

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

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Presentation on Mercury Inventory in Cambodia

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1. Background information

- Cambodia is a tropical country situated in South East Asia between latitudes 10° to 15° north and longitudes 102° and 108° east, where the length from north to south is 480 km and the length from west to east is 580 km. It shares borders with Laos, Thailand and Vietnam. Cambodia has a total area of 181,035 Km² territories with a coastline of about 435 Km. Cambodia composed of 20 provinces and 4 municipalities.

- Population of Cambodia in 2006 is 14.0 million, according to official population projection based on general population census 1998 and 2004. The population increased by 2.0 percent from 13.8 millions in 2005. The average population density for Cambodia is 82 persons per square kilometer. Around 51.4 percent of the population is females, and the population is growing at an estimate rate around 1.7 percent per annum.

2. Methodology

- ➡ Survey team formulation
- ➡ Questionnaire Preparation
- ➡ Training for Survey team
- ➡ Side selection: 12 Provinces and cities
- ➡ Field survey
- ➡ Desk study and research for existing documents
- ➡ Calculation and preparation the inventory report

3. Structure of report

- ❖ Content
- ❖ List of tables
- ❖ Abbreviation
- ❖ Official Speech
- ❖ Summary
- ❖ National Background information
- ❖ Preliminary inventory of mercury use and release in Cambodia
- ❖ Quantification of mercury releases (calculation)
- ❖ Conclusion
- ❖ References
- ❖ Appendices

4. Inventory result

Calculation of quantification of mercury releases from selected category:

1. Extraction and use of fuels/energy sources
2. Primary metal production - small scale gold mining
3. Production of other minerals and materials with mercury impurities
4. Intentional use of mercury in industrial processes
5. Consumer products with intentional use of mercury
6. Other intentional products/process uses
7. Production of recycled metals (secondary metal production)
8. Waste incineration
9. Waste deposition/landfilling and waste water treatment
10. Crematoria and cemeteries
11. Identification of potential hot-spots

4. Inventory result

1. Extraction and use of fuels/energy sources

No	Sub-category	Activity rate(t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
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
Total release by category 1					2.918	119.511

4. Inventory result cont...

2. Primary metal production - small scale gold mining

No	Sub-category	Activity rate (t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
2.1	Maximum mercury use per year	6000 miners	N/A	0.197	34.5	1182
Total release by category 2					34.5	1182

Mercury output distribution by pathway

Phase in life cycle	Air	Water	Land	Product	General waste	Sector specific treatment /disposal
Default output distribution factors, share of mercury input	0.6	0.2	0.2	?		
Output distribution by pathway	709.2	236.4	236.4			

4. Inventory result cont...

3. Mercury release from mineral production category

No	Sub-category	Activity rate(t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
3.1	Lime production	240	0.009 g/t	0.055 g/t	0.002	0.013
	Total release by category 3				0.002	0.013

4. Inventory result cont...

4. Intentional use of mercury in industrial processes

No activities related to the intentional use of mercury in industrial processes in Cambodia, because the country is depending much on and agricultural production and tourist sector, thus no data on mercury release available for this category.

5. Consumer products with intentional use of mercury

Thermometers with mercury

Batteries containing mercury

Electrical and electronic switches, contacts and relays with mercury

Light sources with mercury

Biocides and pesticides

Paints

Pharmaceuticals for human and veterinary uses

Cosmetics and related products

4. Inventory result cont...

5. Consumer products with intentional use of mercury

5.1 Mercury release from consumer product: thermometers

No	Sub-category	Activity rate (t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
5.1.1	Thermometers	6141 items/y	0.5 g/item	1.5 g/item	3.071	9.212
Total release by category 5					3.071	9.212

Mercury output distribution by pathway

Phase in life cycle	Air	Water	Land	General waste	Sector specific treatment/disposal
Default output distribution factors, share of Hg input	0.2	0.3	0.2	0.3	
Output distribution by pathway	4.11	6.17	4.11	6.17	

4. Inventory result cont...

5.2 Mercury release from consumer product: batteries

No	Sub-category	Activity rate (t/y)	Input factor		Amount (Kg Hg/y)	
			Min	Max	Min	Max
5.2.1	Batteries	635.599	0.25 Kg/t	10 Kg/t	158.900	6355.99
5.2.2	Other type batteries	13.251	3.4 Kg/t	160 Kg/t	45.053	2120.16
Total release					203.953	8476.15

Mercury output distribution by pathway

Phase in life cycle	Air	Water	Land	General waste	Sector specific treatment/disposal
Default output distribution factors, share of Hg input	0.25		0.25	0.5	
Minimum output distribution by pathway	50.988		50.988	101.977	
Maximum output distribution by pathway	2119.037	0	2119.037	4238.075	

4. Inventory result cont...

6. Other intentional products/process uses

- *amalgam fillings*
- manometers and gauges
- laboratory chemicals and equipment
- mercury metal use in religious rituals
- folklore medicine, and others

❖ amalgam fillings:

No	Sub-category	Input factor	Activity rate		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
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
	Total release by				7.973	163.019

4. Inventory result cont...

7. Production of recycled metals (secondary metal production)

No	Sub-category	Activity rate (t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
7.1	Production of recycled ferrous metal (iron and steel)	8,358.80	N/A	N/A		
7.2	Production of other recycled metals (aluminum, copper, etc.)	2,197	N/A	N/A		
	Total release by category					

4. Inventory result cont...

8. Waste incineration

No	Sub-category	Activity rate (t/y)	Input factor		Release (Kg Hg/y)	
			Min	Max	Min	Max
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
	Total release				9.941	67.329

Mercury output distribution by pathway

Subcategory	Distribution pathway					
	Air	Water	Land	Product	General waste	Sector specific treatment/ disposal
Emission reduction devices (None)	1					
Incineration of municipal/general waste	35.256					
Incineration of medical waste	32.073					

3. Inventory result cont...

9. Waste deposition/landfilling and waste water treatment

No	Sub-category	Activity rate(t/y)	Input factor		Amount Release (Kg Hg/y)	
			Min	Max	Min	Max
9.1	Solid waste disposal	466556	1 g/t	10 g/t	466.556	4,665.56
9.2	Waste water treatment	N/A	0.5 mg/m ³	10 mg/m ³	0	0
	Total release by category 9				466.556	4,665.56

4. Inventory result cont...

10. Crematoria and cemeteries

No	Sub-category	Activity rate (corpse/y)	Input factor		Amount release (Kg Hg/y)	
			Min	Max	Min	Max
10.1	<i>Cremation</i>	40596	<i>1g/corpse</i>	<i>4 g/corpse</i>	40.596	162.384
	Total release				40.596	162.384

11. Identification of potential hot-spots

There is no data for calculation related to potential hot-spots, because Cambodia closed/abandoned chemical industries

Summary of mercury release from all categories

No	Categories	Result kg/y
1	Extraction and use of fuels/energy sources	119.511
2	<i>Primary metal production - small scale gold mining (third)</i>	1182
3	Production of other minerals and materials with mercury impurities	0.013
4	Intentional use of mercury in industrial processes	-
5	<i>Consumer products with intentional use of mercury (first)</i>	8485.362
6	Other intentional products/process uses	163.019
7	Production of recycled metals	-
8	Waste incineration	67.329
9	<i>Waste deposition/landfilling and waste water treatment (second)</i>	4665.56
10	Crematoria and cemeteries	162.384
11	Identification of potential hot-spots	-
	Total	14845.178

5. Remarks and recommendations

Based on the result of survey from data collection team we faced some difficulties such as:

- ☞ The figure of maximum mercury release is reasonable amount because it was calculated use assumed activity rates and input factor.
- ☞ Utilization Toolkit calculation could cause total figure of maximum of mercury release is high by using input factor of from Toolkit, in case of Cambodia, if compare to some countries which use their standard regulation.
- ☞ Data collected from source owner or interviewee of the field of survey is still reasonable or limited or estimated amount.
- ☞ The total amount of maximum mercury release was concerned and recommended in the consulting workshop on mercury inventory report.

5. Remark cont.

Relevant to Toolkit Calculation:

- ☞ Long table and complication
- ☞ Sub category for calculation some to detail and some too general that does not match or correspond to local context.
- ☞ Some release input factor does not available or fit to local context
- ☞ So many description of mercury release input factor with many examples from western or developed countries.
- ☞ Input factor seem to be inappropriate for least developing countries, where never have industrialized history, mean no putative sources of mercury release so far.

6. Conclusion

- Based on inventory result of the preliminary survey shown that total amount of mercury release in maximum and minimum are reasonable figure. So it need full inventory throughout the whole country in order to evaluate on exactly amount of mercury release in country.
- Three sources which is high potential mercury release mentioned above should be required the study or observation detail of the certain amount of mercury release and its reasons.
- To disseminate on mercury inventory result to relevant agencies, NGOs and stakeholder to make them to pay attention or take action related to the release or use of mercury.

6. Conclusion cont.

- Capacity building and knowledge of inventory team as well as concerned ministries staffs and stakeholder sould be improved.
- Public awareness should be promoted.
- People who work close or involve with mercury use or release should be educated on harmful effect of mercury to human health and environment in odor to change their behavior of mercury using in their living activities.
- To set up and develop new specific regulation for reduction and prevention of mercury use or release into environment.
- In order to achieve goal, Cambodia requires further assistance in terms of both financial and technical support from other international communities and donors for environmental sound management of mercury.

Thank You For Your Kind Attention

