

Inception Workshop for the Project
“Management of Mercury and Mercury-Containing Waste”

***Initial observations from
national mercury inventories***

Dr. Mario Yarto

Consultant for UNEP Chemicals

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Outline

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Introduction

- Scope
 - Provide initial review of the national mercury inventories
 - Offer feedback on strengths and gaps
 - Suggest steps forward and recommendations for improvement/update

Brief overview of Toolkit

- Intended to guide the users in inventory development while recognizing that all country situations are different.
- Using the toolkit should save the user unnecessary effort by providing an immense amount of background data directly.
- A first rough sketch of mercury release estimates can be developed by applying the calculation tool, using the default factors, and entering country activity rates (indicating the magnitude of the sectors and other mercury sources in the country).

Brief overview of Toolkit

- Users can progressively improve the estimates of the most important releases with more accurate activity rates, specific national input factors (such as mercury concentration in a raw material), or details of specific release reduction filters, etc.
- Unfortunately the Toolkit does not yet provide default factors for all mercury release source categories, but this may be a part of future improvements.

Inventory results

Cambodia

Cambodia

- Mercury task team established
 - *Were members of NGOs, academia and civil society included?*
- Training technical workshop
- Field survey conducted in 10 provinces and 2 municipalities (out of 24)
 - *What activities take place in those which were not included?*
 - *Were other sectors involved in questionnaire development?*
- Inventory adopted as official baseline information
 - *Considering shortcomings in first approach, to what extent can policy and decision making move forward?*

Cambodia

- Mineral oils-extraction, refining and use
- Natural gas-extraction, refining and use
- Biomass fired power and heat production
- Gold and silver extraction with mercury amalgamation processes
- Production of lime and light weight aggregates
- Thermometers with mercury
- Batteries with mercury
- Production of recycled ferrous metals
- Production of other recycled metals
- Incineration of municipal/general waste
- Incineration of medical waste
- Informal dumping of general waste
- Waste water system / treatment
- Crematoria

Cambodia

- Main sources were selected based on toolkit, consultations and consideration of local conditions
 - Health sector (hospitals, clinics)
 - Landfill (municipal waste)
 - Gold mining
- Other potential sources considered
 - Secondary ferrous and non-ferrous metal production
 - Energy sources
 - Waste burning (industrial, medical)
 - Cell batteries
 - Lime production

Cambodia

- Total releases from preliminary survey
 - Min 769.51 Kg
 - Max 14845.178 Kg
- Source one: consumer products w/intentional use of mercury (8485.362 Kg)
- Source two: waste disposal with mercury content (4665.56 Kg)
- Source three: gold extraction (1182 Kg)
 - ***Update in official records and surveys (e.g. workers and locations) might be necessary to recalculate this data***

Cambodia

- Max release considered feasible as other sources could not be quantified (e.g. electrical/electronic switches, biocides, pesticides, paints, cosmetics, pharmaceuticals)
- A management plan is non-existent at the national level nor specific provisions for mercury or other chemicals of concern
- Existing legislation mainly covers pesticides and municipal waste management
- Further assistance required (technical, financial)

Cambodia

- Several constraints and barriers found
 - National data was unavailable or unclear for certain sources (e.g. fossil fuels, certain mercury-containing products, informal waste disposal)
 - *Involvement of other sectors may improve data gathering/collection*
- Potential hot-spots (from UNEP toolkit)
 - None considered relevant except from mine tailings
 - *Field work may provide further guidance on other potential hot-spots (e.g. informal waste disposal)*

Cambodia

No	Category and Sub-category	Activity rate	Input factor		Amount (Kg Hg/y)	
			Min	Max	Min	Max
1	Extraction and use of fuel/energy sources					
1.1	Use of crude oil (Power plant)	240748 t/y	10 mg/t	300 mg/t	2.407	72.224
1.2	Use of gasoline, diesel and other distillates (Power plant)	186344.87 t/y	1 mg/t	100 mg/t	0.186	18.634
1.3	Use of gasoline, diesel and other distillates (transportation)	284737.85 t/y	1 mg/t	100 mg/t	0.285	28.474
1.4	Use of pipeline gas (consumer quality)	34176062.25 Nm ³	0.03 µg/Nm ³	0.40 µg/Nm ³	0.001	0.014
1.5	Biomass fired power and heat production	5,511,201 t/y	0.007 mg/t	0.03 mg/t	0.039	0.165
2	Primary metal production					
2.1	Maximum mercury use per year	6,000 miners	N/A	N/A	34.5	1182
3	Production of other minerals and materials with mercury impurities					
3.1	Lime production	240	0.009 g/t	0.055 g/t	0.002	0.013
4	Intentional use of mercury in industrial purposes				N/A	N/A
5	Consumer products with intentional use of mercury					
5.1	Thermometers	6141 items/y	0.5 g/item	1.5 g/item	3.071	9.212
5.2.1	Batteries	635.599 t/y	0.25 Kg/t	10 Kg/t	158.900	6355.99
5.2.2	Other type batteries	13.251 t/y	3.4 Kg/t	160 Kg/t	45.053	2120.16
6	Other intentional products/process uses					
6.1.1	Amalgam fillings in capsule	0.8 g per capsule	2790 capsules	141224 capsules	2.232	112.979
6.1.2	Free metal mercury consumption		5.741 Kg	50.040 Kg	5.741	50.040
7	Production of recycled metals (secondary metal production)					
7.1	Production of recycled ferrous metal (iron and steel)	8,358.80 t/y	N/A		0	0
7.2	Production of other recycled metals (aluminum, copper, etc.)	2,197 t/y	N/A		0	0
8	Waste incineration					
8.1	Incineration of municipal/general waste	3,525.60 t/y	1 g/t	10 g/t	3.526	35.256
8.2	Incineration of medical waste	801.82 t/y	8 g/t	40 g/t	6.415	32.073
9	Waste deposition/land filling and waste water treatment					
9.1	Solid waste disposal	466,556 t/y	1 g/t	10 g/t	466.556	4665.56
9.2	Waste water treatment	N/A	0.5 mg/m³	10 mg/m³	0	0
10	Crematoria and cemeteries					
10.1	Cremation	40,596 corpse/y	1g/corpse	4g/corpse	40.596	162.384
11	Identification of potential hot-spots				N/A	N/A
	Total release from all categories				769.51	14845.178

Inventory results

Pakistan

Pakistan

- Stakeholder team established
 - *Were other sectors included, besides Government and Academia?*
- Identification of mercury and mercury products uses and releases
 - *Was survey conducted with support of a questionnaire?*
- Collection of water, air and soil samples
 - *Statistical analysis, sample representativeness?*
- Laboratory analysis
 - *QA/QC ; Interpretation of results*

Pakistan

- Data collection – markets/industry
- Technical WG and consultation with stakeholders
- Training workshop
- Preparation of baseline data/inventory
- Information will be used to determine which release source types are significant and which sources should be addressed through release reduction initiatives.

Pakistan

- Coal combustion in large power plants
- Other coal use
- Mineral oils-extraction, refining and use
- Natural gas-extraction, refining and use
- Biomass fired power and heat production
- Gold and silver extraction with mercury amalgamation processes
- Zinc, Copper, Aluminum extraction and initial processing
- Primary ferrous production
- Cement, pulp and paper production
- Production of lime and light weight aggregates
- Chlor-alkali production with mercury technology
- Thermometers and light sources with mercury
- Dental mercury-amalgam fillings
- Manometers, gauges, laboratory chemicals and equipment
- Miscellaneous product uses
- Production of recycled mercury
- Production of recycled ferrous metals
- Production of other recycled metals
- Incineration of medical waste
- Informal waste incineration
- Controlled landfills/deposits
- Informal local disposal of industrial production waste
- Informal dumping of general waste
- Waste water system / treatment
- Potential hotspots

Pakistan

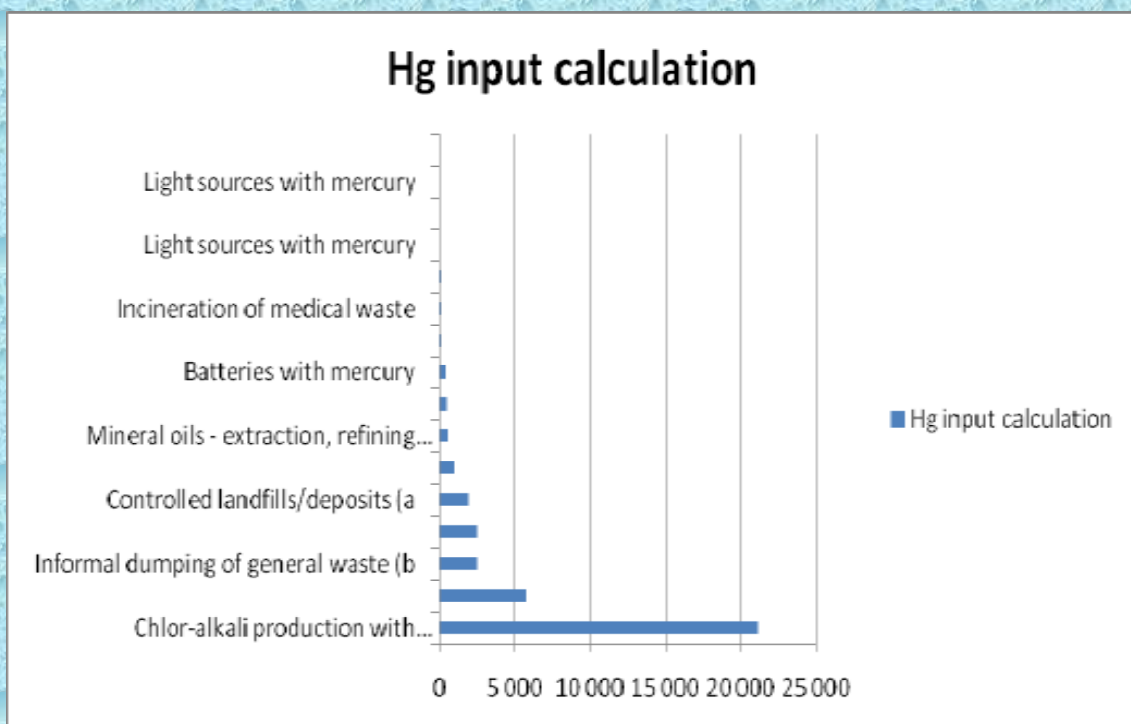
- **Main sources: selection based on toolkit, consultations and considerations of local conditions/knowledge**
 - Chlor-alkali plants
 - Health sector (hospitals, clinics)
 - Landfill (municipal waste)
- **Other potential sources considered (desk study)**
 - Secondary ferrous and non-ferrous metal production
 - Energy sources
 - Waste burning (industrial, medical)
 - Cremation
 - Cell batteries
 - Lime production

Pakistan

- No official records of mercury-containing products/equipment entering the country
 - *This is a major drawback when estimating potential mercury releases*
- Estimation of **mercury imports** at 34,013 Kg (2005-2008)
- Estimated releases (emissions and transfers)
 - Max : 36, 898 Kg Hg / yr
 - Min : 10, 842 Kg Hg /yr
- Major uses
 - Chlor-alkali; Lightning sources; Dental amalgams

Pakistan

Hg input calculation



Pakistan

- Specific guidance or management plan is non-existent at the national level
- Existing legislation mainly covers pesticides (for agricultural purposes) and waste management
- Laboratory infrastructure in place (15 labs) with capacity for mercury analysis
- Further assistance required (technical, financial) to implement management plans

Pakistan

- Several constraints and barriers found
 - National data was unavailable or unclear for several sources (e.g. electrical and electronic switches, biocides and pesticides, paints, pharmaceuticals)
- Potential hot-spots (from UNEP toolkit)
 - 2 abandoned chlor-alkali facilities identified
 - ***Further consideration of additional potential hot -spots is suggested (e.g. waste disposal sites)***

Inventory results

Philippines

Philippines

- Mercury ***multistakeholder*** team established with additional technical advisory
- Consultation workshops (3)
 - Awareness raising
 - Facilitate data gathering
 - Survey questionnaires (mostly incomplete and with inadequate data)
- Inventory developed based on secondary data from reliable sources and relevant estimations
- Toolkit applied but wide range of input factors seen as a drawback
 - ***Country profile (geography, economic activities, main industrial sectors, healthcare issues, etc.) N/A***

Philippines

- Coal combustion in large power plants
- Other coal use
- Mineral oils-extraction, refining and use
- Natural gas-extraction, refining and use
- Biomass fired power and heat production
- Geothermal power production
- Gold and silver extraction with mercury amalgamation processes
- Copper and lead extraction and initial processing
- Gold extraction and initial processing by methods other than mercury amalgamation
- Cement, pulp and paper production
- Production of lime and light weight aggregates
- Chlor-alkali production with mercury technology
- Thermometers and batteries
- Electrical switches and relays
- Light sources with mercury
- Dental mercury amalgam fillings
- Manometers and gauges
- Lab chemicals and equipment
- Miscellaneous product uses, mercury metal uses, and other sources
- Controlled landfills/deposits
- Informal local disposal of industrial production waste
- Informal dumping of general waste
- Waste water system / treatment
- Crematoria and Cemeteries

Philippines

- Total releases
 - Min : 133,856 Kg Hg / yr
 - Max : 234,031 Kg Hg / yr
 - **Review and assessment required to account for the 75% difference**
- Source one: primary virgin metal production (65,927 Kg = 32%)
- Source two: extraction and use of fuel and energy sources (31,940 Kg = 20%)
- Source three: other intentional uses (29,471 Kg = 20%)
- Distribution (using max default factors)
 - Air : 45%; Land: 19%; Water: 18%; Others (e.g. general waste)

Philippines

- Major sources of mercury releases
 - Extraction and use of fuels/energy sources
 - Primary (virgin) metal production
 - Production of other minerals and materials with mercury impurities
 - Intentional use of mercury in industrial processes
 - Consumer products with intentional use of mercury
 - Other intentional product/process use
 - Waste deposition/landfilling and waste water treatment
 - Crematoria and Cemeteries
- Source sub-categories and emission pathways calculated separately

Philippines

Main Source Category	Emissions or Hg output, kg Hg/year						
	Air	Water	Land	Impurity in products	General waste	Sector specific treatment disposal	Total
Extraction and use of fuels/energy sources	31,886	0	0	0	53.90	0	31,940
Primary (virgin) metal production	39,507	13,171	13,197	2,610	0	2,610	65,928
Production of other minerals and materials with mercury impurities	241	0	0	241	0	0	2,415
Intentional use of mercury in industrial processes	105	11	200	53	0	158	525
Consumer products with intentional use of mercury	943	20	1,120	0	1,082	0	3,164
Other intentional product/process use	7,064	1,331	1,326	266	17,179	532	27,431
Production of recycled metals (secondary) metal production)	0	0	0	0	0	0	0
Waste incineration	0	0	0	0	0	0	0
Waste deposition/landfilling and waste water treatment	48	1,1612	595	0	0	0	1,804
Crematoria and cemeteries	38	0	344	0	0	0	382
TOTAL	78,628	15,694	16,782	3,170	18,314	3,300	133,589

Philippines

- General waste incineration is banned and hospitals have stopped this practice
 - *Can incineration practices/contributions at hospitals be calculated?*
- Data gaps identified for several subcategories
- Potential hot-spots (from UNEP toolkit)
 - *None considered (?)*
- Chemical control order on mercury is in place
 - Import, manufacture, distribution and use

Inventory results

Burkina Faso

Burkina Faso

- Consultation workshop to select main categories and subcategories
- Engagement of all sectors with interest and responsibilities in the field (e.g. mercury use, trade, etc.)
- Team selection for inventory development
- Validation of selected categories and subcategories

Burkina Faso

- Extraction and use of fuels /energy sources
- Primary (virgin) metal production
- Production of minerals with raw material containing mercury impurities
- Intentional uses of mercury in industrial processes
- Consumer products with intentional use of mercury
- Other intentional uses
- Production of recycled metals (secondary)
- Waste incineration
- Waste water system / treatment
- Crematoria and Cemeteries
- Identification of hot spots

Burkina Faso

- Technical groups integrated according to specific category/subcategory
 - One professional member (technical knowledge) plus one member of inventory team
 - Specific technical groups for:
 - Hydrocarbons sector
 - Small scale gold mining
 - Amalgams
 - Trade of consumer mercury-containing products
 - Waste
 - Others to be defined by inventory team (?)

Burkina Faso

- Major sources of mercury releases identified
- Inventory fiche to include details and gather data from identified sources
 - *Analysis of “fiche inventory” would be useful*
- Source sub-categories and emission pathways calculated separately
- Calculations made based on UNEP toolkit
- Total releases: 4498.974 Kg
 - *Only max input factors used?*

Burkina Faso

- Lack of cooperation to provide information
- Non availability of certain associations
- Missing reliable statistical data
- Absence of data from certain sectors
- Adaption of toolkit difficult for certain local conditions
- Insufficient sensibilization and awareness raising activities with society

Summary

<i>Hg input / Country</i>	<i>Burkina Faso</i>	<i>Cambodia</i>	<i>Chile</i>	<i>Pakistan</i>	<i>Philippines</i>
Min (Kg/yr)	N/A	769	13841	10842	133856
Max (Kg/yr)	4498	14845	227615	36898	234031
Main sources	-waste disposal -consumer products -gold extraction	-consumer products -waste disposal -gold extraction	-primary metal prod -extraction, use of fuels -production of other minerals	-chloralkali -light sources -dental amalgams	-primary metal prod -extraction, use of fuels -other intent uses
Strengths	-multisector engagement -multitask techn group	-task team -field surv.		-market study -technical team -field & lab work	-multisector team -incineration controlled
Gaps	-limited calc -unavailable info/particip	-lack of data -hot spots		-absence of offi. records -hot spots	-hot spots -country profile

Conclusions

- Pilot countries made big efforts and commitments to develop first/preliminary inventory
- Capacity building on UNEP's toolkit provided guidance for calculations and estimations
- Indication of multistakeholder participation at some level
- Baseline info important for policy making and relevant management actions (e.g. waste mgt plans, update legis.)
- Major drawbacks
 - Lack and unavailability of information, statistics, etc
 - Default vs country specific input and distribution factors
 - Insufficient participation from all sectors

Recommendations

- For a full inventory development it is necessary to collect all information from various sectors as specified in categories and sub-categories addressed in the UNEP Toolkit, reflecting specific country context.
- ***Avoid overlooking sources with potential contributions to mercury emissions and related management issues***
- Field work and surveys may assist in identifying additional potential sources/subcategories and in estimating/quantifying mercury releases from identified sources/subcategories
- Additional data could be generated in existing sources
- Engagement of customs and trade offices is of utmost importance

Recommendations

- Reliability and accuracy of existing data should be verified (e.g. customs office vs industry records)
- Strengthening of information sharing and exchange among stakeholders is crucial for data collection
- Legal and administrative mechanisms may constitute an important tool in support of information collection
- Full application of UNEP's toolkit is advised to ensure a comprehensive analysis of releases and outputs of mercury to environmental media (e.g. calculating with max and min factors)
- Further consideration of additional potential hot -spots is recommended

Recommendations

- Try to include most stakeholders from phase one
 - industry associations and industrial enterprises
 - the agricultural sector (e.g. farmers, agricultural associations, co-operatives)
 - retailers and distributors
 - public health professionals
 - workers and workers' unions
 - public interest groups (e.g. environmental groups, consumer protection groups)
 - research institutes and academia
 - women's organizations
 - indigenous communities
 - communities
 - individual citizens
- Promote effective coordination among the whole range of those who have responsibility for or a stake in mercury issues

Recommendations

- Awareness raising activities to engage civil society with relevant guidance and follow up activities) may provide improvements in data gathering (e.g. shortcomings in questionnaires)
- Development of a country management action plan for mercury:
 - ✓ Clear in its objectives and activities
 - ✓ Prioritize to set achievable goals and expected outcomes
 - ✓ Must ensure political support and engage relevant sectors
 - ✓ Need to secure funds and technical expertise for implementation

Thank you for your attention!

marioyarto@gmail.com