FEDERAL MINISTRY OF ENVIRONMENT

NIGERIA

INVENTORY OF MERCURY RELEASES IN NIGERIA

April 2012

Contact point responsible for this inventory	
Full name of institution	FEDERAL MINISTRY OF ENVIRONMENT, DEPARTMENT OF POLLUTION CONTROL & ENVIRONMENTAL HEALTH
Contact person	DIRECTOR POLLUTION CONTROL & ENVIRONMENTAL HEALTH
E-mail address	obabade2002@yahoo.com
Telephone number	+234-8033220410
Fax number	-
Website of institution	www.environment.gov.ng
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1. EXECUTIVE SUMMARY OF MERCURY INVENTORY RESULTS

This report has been prepared for the Government of Nigeria for the objectives and to the scope set out in the report.

This report has inputs from relevant stakeholders that have submitted data on mercury-containing materials and devices, and mercury in processes. The information being accepted as provided, has not been independently checked and could contain errors in estimates made. Stakeholders that made data available for the different sectors highlighted in the Toolkit inventory Level 1 are: Federal Ministry of Trade and Investment, Power Holding Company of Nigeria (PHCN), the National Bureau of Statistics (NBS), Abuja Environmental Protection Board (AEBP) and the Lagos Waste Management Authority (LAWMA).

Information on the use of mercury, and natural and anthropogenic fate and transport of mercury, in Nigeria is not readily available and in some cases incomplete.

The inadequacies experienced in comprehensivity of data may have resulted in over or under-estimates of particular sectors.

The table below summarises mercury releases from highlighted source categories.

This mercury release inventory was made with the use of the "Toolkit for identification and quantification of mercury releases" made available by the United Nations Environment Programme's Chemicals division (UNEP Chemicals). The Toolkit is available at UNEP Chemicals' website:

http://www.unep.org/hazardoussubstances/Mercury/MercuryPublications/GuidanceTrainingMaterialToolkits/MercuryToolkit/tabid/4566/language/en-US/Default.aspx.

This inventory was developed on the Toolkit's Inventory Level 1. The Toolkit is based on mass balances for each mercury release source type. Inventory Level 1 works with pre-determined factors used in the calculation of mercury inputs to society and releases, the so-called default input factors and default output distribution factors. These factors were derived from data on mercury inputs and releases from such mercury source types from available literature and other relevant data sources.

Results and discussion

An aggregated presentation of the results for main groups of mercury release sources is presented in Table 1.1 below.

INVENTORY LEVEL 1 - EXECUTIVE SUMMARY

Source category	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
		Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Coal combustion and other coal use	13.5	12.1	0.0	0.0	0.0	1.3	0.0
Other fossil fuel and biomass combustion	1,780.8	1,780.8	0.0	0.0	0.0	0.0	0.0
Oil and gas production	49,502.3	148.6	9,806.8	0.0	50.9	133.3	0.0
Primary metal production (excl. gold production by amalgamation)	123,743.6	12,387.8	3.3	37,179.0	37,084.4	6.9	37,082.2
Gold extraction with mercury amalgamation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other materials production	43,521.0	26,112.6	0.0	0.0	8,704.2	8,704.2	0.0
Chlor-alkali production with mercury-cells	-	-	-	-	-	-	-
Other production of chemicals and polymers	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Production of products with mercury content	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Use and disposal of dental amalgam fillings	25,518.6	510.4	8,472.2	0.0	918.7	4,899.6	4,899.6
Use and disposal of other products	43,054.6	3,452.4	4,735.8	2,381.7	0.0	29,592.5	2,892.1
Production of recycled metals	1,198.6	395.5	0.0	407.5	0.0	395.5	0.0
Waste incineration and open waste burning*1	162,941.9	159,147.7	0.0	0.0	0.0	0.0	3,794.2
Waste deposition*1	16,425.0	164.3	1.6	0.0	-	-	-
Informal dumping of general waste *1*2	17,172.3	1,717.2	1,717.2	13,737.9	-	-	-
Waste water system/treatment *3	1,540.8	0.0	1,386.7	0.0	0.0	154.1	0.0
Crematoria and cemeteries	6,830.5	0.0	0.0	6,830.5	0.0	0.0	0.0
TOTALS	**314,820.0**	**205,830.0**	**24,740.0**	**46,800.0**	**46,760.0**	**43,890.0**	**48,670.0**

Table 1.1: **INVENTORY LEVEL 1 - EXECUTIVE SUMMARY**

As shown in the Table 1.1, the following source groups contribute with the major mercury inputs: Use and disposal of other products, Waste Incineration and Open Waste Burning*1, Primary metal production (excl. gold production by amalgamation) Oil and Gas Production and other materials production.

The individual mercury release sub-categories contributing with the highest mercury inputs were Open fire waste burning (on landfills and informally), Production of Zinc from concentrates, Production of Lead from Concentrates, Oil Extraction and Cement Production.

The individual mercury release sub-categories contributing with the highest mercury releases to the atmosphere were Open fire waste burning (on landfills and informally), incineration of medical waste and Cement Production.

Detailed presentation of mercury inputs and releases for all mercury release source types present in the country are shown in the following report sections.

2. MERCURY RELEASE SOURCE TYPES PRESENT

Table 2-1 shows which mercury release sources were identified as present and absent, respectively, in the country. Only source types positively identified as present are included in the quantitative assessment.

It should be noted however, that the presumably minor mercury release source types shown in Table 2-2 were not included in the detailed source identification and quantification work.

INVENTORY LEVEL 1 - MERCURY SOURCES IDENTIFIED

Source category	Source present?
	Y/N/?
Energy consumption	
Coal combustion in large power plants	Y
Other coal uses	Y
Combustion/use of petroleum coke and heavy oil	Y
Combustion/use of diesel, gasoil, petroleum, kerosene	Y
Use of raw or pre-cleaned natural gas	Y
Use of pipeline gas (consumer quality)	Y
Biomass fired power and heat production	Y
Charcoal combustion	Y
Fuel production	
Oil extraction	Y
Oil refining	Y
Extraction and processing of natural gas	Y
Primary metal production	
Mercury (primary) extraction and initial processing	?
Production of zinc from concentrates	Y
Production of copper from concentrates	Y
Production of lead from concentrates	Y
Gold extraction by methods other than mercury amalgamation	Y
Alumina production from bauxite (aluminium production)	Y
Primary ferrous metal production (iron, steel production)	Y

Gold extraction with mercury amalgamation - without use of retort	Y
Gold extraction with mercury amalgamation - with use of retorts	?
Other materials production	
Cement production	Y
Pulp and paper production	Y
Production of chemicals	
Chlor-alkali production with mercury-cells	N
VCM production with mercury catalyst	N
Acetaldehyde production with mercury catalyst	N
Production of products with mercury content	
Hg thermometers (medical, air, lab, industrial etc.)	N
Electrical switches and relays with mercury	N
Light sources with mercury (fluorescent, compact, others: see guideline)	N
Batteries with mercury	Y
Manometers and gauges with mercury	N
Biocides and pesticides with mercury	Y
Paints with mercury	Y
Skin lightening creams and soaps with mercury chemicals	Y
Use and disposal of products with mercury content	
Dental amalgam fillings ("silver" fillings)	Y
Thermometers	Y
Electrical switches and relays with mercury	Y
Light sources with mercury	Y
Batteries with mercury	Y
Polyurethane (PU, PUR) produced with mercury catalyst	Y
Paints with mercury preservatives	Y
Skin lightening creams and soaps with mercury chemicals	Y
Medical blood pressure gauges (mercury sphygmomanometers)	Y
Other manometers and gauges with mercury	Y
Laboratory chemicals	Y
Other laboratory and medical equipment with mercury	Y
Production of recycled of metals	
Production of recycled mercury ("secondary production")	Y
Production of recycled ferrous metals (iron and steel)	Y
Waste incineration	
Incineration of municipal/general waste	Y
Incineration of hazardous waste	Y
Incineration of medical waste	Y
Sewage sludge incineration	Y
Open fire waste burning (on landfills and informally)	Y
Waste deposition/landfilling and waste water treatment	

Controlled landfills/deposits	Y
Informal dumping of general waste *1	Y
Waste water system/treatment	Y
Crematoria and cemeteries	
Crematoria	?
Cemeteries	Y

Table 2-1 Identification of mercury release sources in the country; sources present (Y), absent (N), and possible but not positively identified (?).

Miscellaneous mercury release sources not quantified on Inventory level 1

Source category	Source present?
	Y/N/?
Combustion of oil shale	
Combustion of peat	
Geothermal power production	
Production of other recycled metals	
Production of lime	
Production of light weight aggregates (burnt clay nuts for building purposes)	
Chloride and sodium hydroxide produced from mercury-cell technology	
Polyurethane production with mercury catalysts	
Seed dressing with mercury chemicals	
Infra red detection semiconductors	
Bougie tubes and Cantor tubes (medical)	
Educational uses	Y
Gyroscopes with mercury	
Vacuum pumps with mercury	
Mercury used in religious rituals (amulets and other uses)	
Mercury used in traditional medicines (ayurvedic and others) and homeopathic medicine	
Use of mercury as a refrigerant in certain cooling systems	
Light houses (levelling bearings in marine navigation lights)	
Mercury in large bearings of rotating mechanic parts in for example older	