures	National	International
	4. Financial considerations and capacity-building			
	5. Technology transfer			
3. Reduce mercury use in products, including packaging.	1. Inventories and knowledge-building	13. Support research and development for mercury-free alternatives.	X	
		14. Promote educational campaigns, including registration and labelling requirements, to inform consumers about mercury-containing products and their health and environmental risks.	X	
		16. Raise awareness of health-care professionals of mercury as a health risk.	X	
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	1. Ban or restrict mercury use in products for which affordable alternatives are available.	X	
		2. Promote the use of <u>affordable, alternative</u> mercury-free products.	X	
		3. Promote the increased production of affordable and efficacious mercury-free alternative products where supply shortages exist.	X	
		4. Restrict or ban mercury-containing pesticides; promote non-chemical alternatives such as integrated pest management.	X	
		5. Restrict use of mercury in pharmaceuticals and medical devices.	X	
		6. Promote use of mercury-free pharmaceuticals to the extent feasible.	X	
		7. Prohibit or limit continued trade in mercury-containing products for which affordable alternatives are available.²⁶		
		8. Require low mercury content in products for which mercury-free alternatives are not currently available.	X	
		9. Promote reduction of mercury content, to the extent feasible, in products for which mercury-free alternatives are not currently available.	X	
		10. Tax products that contain mercury to discourage their use.	X	
		11. Require special disposal and collection of mercury products to discourage their use and to promote recovery of mercury from collected products.	X	
12. Promote safer methods of disposal and collection of mercury products.²⁷				
15. Develop a stepwise substitution plan.	X			
17. Put in place measures to progressively phase out the use of mercury-containing products.	X			
18. Promote the donation/exportation of mercury-free products and restrict donation/exportation of			X	

26 Measure 7 was moved to table 4.4, strategic objective 4 (reduce international trade in mercury), where it now appears as measure 9.

27 Measure 12 was moved to table 4.2, strategic objective 2 (separate collection and treatment of mercury-containing wastes), where it now appears as measure 14.

Table 4.3: Reduce global mercury demand related to use in products and production processes				
Strategic objectives	Clusters	Available response measures	National	International
		mercury-containing products from one country to another.		
		19. Promote alternative materials and phase-out mercury use in products and processes. ²⁸	X	
	4. Financial considerations and capacity-building			
	5. Technology transfer			
4. Reduce mercury use in dental practice.	1. Inventories and knowledge-building	1. Educate dental practitioners about health risks of mercury.	X	
		2. Provide educational materials to dental practitioners working through global dental societies on ways to enhance use of alternatives.		X
		7. Request WHO to increase awareness on the hazards and risks of mercury dental amalgams.		X
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	3. Restrict use of mercury amalgam on children and pregnant women.	X	
		4. Promote use of alternatives to mercury dental amalgam fillings on children and pregnant women, where feasible	X	
		5. Require dental practitioners to use alternatives to mercury amalgams.	X	
		6. Train dental practitioners to use alternative materials and provide easy access to them.	X	
		8. Use mercury-free dental amalgams such as composites, gallium or cold silver amalgams. ²⁹	X	
		9. Install amalgam filters, traps and removal systems in dental sinks and drains to prevent mercury from entering wastewater and sewer lines. ³⁰	X	
		10. Require mercury gathered at dental clinics to be disposed of in terminal storage facilities. ³⁰	X	
4. Financial considerations and capacity-building				
5. Technology transfer				

28 Measure 19 refers to phase-out mercury use in products and processes: it was moved from strategic objective 2 of table 4.4, where it was measure 2.

29 Measure 8 refers to use of mercury in dental practice: it was moved from strategic objective 1 of table 4.2, where it was measure 5.

30 Measures 9 and 10 refer to the use of mercury in dental practice: they were moved from strategic objective 2 of table 4.2, where they were measures 4 and 10, respectively.

Table 4.4: Reduce global mercury supply					
Strategic objectives	Clusters	Available response measures	National	International	
1. Reduce supply from mining and extraction of virgin mercury and other ores.	1. Inventories and knowledge-building				
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	1. Establish a hierarchy of mercury sources, in which demand is met with existing mercury stocks instead of through primary mining.			X
		2. Restrict and phase out mining of virgin mercury.		X	
		3. Restrict and phase out sale of mercury produced as by-product from mining other ores; require mining companies to store mercury by-product in environmentally sound storage facilities.		X	
	4. Allow mercury mining companies during operational phase-out to purchase and sell mercury from existing stocks (e.g., chloralkali facilities or strategic stockpiles) rather than mining virgin mercury		X		
4. Financial considerations and capacity-building					
5. Technology transfer					
2. Reduce mercury supply from decommissioned chloralkali cells and other products and processes.	1. Inventories and knowledge-building				
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	1. Recycle mercury cells from decommissioned plants to meet present market demand, instead of meeting demand through primary mining.			X
		2. Promote alternative materials and phase out mercury use in products and processes. ³¹			
		3. Restrict and phase out sale of recycled mercury.		X	
	4. Require environmentally sound terminal disposal and storage of recycled mercury to remove remaining mercury from global supply.			X	
4. Financial considerations and capacity-building					
5. Technology transfer					
3. Reduce mercury supply from	1. Inventories and knowledge-building	2. Require registration of all existing mercury stockpiles to track and discourage sales of mercury.	X		
	2. Targets and timetables				

31 Measure 2 was moved to table 4.3, strategic objective (reduce mercury use in products, including packaging), where it now appears as measure 19.

32 Proposed definitions: A “stockpile” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner still has a commercial use. A “waste” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner no longer has a commercial use.

Table 4.4: Reduce global mercury supply					
Strategic objectives	Clusters	Available response measures	National	International	
stockpiles ³² .	3. BAT/BEP and product standards/restrictions	1. Use national and strategic stockpiles to meet current market demand instead of meeting demand through virgin mercury mining.		X	
		3. Permanently retire stockpiles in environmentally sound terminal storage facilities.	X		
	4. Financial considerations and capacity-building				
	5. Technology transfer				
4. Reduce international trade in mercury.	1. Inventories and knowledge-building	<u>5. Develop non-binding PIC system under which countries report data on mercury imports and exports to UNEP to address data concerns raised by countries and provide additional tools to countries wishing to better control mercury trade flows.</u> ³³		X	
		<u>6. Enhance regional data activities on mercury trade flows.</u> ³³		X	
		<u>7. Conduct inventory of mercury sources and institute arrangements to regulate the import/export and handling of mercury between States.</u> ³³		X	
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	1. Phase out and ban international trade in elemental mercury.			X
		2. Promote national and international restrictions and bans on trade in mercury-containing products, including prior informed consent procedures.			X
		3. Ban import and export of mercury compounds, including cinnabar ore.			X
		4. Ban import and export of wastes with high mercury content.			X
		<u>8. Institute mechanisms that will limit the supply of mercury through new or existing international instruments (e.g., through the Rotterdam Convention by including mercury in the list of PIC chemicals) and increasing the capacity of member States to formulate and enforce mercury-import regulations.</u> ³⁴			X
		<u>9. Prohibit or limit continued trade in mercury-containing products for which affordable alternatives are available.</u> ³⁵			X
	4. Financial considerations and capacity-building				
	5. Technology transfer				

33 Measures 5, 6 and 7 refer to trade in mercury: they were moved from strategic objective 1 of table 4.3, where they were formerly measures 14, 15 and 17, respectively.

34 This measure refers to trade in mercury: it was moved from strategic objective 1 of table 4.3, where it was formerly measure 13.

35 This measure refers to trade in mercury: it was moved from strategic objective 3 of table 4.3, where it was formerly measure 7.

Table 4.5: Find environmentally sound storage solutions for mercury					
Strategic objectives	Clusters	Available response measures	National	International	
1. Reduce releases from stored mercury and mercury wastes.	1. Inventories and knowledge-building				
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	1. Develop BAT /BEP and other guidelines and regulations for terminal (long-term) storage, including encapsulation within deep underground storage facilities impervious to seepage, earthquakes and geological disturbances.			X
		2. Require all wastes containing mercury or mercury compounds to be disposed in terminal storage facilities.	X		
		3. Stabilize mercury wastes and compounds to a less reactive state prior to storage.	X		
		4. Establish post-closure monitoring, inspection, remediation, liability, and compensation requirements to encourage proper treatment of mercury and mercury-containing wastes in the event of contamination from storage facilities.	X		
	4. Financial considerations and capacity-building				
5. Technology transfer					
2. Manage existing stockpiles ³⁶ of mercury and mercury-containing wastes to prevent environmental contamination.	1. Inventories and knowledge-building	1. Identify stockpiles of mercury and mercury-containing materials.	X		
		10. Develop a list of countries with environmentally sound management facilities.		X	
		11. Undertake research in encapsulation measures.	X		
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	2. Ensure that all existing stockpiles of mercury are enclosed in leak proof, airtight containers (e.g., mercury containers or flasks), separated by cushioning/absorbent material and stored atop collection plates to contain any possible leaks.	X		
		3. Over-pack smaller mercury flasks and containers in sealed, air tight drums for storage atop collection plates.	X		
		4. Clearly label all storage containers.	X		
		5. Restrict access to interim storage facilities and train employees on proper handling procedures.	X		
		6. Require frequent government inspection and oversight of storage facilities.	X		

36 Proposed definitions: A “stockpile” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner still has a commercial use. A “waste” consists of a quantity of elemental mercury, mercury compound or mercury-containing material for which the owner no longer has a commercial use.

Table 4.5: Find environmentally sound storage solutions for mercury				
Strategic objectives	Clusters	Available response measures	National	International
		7. Require all obsolete products containing mercury (e.g., pesticides) to be stored under environmentally sound conditions or treated at recycling facilities that will ensure terminal storage of recycled mercury. ³⁷		
		8. Encourage producer responsibility and stewardship.	X	
		9. Return mercury-containing waste to the exporting country.		X
		12. Establish an informal technical expert group to provide guidance on BAT/BEP and respond to requests for technical assistance.		X
	4. Financial considerations and capacity-building			
	5. Technology transfer			

³⁷ Measure 7 was moved to table 4.2, strategic objective 2 (separate collection and treatment of mercury-containing wastes), where it now appears as measure 15.

Table 4.6: Address the remediation of existing contaminated sites affecting public and environmental health				
Strategic objectives	Cluster	Available response measures	National	International
1. Prevent mercury contamination from spreading.	1. Inventories and knowledge-building	1. Develop guidelines for the identification and surveying of sites possibly contaminated with mercury.	X	
		2. Survey, identify and test all sites possibly contaminated with mercury to determine contamination levels and critical areas requiring priority remediation.	X	
		3. Undertake risk assessments for setting priorities for action, including recognition of the need for rapid environmental auditing as required.	X	
		4. Provide information on contaminated sites as part of community right-to-know legislation.	X	
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	5. Quarantine sources of contamination and contaminated areas to prevent further contamination.	X	
		6. Install barriers, covers, collection basins or other technologies to minimize spread of mercury contamination in affected media (e.g., air, soil, sludge, water).	X	
		7. Develop and apply BAT/BEP guidelines for managing landfills and other storage facilities. ³⁸		
4. Financial considerations and capacity-building				
5. Technology transfer				
2. Control and remediate contaminated sites.	1. Inventories and knowledge-building	2. Develop and enforce mechanisms for monitoring contaminated sites.	X	
		5. Develop protocols including criteria for designating and managing contaminated sites and for selecting and testing sites to determine level of mercury contamination.	X	
		12. Require listing of all mercury-containing hazardous waste sites. ³⁹		
	2. Targets and timetables			
	3. BAT/BEP and product standards/restrictions	1. Adopt and enforce legislation requiring environmental remediation of mercury contamination, emphasizing returning the medium to its pre-contaminated state.	X	
		3. Develop and enforce compliance mechanisms to ensure sound management of contaminated sites.	X	
		4. Develop emergency response plans to minimize contamination from mercury spills and leaks.	X	
		6. Establish proper management of water and land resources to prevent enhanced transport and bioavailability of mercury.	X	
7. Establish standards for best environmental practices and minimum removal limits during remediation.			X	

38 Measure 7 was moved to table 4.2, strategic objective 3 (reduce mercury releases from incinerators and landfills), where it now appears as measure 17.

39 Measure 12 was moved to table 4.2, strategic objective 3 (reduce mercury releases from incinerators and landfills), where it now appears as measure 18.

Table 4.6: Address the remediation of existing contaminated sites affecting public and environmental health				
Strategic objectives	Cluster	Available response measures	National	International
		8. Develop guidelines for choosing BAT or BEP remediation technologies based on site-specific criteria.	X	
		10. Develop cost-effective technology for remediation.	X	
		11. Establish liability and compensation mechanisms that include ecological impact of contamination and future management costs, including for sites which were previously contaminated.	X	
		13. Require responsible or remediating party to submit remedial plans for government approval prior to remediation.	X	
		14. Require early compliance benchmarks in remedial plans to ensure rapid quarantine and decontamination.	X	
		15. Encourage voluntary remediation, but frequently inspect voluntary and non-governmental remediation efforts.	X	
		16. Favour in situ remediation plans over ex situ when feasible to lessen chance of further contamination.	X	
		17. Remove contaminated medium from area and transport to a qualified treatment facility if in situ treatment is not feasible.	X	
		18. Treat contaminated area using BAT (e.g., pump and treat technologies for groundwater treatment in waterways).	X	
		19. Immobilize contaminated media; treat with bioremediation or phytoremediation.	X	
		20. Vaporize, wash or flush contaminated soil or sludge to remove mercury content for treatment.	X	
		4. Financial considerations and capacity-building		
5. Technology transfer	9. Provide technology and information transfer to ensure access to appropriate control mechanisms.			X

Table 4.7: Increase knowledge on areas such as inventories, human and environmental exposure, environmental monitoring and socio-economic impacts

Strategic objectives	Clusters	Suggested new and existing response measures	National	International
1. Increase knowledge and capacity on mercury among States.	1. Inventories and knowledge-building	1. Create a mercury register and conduct national inventories of all mercury stockpiles and production sources, noting pollutant release and transfer registers (PRTRs) and UNEP Mercury Toolkit as valuable tools.	X	
		2. Improve emissions inventories.	X	
		3. Improve global understanding of mercury emissions sources, fate, and transport.		X
		4. Improve monitoring of mercury levels in environmental media and biota.	X	
		6. Improve monitoring of atmospheric mercury levels and deposition.	X	
		7. Enhance accuracy of atmospheric transport models.	X	
		8. Improve understanding of the process governing bioaccumulation of atmospherically-derived mercury.	X	
		9. Support research and development programmes to improve emissions control devices, alternative products and processes and understanding of biological and physical effects of mercury in humans and the environment.	X	
		10. Carry out human biomonitoring to provide baseline levels of mercury.	X	
		12. Support research on health impacts and socio-economic costs of continued mercury use, including environmental impact analysis and remediation costs.	X	
		13. Development of environmental monitoring data on human and environmental exposure and studies on socio-economic impacts.	X	
		15. Conduct regional workshops and presentations regarding threats of continued mercury use and environmental releases.		X
		16. Provide States with reports on mercury and suggestions for mercury-free alternatives.		X
		18. Develop strategies for enhanced outreach and risk communication activities to reach at-risk populations, including sensitive populations.	X	
		19. Facilitate international access to existing environmental data (e.g., distribution centres or internet databases) and improve ability of environmental data users to find data they need through comprehensive and accessible tools and training.		X
		22. Develop a global monitoring plan.		X
		23. Promote knowledge of health effects caused by methylmercury in fish.	X	
		24. Develop a system for early warning for exposed populations.	X	
		25. Develop a successful information-sharing strategy regarding mercury pollution control.	X	
		26. Support the promotion of regional projects focused on the assessment of mercury exposure and its health effects, including biomonitoring, which would be followed by country policy strategies and health action plans.		X

Table 4.7: Increase knowledge on areas such as inventories, human and environmental exposure, environmental monitoring and socio-economic impacts					
Strategic objectives	Clusters	Suggested new and existing response measures	National	International	
	2. Targets and timetables				
	3. BAT/BEP and product standards/restrictions	17. Promote information sharing on best available techniques and measures to reduce mercury emissions from point sources.	X		
	4. Financial considerations and capacity-building	5. Support capability of developing countries, especially with regard to the monitoring of air and water.			X
		11. Support pilot programmes in developing countries to study and reduce mercury emissions, use and contamination.			X
		14. Develop model guidelines and legislation for addressing mercury remediation and pollution prevention and distribute to local, regional, and national governments.			X
		20. Support developing country capacity to access chemical and mercury information via appropriate media including the internet and to build national websites and foster networking.			X
		21. Strengthen regional institutions which carry out environmental monitoring and broaden participation to include more countries in the region in monitoring ecosystems.			X
		27. Build national/State capacity to identify mercury-containing products at port of entry/customs.		X	
	28. Establish institutional arrangements to increase knowledge and capacity in each country to address mercury issue.		X		
	5. Technology transfer				
2. Increase knowledge and capacity among individual mercury users and consumers.	1. Inventories and knowledge-building	4. Organize workshops, education programmes and distribution centres to inform the public of mercury exposure and contamination pathways.	X		
		5. Conduct training workshops and educational programmes to inform local communities about dangers of mercury use and availability of mercury-free alternatives for mercury-using processes such as artisanal and small-scale gold mining.	X		
		6. Increase public awareness and promotion of mercury-free products, technologies, and processes, using environmentally friendly alternatives.	X		
		7. Increase local and regional participation in informational workshops and training programmes for persons handling mercury or mercury products and processes.		X	
		8. Initiate programmes that promote local participation in environmental monitoring.	X		
		9. Support pilot programmes to study and reduce mercury emissions; develop and distribute technologies and strategies for monitoring mercury contamination and organize workshops, education programmes and public awareness in general, with particular emphasis on awareness-raising for health-care professionals.	X		
	2. Targets and timetables				
3. BAT/BEP and product standards/restrictions					

Table 4.7: Increase knowledge on areas such as inventories, human and environmental exposure, environmental monitoring and socio-economic impacts				
Strategic objectives	Clusters	Suggested new and existing response measures	National	International
	4. Financial considerations and capacity-building	1. Increase funding for organizations conducting outreach programmes and research on environmentally sound alternatives to mercury-containing products and processes.	X	
		2. Support pilot programmes in developing countries to study and reduce mercury emissions, use, and contamination.		X
	5. Technology transfer	3. Support development and distribution of technologies and strategies for monitoring mercury contamination (i.e., in fish) and informing affected populations.		X