

5. Emissions and releases of mercury

5.1 Mercury emissions to air

Table 5.1.1 shows the estimation results of atmospheric mercury emissions obtained from Japan's "Mercury Emission Inventory (FY2014)". Total amount of anthropogenic atmospheric mercury emission is 17 t-Hg.

Table 5.1.1 Atmospheric Mercury Emission Inventory (FY2014)

Source category	Emission source		Emission (t-Hg/year) ¹	
			FY2014	Subtotal
Sources listed in Annex D of Minamata Convention	Coal-fired power plants		1.3	14
	Coal-fired industrial boilers		0.24	
	Non-ferrous metals production		1.4	
	Waste incineration	Municipal solid waste	1.5	
		Industrial waste	2.5	
		Sewage sludge ²	1.4	
Cement clinker production		5.5		
Other sources	Iron and steel production	Primary iron production	2.0	2.7
		Secondary iron production	0.54	
	Oil refining		0.1	
	Oil and gas production		0.00005	
	Combustion of oil and others	Oil-fired power plants	0.01	
		LNG-fired power plants	0.002	
		Oil-fired industrial boilers	0.002	
		Gas-fired industrial boilers	0.0006	
	Production process using mercury or mercury compounds ³	Chlor-alkali	N.O.	
		Vinyl chloride monomer	N.O.	
		Polyurethane	N.O.	
		Sodium methylate	N.O.	
		Acetaldehyde	N.O.	
	Hg-containing products manufacturing	Vinyl acetate	N.O.	
		Battery ⁴	0	
		Mercury switch	N.E.	
		Mercury relay	N.E.	
		Lamp ⁵	0.005	
		Soaps and cosmetics	N.O.	
		Pesticides and biocides (agricultural chemicals)	N.O.	
		Sphygmomanometer	N.E.	
		Hg thermometer	N.O.	
		Dental amalgam	N.O.	
Thimerosal production facility	N.E.			
Vermillion production facility	N.E.			
Others ⁶	Limestone production		< 0.22	0.48
	Pulp and paper manufacturing (black liquor)		< 0.041	
	Carbon black manufacturing		0.09	
	Fluorescent lamp collecting and shredding		0.000003	
	Cremation		0.07	

Source category	Emission source	Emission (t-Hg/year) ¹	
		FY2014	Subtotal
	Transportation derived from fuel ⁷	0.06	
	Intermediate treatment of waste ⁸	N.E.	
	Mercury recovery (excluding roasting furnace)	N.E.	
Natural sources	Volcano	> 1.4	> 1.4
Total (excluding natural sources)			18 (17)

Source: Implementation of measures for mercury emission based on the Minamata Convention on Mercury (First Proposal), Reference document "Mercury emission inventory (FY2014)"
<http://www.env.go.jp/press/102627.html>

Note: Basically, data in FY2014 is used for the activity rate and other relevant information. If no data was available for FY2014, data for CY2014 is used. If no data was available for 2014, the latest data before 2014 is used.

1. "N.E." stands for "Not Estimated" (Existence of the emission source is unknown, or emission sources exist but no estimation has been done). "N.O." stands for "Not Occurring" (emission sources do not exist).
2. Although some facilities do not fall within waste incineration facilities under domestic laws of Japan, they are categorized as waste incineration facilities in the inventory.
3. There are no domestic industries that use mercury or mercury compounds in their processes.
4. Although mercury is used in the domestic production of button batteries, there is no mercury emission from the manufacturing processes since the processes use equipment to prevent mercury emission.
5. "Lamp" includes fluorescent lamps for general use, cold cathode fluorescent lamps and HID lamps.
6. "Others" include sources that are not discussed in the past INC meetings, but has a probability of mercury emission.
7. "Transportation derived from fuel" includes gasoline and light oil (business use).
8. Waste incineration process is excluded.

5.2 Mercury releases to water

Table 5.2.1 shows mercury releases to water obtained from interviews with business organizations in charge of processing/industrial use of raw minerals and manufacturers of mercury-added products, and data obtained from Japanese PRTR.

Table 5.2.1 Mercury releases to water (FY2014)

Release source	Mercury release (t-Hg)
Processing/industrial use of raw minerals	0.087
Production process of mercury-added products	0
PRTR (Registered amount + Estimation of exempted amount) ^{Note}	0.16
Total	0.24

Note: In order to avoid double-counting of the release from processing/industrial usage of raw fuel (non-ferrous metal smelting process), the value of "non-ferrous metal production" is excluded from the PRTR data.

(1) Mercury releases to water from processing/industrial use of raw minerals

Table 5.2.2 shows mercury releases to water from processing/industrial use of raw minerals in reference to section 1.3. The total amount of release to water accounts for 0.087 t-Hg.

Table 5.2.2 Mercury releases to water from processing/industrial use of raw minerals
(FY2014)

Release source	Mercury content in waste water (t-Hg)	Source (remarks)
Non-ferrous metal smelting	0.087	Interview with Japan Mining Industry Association
Coal-fired power plants	0	Interview with Federation of Electric Power Companies (Waste water from stack gas desulfurization facility: Mercury elution N.D.)
Coal-fired industrial boilers	0	-
Primary iron-manufacturing	N/A	Interview with Japan Iron and Steel Federation (Process managed based on the effluent standard in the Water Pollution Control Law)
Secondary iron-manufacturing	0	Interview with Japan Iron and Steel Federation (Waste water does not occur due to dry-type flue gas treatment)
Oil and natural gas processing	0	Interview with domestic companies
Cement clinker production	0	Interview with Cement Association of Japan
Municipal solid waste incineration	0	-
Industrial waste incineration	0	-
Sewage sludge incineration	0	-
Total	0.087	

(2) Mercury releases to water from manufacturing processes of mercury-added products

Table 5.2.3 shows mercury releases to water from manufacturing processes of mercury-added products. According to interviews with business organizations and others in 2016, the amount of release was 0 or unknown for all the manufacturing processes.

Table 5.2.3 Mercury releases to water from manufacturing processes of mercury-added products (FY2014)

Product	Mercury release (kg-Hg)	Interviewee
Button batteries	0	Battery Association of Japan
Switches and relays	0	Manufacturer
Lamps	N/A	Japan Lighting Manufacturers Association
Industrial measuring devices	0	Japanese Cooperative Kumiai for Glass Measuring Instruments Industry, Japan Pressure Gauge and Thermometer Manufacturers' Association, Japan Association of Meteorological Instrument Engineering,

Product	Mercury release (kg-Hg)	Interviewee
		Japan Scientific Instrument Association
Medical measuring devices	0	The Japan Federation of Medical Devices Association
Medicine	0	Japanese Association of Vaccine Industries, Manufacturers
Inorganic chemicals	0	Manufacturer
Total	0	

Source: Interview with organizations/companies shown in the column of "Interviewee" in 2016.

(3) Mercury releases to public waters (PRTR data)

Table 5.2.4 shows the reported data on mercury releases to public waters and the estimated releases outside notification in reference to the PRTR data in FY2014. In the material flow, in order to avoid double-counting with "(1) Mercury releases to water from processing/industrial use of raw minerals", a sum of PRTR notification amount excluding "non-ferrous metal production" with estimated amount (for estimation for portion under the cutoff amount for notification), which amounts to 0.16 t-Hg, is used.

Table 5.2.4 Mercury releases to public waters (FY2014, PRTR data)

Industry code	Industry type	Reported data of releases to water (kg)	Estimated releases outside notification (kg)
1200	Manufacture of food	-	0.1
1300	Manufacture of beverages, tobacco and feed	-	0.02
1400	Manufacture of textile mill products	-	0.4
1800	Manufacture of pulp, paper and paper products	11	0
1900	Publishing, printing and allied industries	-	0.04
2000	Manufacture of chemical and allied products	-	3.8
2100	Manufacture of petroleum and coal products	-	0.1
2200	Manufacture of plastic products	-	0.03
2300	Manufacture of rubber products	-	0.004
2500	Manufacture of ceramic, stone and clay products	-	3.2
2700	Manufacture of non-ferrous metals and products ^{Note}	23	0.1
2800	Manufacture of fabricated metal products	-	0.02
2900	Manufacture of general-purpose machinery	-	0.1
3000	Manufacture of electrical machinery, equipment and supplies	-	0.4
3100	Manufacture of transportation equipment	-	0.4
3200	Manufacture of precision instruments and machinery	-	0.2
3400	Miscellaneous manufacturing industries	-	0.03

Industry code	Industry type	Reported data of releases to water (kg)	Estimated releases outside notification (kg)
3830	Sewage industry	128	0
5132	Wholesale trade (petroleum)	-	0.002
7210	Laundry industry	-	0.001
7810	Machine repair industry	-	0.008
8620	Product inspection industry	-	0.1
8630	Measurement certification industry	-	0.2
8716	Municipal solid waste treatment service	2	-
8722	Industrial waste disposal business (including special controlled industrial waste disposal business)	4	0.001
8800	Medical and other health services	-	1.2
9140	Higher education institution	-	0.04
9210	Natural science research institution	-	0.2
	Subtotal	145	11
	Total		156

Source: PRTR data in FY2014 (published on 4 March 2016), <http://www.env.go.jp/chemi/prtr/result/gaiyo.html>

Note: In order to avoid double counting of the released amount from processing/industrial usage of raw material (non-ferrous metal smelting process), the value of "non-ferrous metal production" is excluded when aggregating the material flow.

5.3 Mercury releases to land

For residue generated from the processing/industrial use of raw minerals, "mercury releases to land" refers to the release amount of mercury to soil from the portion that either comes in direct contact with soil or gets mixed, or is utilized by directly spreading over the soil.

Table 5.3.1 shows the amount of residue utilization that falls within the definition mentioned above and mercury content therein. The total amount of mercury release to land is estimated as 0.34 t-Hg.

Table 5.3.1 Mercury releases to land (FY2014)

Release source	Medium	Utilization purpose	Utilization (10 ³ t)	Mercury content (t-Hg)
Coal-fired power plants	Fly ash	Soil-contact type	1,207	0.18
Coal-fired industrial boilers	Coal ash	Soil-contactless type	293	0.037
Others	Sewage sludge	Compost use at green farms	324	0.13
		Total		0.34