

Regulations Amended to Control Mercury Emissions toward the Effective Implementation of the Minamata Convention on Mercury

Mercury emitters and owners of facilities subject to mercury emission control are required to take additional measures to control mercury emissions.

Background

Adoption of the Minamata Convention on Mercury

To avoid repeating a tragic history of Minamata Disease...

With consideration of increasing anthropogenic mercury emissions caused by the combustion of fossil fuel, etc. results in the continuous accumulation of mercury in the atmosphere, water, and biological organisms, there is an urgent need of effective mercury management across nations, which led to the adoption of the **Minamata Convention on Mercury** (hereinafter referred to as “the Convention”) that aims “to protect the human health and the environment from anthropogenic emissions and releases of mercury and its compounds” in October 2013. Japan accepted the Convention in February 2016, becoming the 23rd Party. The Convention will enter into force 90 days after 50 countries have deposited their instruments of ratification, acceptance or accession with the UN Secretary-General. As of the end of February 2017, 38 Parties have joined the Convention. The Convention is designed to reduce anthropogenic mercury emissions and prevent **global mercury pollution** by **taking comprehensive measures internationally** in each lifecycle of mercury management **in collaboration with developed and developing countries**.

Measures to be taken by Parties of the Minamata Convention on Mercury

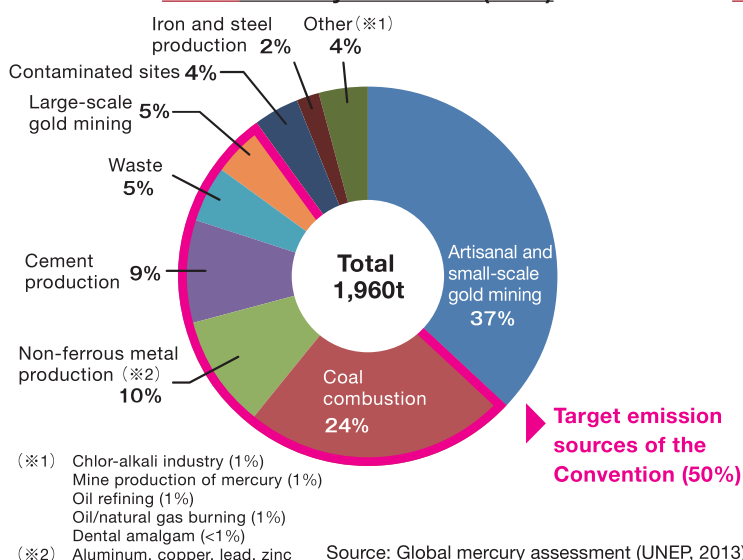
Parties have the following obligations to control mercury emissions:

- Apply BAT (Best Available Techniques) and BEP (Best Environmental Practices) to the newly constructed facilities that fall into the five source categories¹ .
 - ¹ 1. Coal-fired power plants;
 - 2. Coal-fired industrial boilers;
 - 3. Smelting and roasting processes used in the production of non-ferrous metals²;
 - 4. Waste incineration facilities;
 - 5. Cement clinker production facilities
- ² Lead, zinc, copper and industrial gold (excluding artisanal and small-scale gold mining)
- Introduce appropriate measures to existing facilities in the context of national circumstances
- Establish and maintain a national inventory regarding estimated mercury emissions from relevant sources

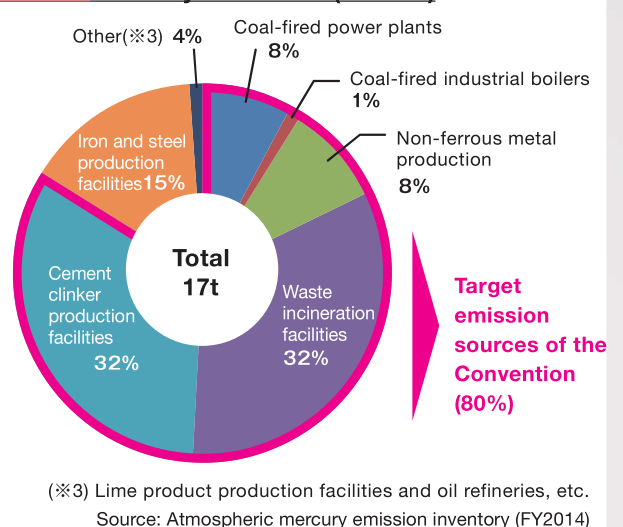
Atmospheric mercury emissions

The global atmospheric mercury emissions were estimated as 1,960t in 2010, of which 50% was from emission sources subject to the Convention. The national atmospheric mercury emissions in Japan excluding those from natural sources were 17t in FY2014, of which 80% was from emission sources subject to the Convention. Although iron and steel production facilities are not subject to the Convention, they were the third largest mercury emission source in Japan.

Global Mercury Emissions (2010)



National Mercury Emissions (FY2014)



Outline of the Amended Air Pollution Control Act

To ensure effective and efficient implementation of the Convention, the Air Pollution Control Act (hereinafter referred to as “the Act”) and relevant regulations were amended, such as the establishment of an advance notification system upon establishing mercury emitting facilities and the obligation to comply with the emission standards for those who emit mercury and its compounds from mercury emitting facilities into the atmosphere (mercury emitters).

Control of atmospheric mercury emissions is added to the purpose of the Act

The original purpose of the Act was “to protect the human health and the living environment from air pollution”. However, in order to reduce the total global amount of mercury circulating in the environment in line with the Convention, “to control mercury emissions associated with business operations in factories and workplaces, for the purpose of ensuring effective and efficient implementation of the Convention” has been added to the Act. Therefore, nature of the mercury emission standards and the evaluation of mercury measurement values are different from regulations on conventional air pollutants under the Act.

Obligations and roles of stakeholders

○ Mercury emitters (those who emit mercury and its compounds from mercury emitting facilities to the atmosphere)

- A mercury emitter intending to establish or change structures, etc. of the mercury emitting facility¹ must **submit a notification to a prefectural governor or a mayor of designated cities for the implementation of the Act in advance**².
¹ Coal-fired power plants; Coal-fired industrial boilers; Non-ferrous metal production facilities; Waste incineration facilities; Cement clinker production facilities
² Those who have already established the facilities before the date of enforcement of the Act are required to submit the notification within 30 days after the date of enforcement of the Act.
- A mercury emitter must not establish or change structures and specified items of the mercury emitting facility until 60 days after the prefectural governor or the mayor receives the notification (implementation restriction).
- A mercury emitter **must comply with the emission standards** pertaining to said mercury emitting facility.
- A mercury emitter must **measure the concentration of mercury, keep a record and save the results**, as prescribed by the **Ordinance of the Ministry of Environment**.

○ Owners of facilities subject to mercury emission control

- A person who owns a facility with a significant amount of mercury emissions which is prescribed by the Cabinet Order as **a facility subject to mercury emission control (sintering furnaces provided for iron making (including pellet sintering furnaces) and electric furnaces provided for steel making)** must **establish voluntary emission standards, measure the concentration of mercury, keep a record and save the results**, and disclose information of implementation status and evaluation results to the public.

○ Local governments

- The prefectural governor and the mayor may order a person to change or abolish his/her plans on establishing mercury emitting facilities within up to 60 days since the date of receipt of the notification. Moreover, they may recommend those who emit mercury to the level beyond the emission standards to improve their emission control strategies, and in cases where mercury emitters do not comply, they can issue Order of Improvement.
- Local governments must make an effort to **provide business operators with information that would promote the implementation of necessary measures to control mercury emissions**. Local governments must also make an effort to **disseminate relevant knowledge** on mercury emission control to local residents.

○ The National government

The national government must make an effort to implement measures to control mercury emissions through identifying the national situation of mercury emissions, **making the results open to the public, collecting and organizing information on relevant mercury emission control techniques and technologies**, and **disseminating such information**.

Penal provisions

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| ○ Violation of Order to Change or Abolish Plans (Article 18-26)
Violation of Recommendation and Order for Improvement (Article 18-29) | ▶ Up to one year of imprisonment, or a fine up to 1,000,000 yen |
| ○ Violation of Notification of Establishment of Mercury Emitting Facility (or providing a false notification) (Paragraph (1) of Article 18-23, Paragraph (1) of Article 18-25) | ▶ Up to three months of imprisonment, or a fine up to 300,000 yen |
| ○ Violation of Keeping Records and Saving the Results of Measured Concentration of Mercury (or keeping false records) (Article 18-30) | ▶ A fine up to 300,000 yen |

Date of enforcement

April 1, 2018 (If the Convention enters into force after this date, the day the Convention enters into force)

Regulated Facilities and Their Emission Standards (New and Existing)

The following facilities are considered as mercury emitting facilities under the Act:

Facility targeted as emission sources under the Convention	Type of the mercury emitting facility (under the Act)		Scale of the facility (must correspond to at least one of the followings)	Emission standard ^{*1} ($\mu\text{g}/\text{Nm}^3$)	
				New	Existing ^{*2}
Coal-fired power plants; coal-fired industrial boilers	Coal-fired boiler Large-scale coal-mix fired boiler		<ul style="list-style-type: none"> ● Heat transfer area: $\geq 10 \text{ m}^2$ ● Combustion capacity^{*3}: $\geq 50\text{L}/\text{h}$ 	8	10
	Small-scale coal-mix fired boiler ^{*4}			10	15
Smelting and roasting processes of non-ferrous metal production (copper, lead, zinc, and industrial gold)	Primary smelting and roasting facility	Copper or industrial gold	Roasting furnace, sintering furnace (including pellet sintering furnace), and calcining furnace for metal refinery/ blast furnace (including reverberator furnace for smelting), converter, and open-health furnace used for metal refinery: <ul style="list-style-type: none"> ● Processing capacity of raw materials: $> 1\text{t}/\text{h}$ 	15	30
		Lead or zinc	Melting furnace (excluding cupola) for metal refinery: <ul style="list-style-type: none"> ● Area of the fire grate: $\geq 1\text{m}^2$ ● Cross-section area of the tuyere: $\geq 0.5\text{m}^2$ ● Combustion capacity^{*3}: $\geq 50\text{L}/\text{h}$ ● Rated capacity of transformer: $\geq 200\text{kVA}$ 	30	50
	Secondary smelting and roasting facility	Copper, lead, or zinc	Roasting furnace, sintering furnace (including pellet sintering furnace), blast furnace (including reverberator furnace for smelting), converter, melting furnace, and drying furnace used of copper, lead, and zinc refinery: <ul style="list-style-type: none"> ● Processing capacity of raw materials: $\geq 0.5\text{t}/\text{h}$ ● Area of the fire grate: $\geq 0.5 \text{ m}^2$ ● Cross-section area of the tuyere: $\geq 0.2 \text{ m}^2$ ● Combustion capacity^{*3}: $\geq 20\text{L}/\text{h}$ 	100	400
		Industrial gold	Melting furnace for secondary refining of lead: <ul style="list-style-type: none"> ● Combustion capacity^{*3}: $\geq 10\text{L}/\text{h}$ ● Rated capacity of transformer: $\geq 40\text{kVA}$ Roasting furnace, sintering furnace, blast furnace, melting furnace, and drying furnace for collection of zinc <ul style="list-style-type: none"> ● Processing capacity of raw materials: $\geq 0.5\text{t}/\text{h}$ 	30	50
Waste incineration facilities	Waste incinerator (general, industrial, and sewage sludge)		<ul style="list-style-type: none"> ● Area of the fire grate: $\geq 2\text{m}^2$ ● Combustion capacity: $\geq 200 \text{ kg}/\text{h}$ 	30	50
	Facilities to treat mercury contaminated industrial waste, etc.		Facilities that treat either industrial waste with the obligation to recover mercury ^{*5} or recyclable materials containing mercury ^{*6} (limited to facilities with the heating processes) (No limit of facility scale)	50	100
Cement clinker production facilities	Combustion furnace for cement production		<ul style="list-style-type: none"> ● Area of the fire grate: $\geq 1\text{m}^2$ ● Combustion capacity^{*3}: $\geq 50\text{L}/\text{h}$ ● Rated capacity of transformer: $\geq 200 \text{ kVA}$ 	50	80 ^{*7}

*1 Emission standards for new facilities will be applied when existing facilities undergo large structural changes (changes in facility scale: $\geq 50\%$) which come along with a large increase in mercury emissions.

*2 Facilities established on the date of enforcement (including facilities undergoing construction)

*3 Combustion capacity of the burner, converted to heavy oil

*4 Combustion capacity of the burner (converted to heavy oil): $< 100,000 \text{ L}/\text{h}$

*5 The definition of industrial waste with the obligation to recover mercury is stated under the Order for Enforcement of the Waste Disposal and Public Cleansing Act.

*6 The definition of recyclable resources containing mercury is stated under the Act on Preventing Environmental Pollution of Mercury

*7 $140\mu\text{g}/\text{Nm}^3$ for facilities using limestones as raw materials containing $\geq 0.05 \text{ mg}/\text{kg}$ of mercury.

Notifications of Establishment or Structural Changes of Mercury Emitting Facilities

A notification should be submitted to the prefectural governor or the mayor of designated cities for the implementation of the Act in advance in the following cases:

Rationale	Case in which notification is required	Submission deadline	Type of notification*
Article 18-23	In cases where a person plans to establish a mercury emitting facility	60 days before the first day of construction	Notification of Establishment (Use or Change) of Mercury Emitting Facility [Form No. 3-5]
Article 18-24	In cases where a mercury emitting facility is already established on the date of enforcement of the Act	30 days from the date of enforcement	
Article 18-25	In cases where there are changes in the following: •Structure of the mercury emitting facility •Way in which the mercury emitting facility is used •Way in which mercury and its compounds are removed	60 days before the first day of construction	
Paragraph (2) of Article 18-31	In cases where there are changes in the following: •Name and address of a (juridical) person, name of the representative in the case of a juridical person •Name or location of the factory or workplace	30 days from the incident	Notification of Changes in Names and Other Matters [Form No. 4]
	In cases where the use of the mercury emitting facility is terminated		Notification of Termination of Use [Form No. 5]
	In cases where a person takes over/borrows the mercury emitting facility		Notification of Succession [Form No.6]

*Notification forms are provided in Ordinance for Enforcement of the Act.

Methods for Measuring the Amount of Mercury in Flue Gas

Target of the measurement and its methods

- **Total mercury** (gaseous mercury and particulate mercury) with an application of **Batch Measurement**.
※The continuous measurement devices are currently incapable of measuring particulate mercury.

Sampling and analysis methods

- **Gaseous mercury** (wet-type absorption process – cold-vapor-atomic absorption spectrometry)
On the grounds of JIS K 0222 (Methods for determination of mercury in flue gas), the amount of gas suctioned shall be about 100L, and gas which contains the high concentration of SO₂ or a large amount of organic matters shall be cleaned with mixed solution of nitric acid (5%) and hydrogen peroxide water (10%) and others.
- **Particulate mercury** (wet-type acid hydrolysis method - cold-vapor-atomic absorption spectrometry, or head-vapor-atomic absorption spectrometry).
In accordance with JIS Z 8808 (Methods of measuring dust concentration in flue gas), more than 1,000L shall be extracted.

Frequency of the measurement

- Facilities whose flow rate of flue gas **are at least 0.4 million Nm³/h**: at least once every ≤ **4 months** of operation period
- Facilities whose flow rate of flue gas **fall below 0.4 million Nm³/h**: at least once every ≤ **6 months** of operation period
- Drying furnaces which solely input sulfide ores of copper, lead, and zinc as raw materials and melting furnaces which solely input waste lead-acid battery or waste solder as raw materials: at least once a year

Confirmation of the results

- It should be confirmed that the measurement results represent **the average mercury emission level under business-as-usual circumstances**.
In case where results are above the emission standards.
Additional measurements should be conducted for **three or more times immediately** (including the process to collect samples) under a consistent operational condition. **The average measurement value (results) calculated from the results excluding the minimum and maximum values among the results of a total of four or more measurements** including the first result shall be used for evaluation.
※If the first result exceeds 1.5 times of the emission standards, an additional measurement must be conducted within 30 days after the first measurement, and in other cases measurements should be conducted within 60 days.
※All results should be recorded and saved (including maximum and minimum values when conducted additional measurements)
※If the average measurement value still exceeds the emission standard even after additional measurements, a person in charge shall contact the relevant local government, pursue the cause, and take necessary measures to prevent such event.