CURRENT STATUS OF MERCURY IN PAKISTAN

BY

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Objectives of the mercury inventory project

- To develop the basic data about the inventory of mercury and mercury products in Pakistan.
- To identify the mercury exposure resources in the country.
- To identify the groups of people at more risk.
- To create the awareness in the general public regarding the toxicity of mercury.
- To attempt the replacement of mercury containing commodities.
- To develop strategies to reduce the risk of mercury exposure.

Methodology of the Project

- Creation of Stakeholders Team.
- Identification of mercury and mercury products uses and releases by federal/provincial EPA's.
- The selection of areas susceptible/effected for mercury contamination in the country.
- Collection of samples of water, air and soil from the country with the help of federal/provincial EPA's.
- Analysis of the samples in the laboratories of Institute of the chemistry, University of the Punjab, Lahore.
- Data collection of mercury and mercury products from mercury usage markets/industries in the country.
- Technical working group and consultation meetings of all stakeholders.
- Training of Stakeholders Team by UNEP expert.
- Preparation of baseline data/inventory of mercury and mercury products about the current situation in the country.

Results of Samples from Punjab (Lahore, Sheikhupura, Faisalabad etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
1	Near taj company ravi road	1.26
2	Shahdra village bridge ravi raod	0
3	Azadi chowk ravi road	0
4	Kotlakhpat industrial waste	0
5	Main ferozpur road hudarian drain	0
6	ARC sock near Kahna hudarian drain	0
7	Badian road hudarian drain	1.59
8	Town ship waste drain	0.59
9	Dharam pura canal	0
10	Near shafi reso chem hudarian drain	0

Cont'

Results of Samples from Punjab (Lahore, Sheikhupura, Faisalabad etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
11	Residual Waste of Incinerated children Hospital Waste	1.52
12	Shikhupura Municipal Drain	2.1
13	Sitara chemicals 1	1.1
14	Sitara chemicals 2	1.3
15	Sitara chemicals 3	0.89
16	Sitara chemicals 4	1.34
17	Sitara chemicals 5	2.7
18	Drain Near Sitara chemicals	2.4
19	Sitara chemicals Solid Waste 1	0.4
20	Sitara chemicals Solid Waste 2	0.5

Cont'

Results of Samples from Punjab (Lahore, Sheikhupura, Faisalabad etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
21	Sitara chemicals Solid Waste 3	1.2
22	Ittehad chemicals Outlet 1	2.3
23	Ittehad chemicals Outlet 2	0.4
24	Ittehad chemicals Outlet 3	3.1
25	Ittehad chemicals Outlet 4	2.7
26	Ittehad chemicals Solid Waste 1	0.77
27	Ittehad chemicals Solid Waste 2	0.4
28	Ittehad chemicals Solid Waste 3	0
29	Nimir chemicals 1	0
30	Nimir chemicals 2	0
31	Nimir chemicals 3	0

Cont'

Results of Samples from Punjab (Lahore, Sheikhupura, Faisalabad etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
32	Municipal Sewrage Okara	0
33	Yusaf Sugar mill Shahpur	0
34	Supra Tannery	0
35	Mehmood Booti Drain	3.9
36	Leachate Mehmood Booti Dumping Site Bund Road 1	4.1
37	Leachate Mehmood Booti Dumping Site Bund Road 2	3.7
38	Leachate Mehmood Booti Dumping Site Bund Road 3	2.8
39	Mehmood Booti Dumping Site 1	1.2
40	Mehmood Booti Dumping Site 2	0.6

Results of Samples from Sindh (Karachi etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
1	PSL Sludge	0.85
2	Municipal sludge	0.0
3	Municipal effluent	0.0
4	Leachatae	2.73
5	Inlet	2.41
6	Zubair Afzal Tannery	9.26
7	Modern Tannery	0.0
8	Serri Sugar Mill (Tando Mohammad Khan)	0
9	Tando Muhammad Khan Sugar Mill (Tando Mohammad Khan)	0
10	Digri Sugar Mill (Digri)	0
11	Mehran Sugar Mill (Talhar)	0

Cont'

Results of Samples from Sindh (Karachi etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
12	Haji Naimutlah Tannery	0
13	Shaheen Tannery	0
14	Subhanullah Tannery	0
15	Faran Sugar Mill (Badin)	0.58
16	Malir river wet land sludge	0
17	Korangi waste drain (Left)	0
18	Korangi waste drain (Right)	0
19	Malir river wet land water	2.05
20	Civil hospital korangi	0
21	Hasan square drain	0.05
22	Korangi dumping waste "A"	8.83
23	Korangi dumping waste "B"	0.02
24	Korangi dumping waste "C"	1.49
25	Korangi dumping waste "D"	3.48

Results of Samples from Baluchistan (Quetta)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
1	Lime fuel source (coal)	5.26
2	Lime stone raw material	2.95
3	Lime product	0
4	Waste incinerator	1.80
5	Informal dumping site "1"	3.48
6	Informal dumping site "2"	7.15
7	Quetta municipal waste sludges	0
8	Quetta municipal waste water	0.02

Results of Samples from N.W.F.P (Peshawar etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
1	Waster Water Industrial Estate Hyatabad	3.1
2	Mohsin Match Hayatabad Waste water	2.4
3	Taj Ghee	1
4	Hasan Pharma Hayatabad Waste water	3.4
5	Musarat Shaukat Hospital Complex Dir	2
6	Sludge Industrial Estate Hyatabad	4
7	Chinoti Gul Ghee WW	1
8	Khyber Match	2.1
9	Afghan Match Hyatabad	2.7
10	Hayatabad Treatment Plant	3.5
11	PCSIR Env Lab	<0.8
12	Fouji Corn Complex swabi	3.4
13	Volta Battery Hattar	3.7

Cont'

Results of Samples from N.W.F.P (Peshawar etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
14	Hayatabad Labor colony	0
15	Sardar Begum Dental College Ghandara University	0
16	Sufi Foods	0
17	Rapid Car Wash	0
18	Pakistan Tobaco Company	1.9
19	Khyber Lamps	3.6
20	Chashma sugar Mill D.I. Khan	0
21	Ganda Nala Peshawar	5.4
22	Hattar Rending	2.1
23	Sarhad Board Hayatabad	1.5
24	Midway Hotel	0
25	Lateef Ghee	1.5

Cont'

Results of Samples from N.W.F.P (Peshawar etc)

S/No.	Sampling Point	Concentration of Mercury in ppb or ug/kg
26	Khyber Teaching Hospital	2.4
27	Ashraf Match	2
28	Treatment Plant Gulbahar Peshawar	3.1
29	Buddhni Nala Bacha Khan Chowk Pesahwar	6.8
30	Neelam Paper	2.6
31	Permanent Paper Hattar	3.6
32	Ferrous Waste Unreacted	<0.5
33	Ferrous Waste Procduct	<0.5
34	Hayatabad Dumping site 1 (Labor colony)	6.4
35	Hayatabad Dumping site 2	5.7
36	Royal PVC Hayatabad Raw Material	1.3

SUMMARY OF IMPORT DATA FOR THE PERIOD JUL-2005 TO JUN-2006

S.#	IMPORTER NAME	QUANTITY (KG)
1	MERCK (PRIVATE) LIMITED	3
2	REHAN AHMED AND COMPANY	7
3	PHILIPS ELECTRICAL INDUSTRIES OF PAKISTAN LIMITED	345
4	SITARA CHEMICAL INDUSTRY	2,146
5	FAUJI FERTILIZER COMPANY LIMITED	1
6	NAEEM ALI SHAH	400
7	CROWN LIGHTING (PVT.) LIMITED	690
8	TAYYABA FABRICS	50
9	CROWN LIGHTING (PVT.) LIMITED	30
TOTAL		**3,672**

SUMMARY OF IMPORT DATA FOR THE PERIOD JUL-2006 TO JUN-2007

S.#	IMPORTER NAME	QUANTITY (KG)
1	MERCK (PRIVATE) LIMITED	9
2	MARI GAS COMPANY LIMITED	4
3	PHILIPS ELECTRICAL INDUSTRIES OF PAKISTAN LIMITED	1,031
4	ITTEHAD CHEMICALS LIMITED	21,735
5	FAUJI FERTILIZER COMPANY LIMITED	4
6	UNIVERSAL DENTAL (PVT.) LIMITED	40
7	CROWN LIGHTING (PVT.) LIMITED	53
TOTAL		**22,876**

SUMMARY OF IMPORT DATA FOR THE PERIOD JUL-2007 TO FEB-19-2008

S.#	IMPORTER NAME	QUANTITY (KG)
1	PHILIPS ELECTRICAL INDUSTRIES OF PAKISTAN LIMITED	345
2	ITTEHAD CHEMICALS LIMITED	200
3	UNIVERSAL DENTAL (PVT.) LIMITED	20
TOTAL		**565**

The status of chlor-alkali industry in Pakistan regarding use of mercury

S.#	Name of Industry	Capacity (tons)	Basis
1	Sitara Chemicals	180,000	100% Production is based on Membrane Cell
2	Ittehad Chemicals	132,000	60% Production is based on Membrane Cell and 40% production is based on mercury cell
3	Nimir Chemicals	10,000	100% Production is based on Membrane Cell

10,000 M.Tons of Caustic Soda consumes Mercury (Hg) = 2.5 M. Tons

I M. Tons of Caustic Soda consumes Mercury (Hg) = 2.5/10,000=0.00025 M. Tons

0.00025 Ton Or 0.25 Kg per Metric Tons of Caustic Soda

Summary of mercury release from all categories

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	Coal combustion in large power plants	2091310 T/y	0.05 g Hg/T	0.5 g Hg/T	104.5655 Kg/year	1045.655 Kg/year
1.2-a	Mineral oils - extraction, refining and use	1610762 T/y	0.01 mg Hg/T	0.01 mg Hg/T	0.016107 62 Kg/year	0.0161076 Kg/year
1.2-b	Use of gasoline, diesel and distillates	567182.5 T/y	1 mg Hg/T	100 mg Hg/T	5.676182 Kg/year	567.6182 Kg/year
1.2-c	Natural gas - extraction, refining and use	29540000000 m3/year	0.03 µ gHg/Nm3 gas	0.4 µg Hg/Nm3 gas	0.8862 kg/year	11.816 kg/year
2	**Production of other minerals and materials with mercury impurities**					
2.1	Cement production	25000000 T/y	0.02 g Hg/T	0.1 g Hg/T	500 Kg/year	2500 Kg/year
3	**Intentional use of mercury in industrial purposes**					
3.1	Chlor-alkali production with mercury-Technology	52800 T/y	25 g Hg/T	400 g Hg/T	1320 Kg/year	21120 Kg/year

Cont'

Summary of mercury release from all categories

No	Category and Sub-category	Activity rate	Input factor		Amount (Kg Hg/y)	
			Min	Max	Min	Max
4	**Consumer products with intentional use of mercury**					
4.1	Thermometers with mercury	310.365 items/y	0.5 items/y	1.5 items/y	155.1825 Kg/year	465.5475 Kg/year
4.2-a	Light sources with mercury(fluorescent tube)	5613180 items/year	10 mg Hg/item	10 mg Hg/item	56.1318 Kg/year	56.1318 Kg/year
4.2-b	Light sources with mercury(metal halide lamps)	360866 items/year	25 mg Hg/item	25 mg Hg/item	9.02165 Kg/year	9.02165 Kg/year
4.3-a	Batteries with mercury (alkaline, other than button cell shapes)	1573 T/year	0.25 kg Hg/T	0.25 kg Hg/T	393.25 Kg/year	393.25 Kg/year
4.3-b	Batteries with mercury {mercury oxide (all sizes)} also called mercury-zinc cell}	0.462 t/year	320 kg/T	320 kg/T	147.84 Kg/year	147.84 Kg/year
5	**Custom import data of Biocides and pesticides with quantity**					
5.1	Misc. Product uses, mercury metal uses, and other sources	5779 T/year	1 kg Hg/T	1 kg Hg/T	5779 Kg/year	5779 Kg/year

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Summary of mercury release from all categories

No	Category and Sub-category	Activity rate	Input factor		Amount (Kg Hg/y)	
			Min	Max	Min	Max
6	**Waste incineration**					
6.1	Incineration of medical waste	4118 T/year	8 g Hg/T	40 g Hg/T	32.944 Kg/year	164.72 Kg/year
7	**Waste deposition/land filling and waste water treatment**					
7.1	Informal dumping of general waste	255000 T/year	1 g Hg/T	10 g Hg/T	255 Kg/year	2550 Kg/year
7.2	Control land fills/deposits	1900000 T/year	1 g Hg/T	1 g Hg/t	1900 Kg/year	1900 Kg/year
7.3	Waste water treatment	93776724 cm3/year	2 mg Hg/m3	2 mg Hg/m3	187.553448 Kg/year	187.553448 Kg/year
TOTAL					**10846 Kg/year**	**36 898.77 Kg/year**

INPUTS MAX VALUES

Hg input calculation		
Sub category name	No File	Total
Chlor-alkali production with mercury-technology	4	21 120
Total Chlor-alkali production with mercury-technology		21 120
Mineral oils - extraction, refining and use	1 2	0 568
Total Mineral oils - extraction, refining and use		568
Waste water system/treatment	13	188
Total Waste water system/treatment		188
Controlled landfills/deposits (a	12	1 900
Total Controlled landfills/deposits (a		1 900
Incineration of medical waste	11	165
Total Incineration of medical waste		165
Miscellaneous product uses, mercury metal uses, and other sources	10	5 779
Total Miscellaneous product uses, mercury metal uses, and other sources		5 779
Batteries with mercury	8 9	393 148
Total Batteries with mercury		541

Cont’

INPUTS MAX VALUES

Light sources with mercury	6	56
	7	9
Total Light sources with mercury		65
Thermometers with mercury	5	466
Total Thermometers with mercury		466
Natural gas - extraction, refining and use	3	12
Total Natural gas - extraction, refining and use		12
Cement production (a	15	2 500
Total Cement production (a		2 500
Informal dumping of general waste (b	14	2 550
Total Informal dumping of general waste (b		2 550
Coal combustion in large power plants	0	1 046
Total Coal combustion in large power plants		1 046
Total maximum quantity (in kg)		**36 898**

TYPE OF RELEASE PER CATEGORY

Sub category no	Sub category name	air	water	land	product	waste
511	Coal combustion in large power plants	x				
513	Mineral oils - extraction, refining and use	x				
514	Natural gas - extraction, refining and use	x				
531	Cement production (a	x				
541	Chlor-alkali production with mercury-technology					x
551	Thermometers with mercury	x	x	x		
553	Light sources with mercury	x	x	x		
554	Batteries with mercury	x	x	x		
565	Miscellaneous product uses, mercury metal uses, and other sources	x	x	x		
583	Incineration of medical waste	x				
591	Controlled landfills/deposits (a		x	x		
594	Informal dumping of general waste (b	x	x	x		
595	Waste water system/treatment		x			

Hg Inputs per Main Categories (kg per year)

No Category	Category name	Total Max	Total Min
51	Extraction and use of fuels/energy sources	1 625	111
53	Production of other minerals and materials with mercury impurities	2 500	500
54	Intentional use of mercury in industrial processes	21 120	1 320
55	Consumer products with intentional use of mercury	1 072	761
56	Other intentional product/process use	5 779	5 779
58	Waste incineration	165	33
59	Waste deposition/landfilling and waste water treatment	4 638	2 338
Total quantity (in kg)		**36 898**	**10 842**

Hg Inputs per sub categories

No Category	Category name	Sub category no	Sub category name	Max input	Min input
51	Extraction and use of fuels/energy sources	511	Coal combustion in large power plants	1 046	105
		513	Mineral oils - extraction, refining and use	568	6
			Mineral oils - extraction, refining and use	0.016	0.016
		514	Natural gas - extraction, refining and use	12	1
53	Production of other minerals and materials with mercury impurities	531	Cement production (a	2 500	500
54	Intentional use of mercury in industrial processes	541	Chlor-alkali production with mercury-technology	21 120	1 320
55	Consumer products with intentional use of mercury	551	Thermometers with mercury	466	155
		553	Light sources with mercury	9	9
			Light sources with mercury	56	56
		554	Batteries with mercury	148	148
			Batteries with mercury	393	393
56	Other intentional product/process use	565	Miscellaneous product uses, mercury metal uses, and other sources	5 779	5 779
58	Waste incineration	583	Incineration of medical waste	165	33
59	Waste deposition/landfilling and waste water treatment	591	Controlled landfills/deposits (a	1 900	1 900
		594	Informal dumping of general waste (b	2 550	250
		595	Waste water system/treatment	188	188
			Total	**36 898**	**10 842**

Comparison of Inventory results with world Hg consumption

- Average consumption of Hg per capita and per year in South Asia : 0.12g
- Population of Pakistan: 173 000 000 hab.
- Estimated Hg consumtion per year: 20,000 kgs
- Average value between Min and Max inputs: 23870 kg

Pictures of Meetings, Industries and Sampling Points


Thanks