

National Implementation Plan for Preventing Environmental Pollution of Mercury and Mercury Compounds

- To Realize the Mercury-Minimum Environment -

October 2017

Inter-Ministerial Coordination Council on
the Minamata Convention on Mercury

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Preface

Minamata disease, a toxic nervous disorder occurred in and around the Minamata Bay in Kumamoto Prefecture, which was caused by ingesting fish and shellfish contaminated with methylmercury compounds discharged from a chemical plant, was officially acknowledged in 1956, and the same disease was also officially acknowledged in the Agano River Basin in Niigata Prefecture in 1965. Minamata disease is an unprecedented environmental pollution throughout the history of Japan in terms of its extent and seriousness of the health damage and the environmental destruction caused by an anthropogenic contaminant. It also left a long-term and significantly negative legacy to the entire society of the region. Suggestions should be seriously taken that the behaviors of the responsible companies, the national government and others to prioritize economic growth without proper attention to the human health and the environment, in the backdrop of Japan's post-war rehabilitation to the decade of booming economy, had resulted in the failure to prevent the exacerbation of the damage by Minamata disease. Afterwards, so-called Pollution Diet Session in 1970 enacted or amended 14 laws on pollution prevention, and other environmental conservation measures by various stakeholders including the national government, local governments, industrial sectors, civil groups and the citizens have been gradually strengthened. Japan must transmit the lessons of the Minamata disease to future generations, and make every possible effort not to repeat such tragic pollution-induced health damage in the rest of the world.

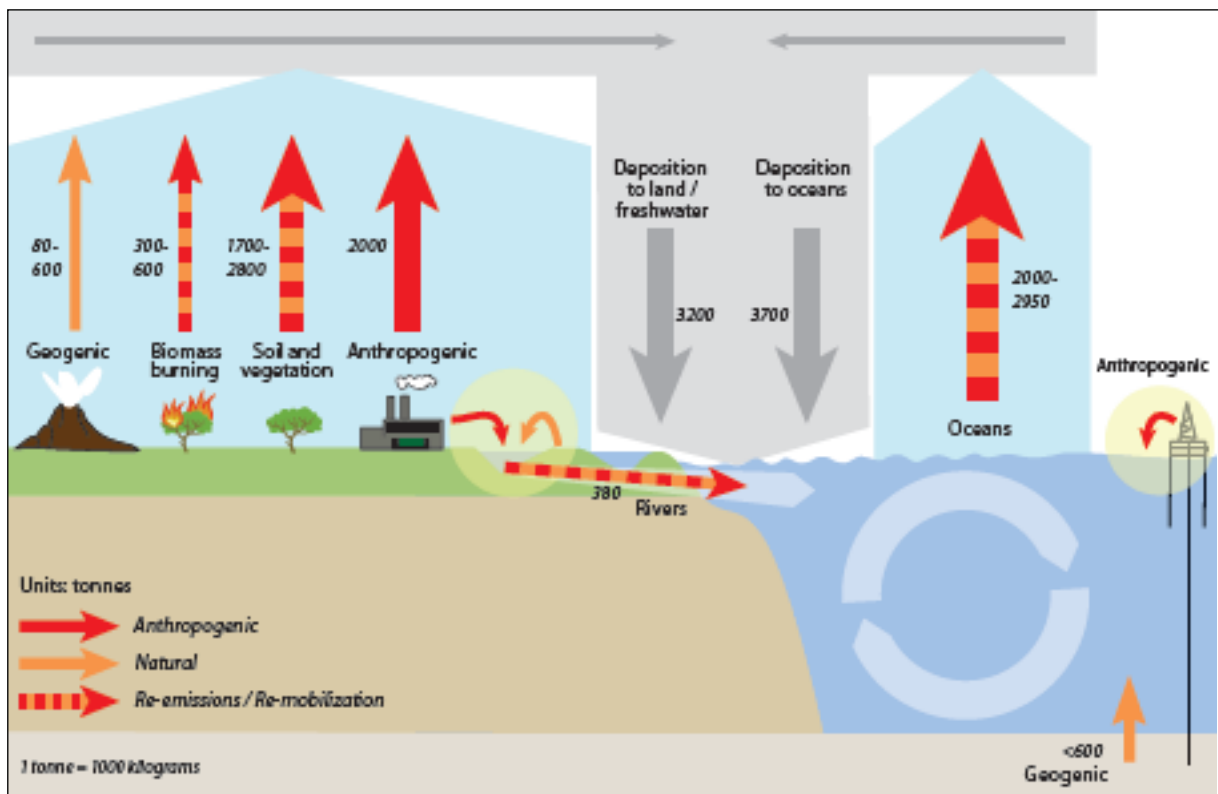
The international concerns of the global mercury pollution and the health damage have not been assured, rather it is increasing. The United Nations Environment Programme (UNEP) released the "Global Mercury Assessment" in 2002 and pointed out the following findings (Figure 1):

- The environmental concentration of mercury has been increasing rapidly in global scale since the Industrial Revolution;
- Mercury is emitted into the environment from various anthropogenic sources, and it will not decompose but circulate and accumulate globally;
- Mercury is highly toxic, and methylmercury, in particular, damages the neurological system of humans during their developmental stage, i.e. fetus,

neonatal and infant stages; and

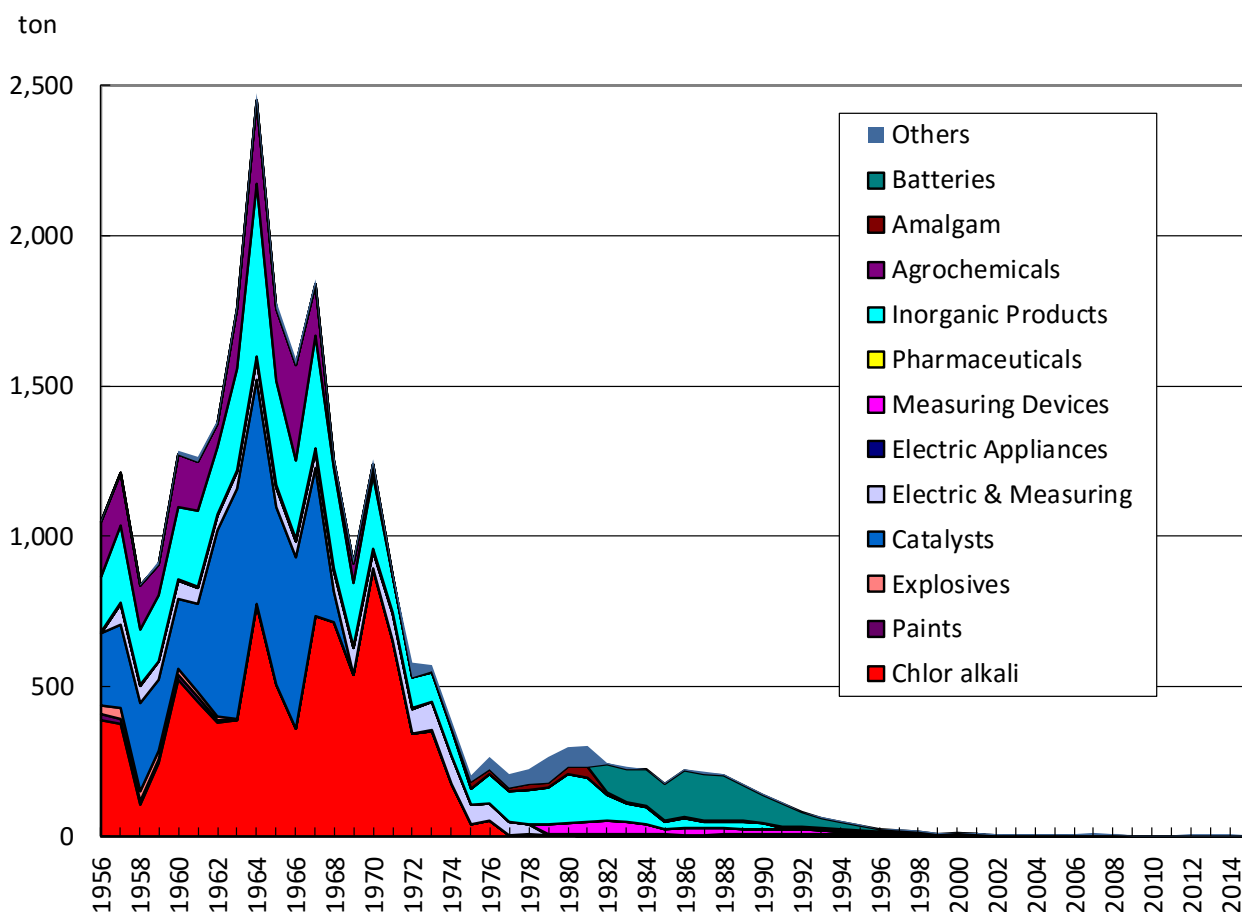
- Global actions are required to reduce the anthropogenic emissions of mercury.

Under such circumstances, the UNEP took the lead to consider the strengthening of measures to prevent global-scale environmental pollution and health damage caused by mercury. Following the UNEP Governing Council decision adopted in 2009, the negotiation process towards the development of an international convention was initiated. In October 2013, Japan hosted the Diplomatic Conference (Conference of Plenipotentiaries) in Kumamoto City and Minamata City in Kumamoto Prefecture where the Minamata Convention on Mercury (hereinafter referred to as "the Convention") was unanimously adopted. 92 countries and regions, including Japan, signed the Convention there. The Convention, recognizing the substantial lessons of Minamata disease, and with the objective of protecting human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds, comprehensively regulates the entire lifecycle of mercury from mining to trade, use, emissions, releases, disposal and so on.



<Figure 1> Global mercury cycling

(Source: Global Mercury Assessment 2013)



<Figure 2> Change in mercury use in Japan

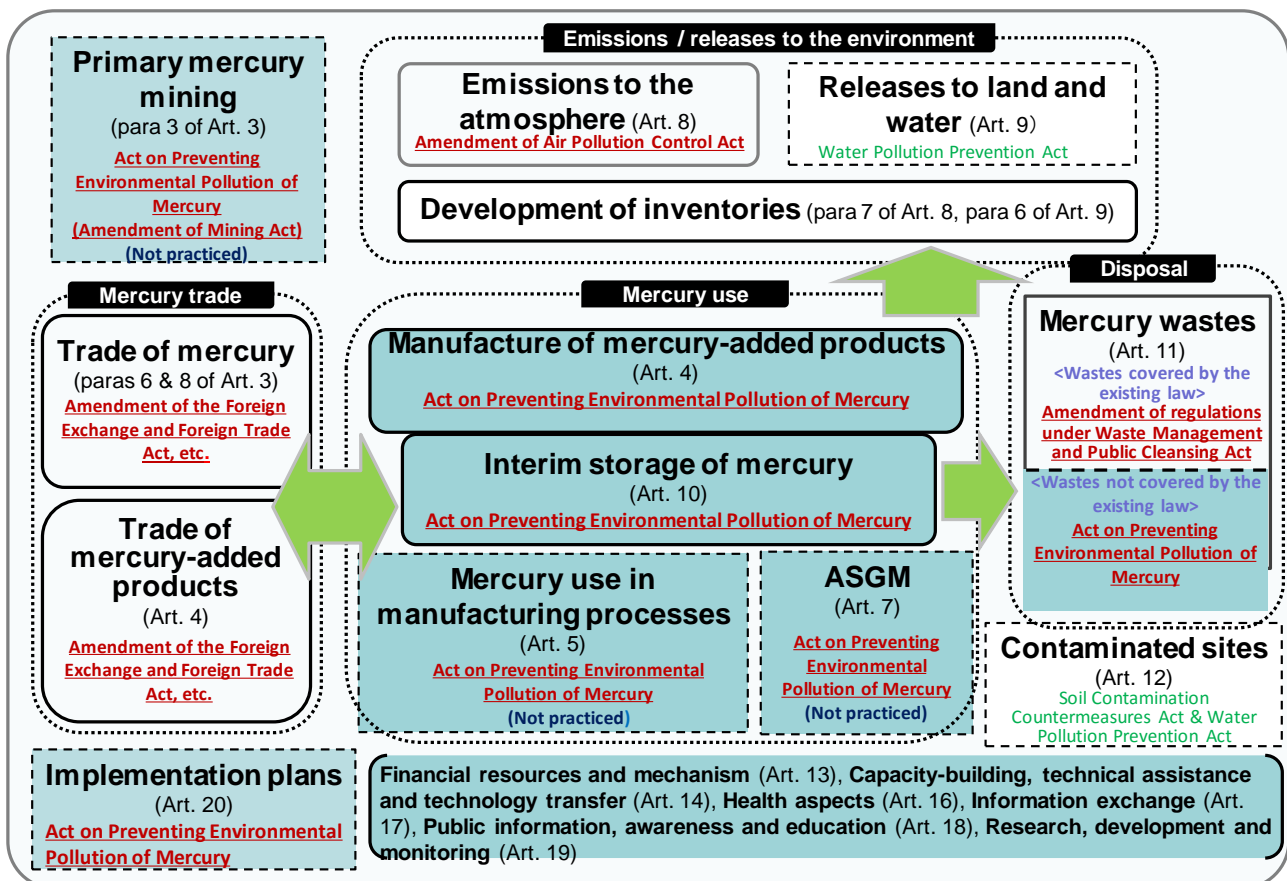
*Fluorescent lamps were categorized as Electric & Measuring from 1956 to 1978 and Electric Appliances after 1979.

(Source: Prepared by Ministry of the Environment based on the Yearbook of Minerals and Non-ferrous Metals Statistics, Iron and Steel, Non-ferrous Metal and Fabricated Metals Statistics, and Non-Ferrous Metal Supply and Demand Statistics)

In Japan, mercury emissions into the environment as well as the use of mercury or mercury compounds for products and manufacturing processes has been reduced as the result of the environmental protection measures given the lessons of Minamata disease. The mercury use in Japan has declined from its peak of 2,500 tons per year in 1964 to some tons per year in recent years (Figure 2).

Meanwhile, Japan, as a country that experienced Minamata disease, should take a leading role in world's efforts for further promoting mercury management measures to realize the global *Mercury-Minimum* environment. Thus, the Act on Preventing Environmental Pollution of Mercury (Act number 42 of 2015, hereinafter referred to as "the Act") and other bills passed in the 189th National Diet Session (the ordinary session

of 2015) and promulgated in June 2015. Those legislations cover the measures to ensure the reliable and smooth implementation of the Convention as well as the additional measures beyond the ones stipulated by the Convention. More specifically, aiming at preventing environmental pollution of mercury through international cooperation and ensuring the reliable and smooth implementation of the Convention, the Act addresses such additional measures as extending the coverage of manufacturing restriction and establishment of responsibilities for sorting, disposal and collection of mercury-using products as the unique measures of Japan. In addition to the Act, the following legislations were amended in 2015 for the implementation of the Convention: the Foreign Exchange and Foreign Trade Act (Act number 228 of 1949), the Air Pollution Control Act (Act number 97 of 1968), and the Waste Management and Public Cleansing Act (Act number 137 of 1970) (Figure 3). With these legislative actions, Japan accepted the Convention on 2 February 2016.



< Figure 3 > The relation between national legislations relevant to the National Implementation Plan for Preventing Environmental Pollution of Mercury and Mercury Compounds and the Minamata Convention

The National Implementation Plan for Preventing Environmental Pollution of Mercury and Mercury Compounds (hereinafter “the Plan”) is designed to promote

measures for preventing environmental pollution of mercury and mercury compounds in a comprehensive and systematic manner under paragraph (1), Article 3 of the Act and to provide the items listed in each item of paragraph (2), Article 3 of the Act to ensure reliable and smooth implementation of the Convention. It corresponds to the implementation plan to be prepared under stipulations in Article 20 of the Convention. The Inter-Ministerial Coordination Council on the Minamata Convention on Mercury (decision by relevant ministries and agencies in January 2016, hereinafter "Inter-Ministerial Coordination Council") is to review the status of implementation of the Plan prior to the submission of the national reporting to the Conference of the Parties in accordance with the timing and frequency decided by the Conference of the Parties at its first meeting. The results of the review of the Plan will be reported to the joint committee of the Subcommittee for the Implementation of the Minamata Convention on Mercury within the Task Force on the Environmental Health of the Central Environment Council and the Working Group on Institution Building within the Subcommittee on Chemical Policies under the Manufacturing Industry Committee of the Industrial Structure Council. The Inter-Ministerial Coordination Council revisits the Plan whenever deemed necessary, when the Convention, relevant domestic law or regulation is amended, taking into consideration the results of its review and the guidelines and others adopted by the Conference of the Parties.

Part I Fundamentals for preventing environmental pollution of mercury and mercury compounds: measures by national legislation to realize *Mercury-Minimum* environment

As a country that experienced Minamata disease, Japan implements the measures stipulated in the Convention as well as the other more stringent measures to lead the world to realize the global *Mercury-Minimum* environment.

Japan's legislative instruments to implement these measures are diverse. Specifically, the provisions of the Convention are implemented under the following domestic legislations:

- Measures for primary mercury mining (related to Article 3 of the Convention (Mercury supply sources and trade)): by the Act and the Mining Act (Act number 289 of 1950);
- Measures for export and import of mercury (related to Article 3 of the Convention): by the Foreign Exchange and Foreign Trade Act;
- Measures for manufacture, export and import of mercury-added products (related to Article 4 of the Convention (Mercury-added products)): by the Act and the Foreign Exchange and Foreign Trade Act;
- Measures for dental amalgam (related to Article 4 of the Convention)): by the Act on Promotion of Dental and Oral Health (Act number 95 of 2011), the Health Insurance Act (Act number 70 of 1922), the National Health Insurance Act (Act number 192 of 1958), the National Public Servants Mutual Aid Association Act (Act number 128 of 1958 including cases where the same provision applies *mutatis mutandis* or governs to other laws), the Local Public Officers, etc. Mutual Aid Association Act (Act number 152 of 1962), and the Act on Assurance of Medical Care for Elderly People (the Act number 80 of 1982);
- Measures for the use of mercury and mercury compounds in manufacturing processes and for the gold extraction (including artisanal and small-scale gold mining) (related to Article 5 of the Convention (Manufacturing processes in which mercury or mercury compounds are used) and Article 7 of the Convention (Artisanal and small-scale gold mining)): by the Act;
- Measures for mercury emissions (related to Article 8 of the Convention (Emissions)): by the Air Pollution Control Act;
- Measures for mercury releases (related to Article 9 of the Convention (Releases)): by the Water Pollution Prevention Act (Act number 138 of 1970);
- Measures for environmentally sound interim storage of mercury and mercury compounds other than waste mercury (related to Article 10 of the Convention

(Environmentally sound interim storage of mercury other than waste mercury)): by the Act;

- Measures for mercury wastes (related to Article 11 of the Convention (Mercury wastes)): by the Waste Management and Public Cleansing Act, the Act on the Control of Import, Export, etc. of Specified Hazardous Wastes and Other Wastes (Act number 108 of 1992), the Act, and the Mining Safety Act (Act number 70 of 1949);
- Measures for contaminated sites (related to Article 12 of the Convention (Contaminated sites)): by the Soil Contamination Countermeasures Act (Act number 53 of 2002), the Water Pollution Prevention Act, and the Mining Safety Act).

The main contents, etc. of these measures are described in following sections:

1. Measures for primary mercury mining

(Baseline at the time when the Act was enacted.)

No primary mercury mining has been conducted since 1974.

(To realize the *Mercury-Minimum* environment)

No primary mercury mining activity including prospecting is ensured.

(Specific measures)

The Act prohibits opening new primary mercury mining. In response, for prohibiting domestic primary mercury mining including prospecting, mercury ore is removed from the applicable minerals for creating mining rights under the Mining Act starting with the day when the Convention enters into force to Japan.

2. Measures for export and import of mercury

(Baseline at the time when the Act was enacted.)

Out of the recovered mercury from imported crude fuels, wastes, etc., approximately 80 tons of surplus mercury, which is not used for domestic manufacturing, etc. is being exported annually from Japan. The amount of mercury exported from Japan accounted for about 8% of global exports in 2015. Meanwhile, Japan is exporting approximately 40 kg of mercury compounds

annually while importing very little mercury, etc.

The exports of mercury or mercury compounds intended for use as pesticides are subject to the export and trading inspection conducted under the Foreign Exchange and Foreign Trade Act based on the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which provides information on the end users together with the names of cargo, quantities, destinations, shipping routes, etc. prior to the exports.

(To realize the *Mercury-Minimum* environment)

The mercury exported from Japan should not cause environmental pollution or health damage in other parts of the world or increase mercury concentration in the global scale. On the other hand, some amount of mercury will still be used globally for the uses allowed under the Convention even after the entry into force of the Convention. Thus, stopping the export of mercury recycled with the advanced mercury recycling technology of Japan might result in the increase of primary mercury mining outside of Japan to compensate the mercury deficit. Considering the aspect above, Japan prohibits, in principle, the export of mercury and specific mercury compounds. Nonetheless, on an exceptional basis, Japan allows the export only for the uses allowed under the Convention, in order to prevent inappropriate use of the exported mercury and mercury compounds that will cause environmental pollution and health damage at the export destinations. In regards to the imported mercury or mercury compounds, Japan prevents environmental pollution caused by inappropriate storage by respective legislations.

(Specific measures)

To ensure the mercury exported from Japan not causing environmental pollution or health damage by its inappropriate use at the export destinations, Japan established much practicable export control systems under the Foreign Exchange and Foreign Trade Act, by implementing more stringent measures for mercury export than those stipulated in the Convention from the date of entry into force of the Convention. Specifically, in addition to the export control of mercury stipulated in Article 3 of the Order for the Enforcement of the Act on Preventing Environmental Pollution of Mercury (Ordinance number 378 in 2015),

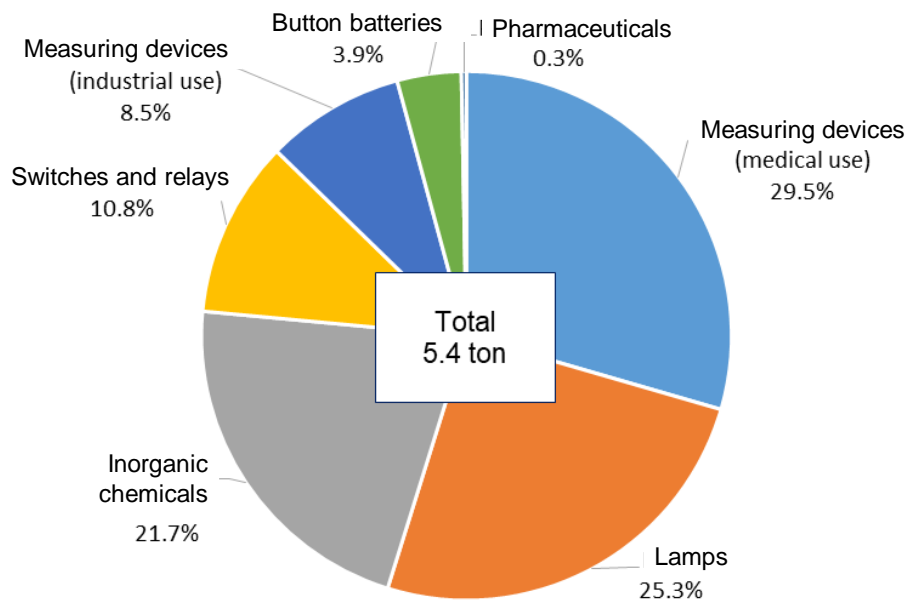
the export of specific mercury compounds stipulated in the said Article is also prohibited in principle. The export is granted only for the use allowed by the Convention. The export for artisanal and small-scale gold mining and interim storage is prohibited as well, as it may pollute surrounding environment and damage human health. To ensure the effective implementation of the export control, the end uses and users, etc. at the export destinations are strictly checked prior to the export under the Foreign Exchange and Foreign Trade Act. Exporters are also required to submit reports after the export, for the time being, to confirm that the information on end uses and users, etc. conforms to the application form submitted at the prior permission.

In regards to the import of mercury, measures to comply with the Convention is implemented under the Foreign Exchange and Foreign Trade Act from the date of entry into force of the Convention, given that the environmentally sound storage, etc. of mercury and mercury compounds is enforced by respective legislations..

3. Measures for the manufacture, distribution in commerce, export, and import of mercury-added products

(Baseline at the time when the Act was enacted)

Approximately five tons of mercury has been used annually for manufacturing the products such as lamps, button batteries, measuring devices, etc. (Figure 4). On the other hand, agricultural chemicals that contain mercury or mercury compounds as the active ingredients are no longer registered under the Agricultural Chemicals Regulation Act (1948, Act number 82); thus, the manufacturing, processing or import of such agricultural chemicals for distribution in commerce or use is not permitted in Japan. The mercury uses for cosmetics and medical devices are regulated both under the Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical devices (1960, Act number 145). Namely, that the inclusion of mercury in cosmetics is prohibited by Standards for Cosmetics, and the manufacturing and import of mercury sphygmomanometers and thermometers are restricted as medical devices.



<Figure 4> Use of mercury in Japan

(Source: Material flow of mercury in Japan (FY2014 basis, prepared in 2017))

Although the Strategic Energy Plan (Cabinet Decision in April 2014) does not directly focus on mercury reduction, it sets targets of penetration rate for highly-efficient lighting equipment such as LED lighting and organic EL lighting to 100% on a flow-basis by 2020 and on a stock-basis by 2030.

In regards to the use of dental amalgam, the Act concerning the Promotion of Dental and Oral Health sets targets and plans for preventing tooth decay subject to dental amalgam treatment. In addition, medical insurance laws such as the Health Insurance Act and others stipulates that no advantage is given to mercury-containing dental amalgam in calculating medical treatment cost when medical facilities claim the subsidies listed under paragraph 3 (i), Article 63 of the Health Insurance Act (hereinafter “insurance medical facilities”).

(To realize the *Mercury-Minimum* environment)

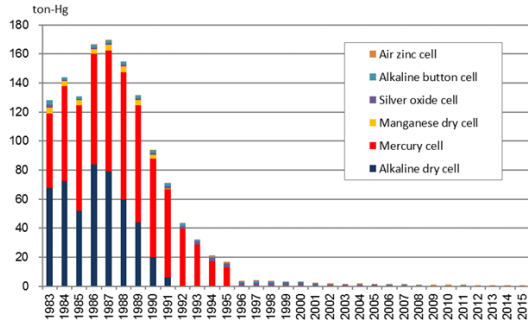
It is necessary to avoid increasing health risks to the citizens through food chain or others due to the inadequate disposal of products containing mercury which will result in increased concentration of the global mercury. In regards to the mercury use in products, the information on mercury alternative or technologies to reduce mercury, etc. is regularly collected and the scope for the specific mercury-using products that are subject to restriction under the Act are

reviewed based on the technological trend for replacement or reduction of mercury as much as possible. In addition, the equivalent measures are imposed for the export and import of mercury-using products. The use of dental amalgam is further reduced.

(Specific measures)

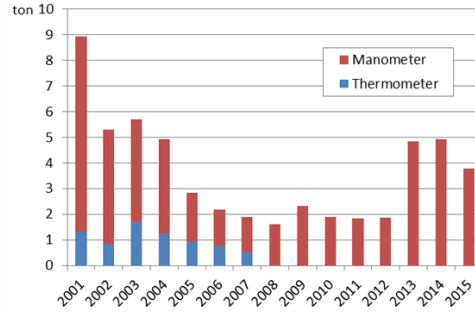
Most of the mercury-added products in the marketplace in Japan are the same as the items listed in Part I of Annex A, of the Convention and no other products have special concerns over environmental conservation. Thus, the Act defines the term 'mercury-using products' as the products for which mercury or a mercury compound is used and then designates the products listed in Part I of Annex A of the Convention as specified mercury-using products. The manufacturing and the incorporation into assembled products as components of the specified mercury-using products are prohibited in principle while the competent ministers may permit the exceptional case if such products are definitely manufactured for the uses allowed by the Convention. The permissions are granted by product items with their individual expiration dates. As Japan has the experiences and technologies for developing alternatives for mercury or reducing mercury in mercury-using products, upon the designation of the specified mercury-using products, in consideration with the objective of the Convention and others, the mercury content in those products is further reduced as much as possible and the phase-out dates of the applicable products are brought forward earlier than 2020, which is the date set out in Annex A, Part I, of the Convention (Figure 5, Table 1),.

Domestic production of mercury containing batteries



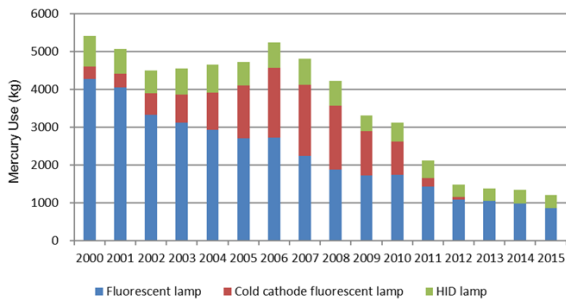
Source: Battery Association of Japan

Mercury content in medical devices



Note: Figures are based on an assumed mercury amount of 1.2g per thermometer, 47.6g per manometer.
Source: Ministry of the Environment

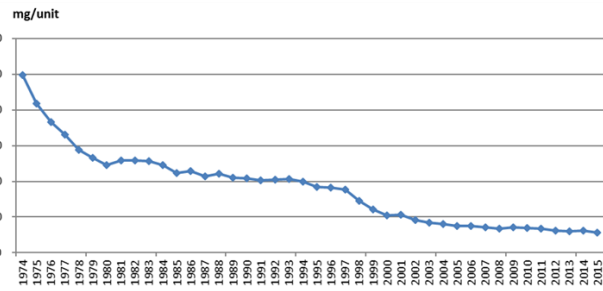
Annual mercury consumption for lighting fixture production



Source: Japan Lighting Manufacturers Association (JLMA)

Note: The manufacture of fluorescent lamps after 2013 includes that of cold cathode fluorescent lamps.

Mercury content in a fluorescent lamp



Source: Japan Lighting Manufacturers Association (JLMA)

<Figure 5>Amount of mercury used in products in Japan

<Table 1>More stringent regulations for specified mercury-using products

Item		Lowering mercury content standard	Earlier phase-out dates (Convention sets out by the end of 2020)
Batteries	Silver oxide (button batteries only)	<u>Excluding from less than 2% to less than 1%</u>	<u>By the end of 2017</u> (Taking into account the notification period although the criteria are mostly achieved.)
	Zinc/air (button batteries only)	Same as the Convention (excluding less than 2%) (concern over safety and deteriorated performance)	
	Alkaline (button batteries only)	No criterion stated in the Convention (mercury-free)	Same as the Convention (end of 2020) (Some businesses have not achieved the criterion yet.)
	Other types	No criterion stated in the Convention (mercury-free)	<u>By the end of 2017</u> (Taking into account the notification period although the criterion is already achieved.)
Switches and relays		No criterion stated in the Convention (mercury-free)	Same as the Convention (end of 2020) (Transition to alternatives needs some time as various stakeholders are involved.)
Fluorescent lamps	Compact fluorescent lamps (CFLs) for general lighting	Same as the Convention	<u>By the end of 2017</u> (Taking into account the notification period although the criteria are mostly achieved.)
	Linear fluorescent lamps for general lighting (LFLs)	Same as the Convention	
	Cold cathode fluorescent lamps (CCFLs) and external electrode fluorescent lamps (EEFLs) for electronic displays	Same as the Convention	
High-pressure mercury vapor lamps (HPMV) for general lighting purposes		No criterion stated in the Convention (mercury-free)	Same as the Convention (end of 2020) (Transition to alternatives needs some time.)
Cosmetics		<u>Changed from “1 ppm or more” to “mercury-free”</u>	<u>By the end of 2017</u> (Taking into account the notification period although the criterion is already achieved.)
Biocides to control animals, plants or viruses*	Biocides other than merbromin	No criterion stated in the Convention (use of mercury prohibited)	<u>By the end of 2017</u> (Taking into account the notification period although the criterion is already achieved.)
	Merbromin	No criterion stated in the Convention (mercury-free)	Same as the Convention (end of 2020) (Transition to alternatives needs some time as various stakeholders are involved.)
Non-electronic measuring devices (barometers, hygrometers, manometers, thermometers, sphygmomanometers)		No criterion stated in the Convention (mercury-free)	Same as the Convention (end of 2020) (For medical devices (sphygmomanometers and thermometers): A certain time is required to correspond to actual medical settings.) (Industrial devices: Small and medium-sized enterprises are the main manufacturers and a certain time is required to switch to alternatives.)

*Excluding preservatives containing thiomersal as an active ingredient (except for preservatives containing mercury or mercury compounds other than thiomersal), which are added to pharmaceutical products.

The Foreign Exchange and Foreign Trade Act provides the equivalent measures as in the Act for the export and import of specified mercury-using products and mercury-using products in which specified mercury-using products are used as the components. Measures for the phase-down of the use of dental amalgam stated in Part II of Annex A has already been in place as described in the aforementioned baseline at the time when the Act was enacted. The additional measure was taken to stop using mercury-using dental amalgam for recuperation by insurance medical facilities to be covered by the medical insurance subsidies starting from April 2016. In order to discourage the manufacturing and the distribution in commerce of mercury-using products that are not recognized domestically as the existing purposes of use on the date of entry into force of the Convention, the Act prohibits those who seek to manufacture or distribute those products in commerce from such manufacture or distribution, unless the products in question contribute to protect human health or to maintain the integrity of the living environment. The self-assessment on the contribution and the submission of the report to the competent ministers become mandatory after the date of entry into force of the Convention.

The Convention stipulates that the Conference of the Parties shall review Annex A no later than five years after the date of entry into force, and the Act also requires the review of its implementation status of the Act five years after the enforcement. Legal measures on mercury-using products under the Act are to be reviewed based on the examination of the Plan, results of the sampling surveys of mercury-using products distributed domestically, and efforts made by relevant businesses and technological trends to reduce or replace the use of mercury at the time. In addition, the information on mercury-using products and alternatives distributed in Japan will be submitted to the Secretariat of the Convention for sharing of information with other Parties to the Convention.

In addition, Japan promotes under the Act the relevant activities of the responsible entities to properly collect mercury-using products for disposal as one of the unique measures in Japan. Following provisions of the Act entered into force in December 2016:

- The national government shall endeavor to provide the necessary technical advices, etc. for municipalities, as the responsible bodies for disposing of municipal solid wastes, to collect mercury-using products properly;
- Municipalities shall endeavor to take the necessary measures, in consideration with the local socio-economic condition of the areas, for proper collection of the waste mercury-using products in the areas.
- Businesses manufacturing or importing mercury-using products shall endeavor to provide labeling that indicates the use of mercury or mercury compounds, or other useful information for the consumers to ensure proper sorting and disposal of the mercury-using products.

Upon the enforcement of these measures, two guidelines, the "Guidelines on the Sorted Collection of Waste Mercury-using Products from Households (December 2015, Ministry of the Environment)" for municipalities and the "Guidelines on Information Provision including Labeling in order to Ensure Appropriate Sorting and Discharge of Mercury-using Products (September 2016, Ministry of the Environment and Ministry of Economy, Trade and Industry)" for manufacturers and importers of mercury-using products, have been developed and published, and the promotion and awareness raising of these measures are undertaken.

4. Measures for the manufacturing processes in which mercury or mercury compounds are used

(Baseline at the time when the Act was enacted)

The pre-installation notifications, to be submitted to prefectural governments, etc. under the Water Pollution Prevention Act, allows the identification of installation of facilities related to manufacturing processes using mercury or mercury compounds. The use of mercury or mercury compounds in the manufacturing processes listed in Annex B of the Convention, such as chlor-alkali production, has not been found, thus such manufacturing processes have already being replaced by mercury-free alternative processes in Japan. All chlor-alkali production have been converted to mercury-free processes by 1987, then shifted to the ion-exchange membrane process completely by 1999, the technology of which is now exported around the world. The use of mercury catalysts (hereinafter the term 'mercury catalysts' include catalysts using mercury compounds) for acetaldehyde production has been aborted by around 1975. The use of mercury catalysts for vinyl chloride monomer production has been aborted due to the shift

from the acetylene-based process to the ethylene-based process. Manufacturing process using mercury electrodes has been phased out in the production of sodium or potassium methylate or ethylate. No manufacturing process using mercury catalysts has been found in the polyurethane production processes.

(To realize the *Mercury-Minimum* environment)

The use of mercury or mercury compounds is prohibited for the manufacturing processes listed in Annex B of the Convention.

(Specific measures)

With regards to vinyl chloride monomer production and the other processes listed in Part II of Annex B, the Convention does not completely prohibit the use of mercury and mercury compounds for manufacturing processes. Nevertheless, the Act prohibits the use of mercury and mercury compounds for all manufacturing processes listed in Annex B of the Convention after the date of entry into force of the Convention, in consideration of the current absence of the actual facilities, the availability of the established alternative processes and the objective of the Convention and others.

Meanwhile, the Convention stipulates that the Conference of the Parties shall review Annex B no later than five years after the date of entry into force, and the Act also requires the review of its implementation status five years after the enforcement. Measures on manufacturing processes under the Act are thus reviewed taking into consideration the review of the Plan and other aspects. In addition, the information on the manufacturing processes and their alternatives will be submitted to the Secretariat of the Convention.

In regards to the environmentally sound disposal of excess mercury from decommissioning of chlor-alkali facilities stipulated under paragraph 5(b), Article 3 of the Convention, the disposal of the excess mercury will not be conducted as the chlor-alkali production facility using mercury electrodes no longer exists.

5. Measures for the gold extraction using mercury and mercury compounds (including artisanal and small-scale gold mining)

(Baseline at the time when the Act was enacted)

No gold mining and processing using mercury amalgamation is conducted in Japan.

(To realize the *Mercury-Minimum* environment)

Gold mining and processing using mercury amalgamation is prohibited.

(Specific measures)

Considering little possibility for gold extraction using mercury and mercury compounds being conducted in future, the objective of the Convention and other aspects, the Act prohibits commercial gold extraction from ore using mercury or mercury compounds after the date of entry into force of the Convention.

6. Measures for mercury emissions

(Baseline at the time when the Act was enacted)

The main sources and the amount of emissions in fiscal year 2014 are: cement production facilities (5.5 tons/year), waste incineration facilities (5.4 tons/year), non-ferrous metal production facilities (1.4 tons/year), coal-fired power plants (1.3 tons/year), coal-fired industrial boilers (0.24 tons/year), and iron and steel production facilities (2.5 tons/year) (Table 2).

The Air Pollution Control Act requires those who emit soot and smoke such as sulfur dioxide, dust, etc. into the atmosphere to notify prefectural governments, etc. on the new construction or modification of the facilities with the information on structures, operational methods and emission treatment methods prior to the construction or modifications. The Air Pollution Control Act also establishes the emission standards and controls atmospheric emissions of the air pollutants by imposing the facility owners to comply with the standards. Mercury vapor is generated together with soot and smoke such as sulfur dioxide and dust, etc. through combustion, which is removed by the soot and smoke disposal facilities such as NO_x removal systems, dust collection systems, or desulphurization systems in the soot-and-smoke-generating facilities partially through adhering to the dust. The soot and smoke disposal technologies have some effectiveness in reducing mercury emissions.

<Table 2> The amount of atmospheric emissions by main emission sources in Japan (FY2014)

Source category	Atmospheric emission (t/year)
Coal-fired power plants	1.3
Coal-fired industrial	0.24
Non-ferrous metal	1.4
Waste incineration	5.4
Cement production	5.5
Iron and steel production	2.5
Pulp and paper production	<0.041
Lime product	<0.22
Volcano (natural)	>1.4
Total	18

Mercury emitting facilities (facilities regulated under the Convention)

Most facilities are subject to emission control (unique measures in Japan)

(Source: Inventory of Atmospheric Mercury Emissions, FY 2014)

Japan has established a guideline values for reducing health risks caused by hazardous air pollutants in the environment and set the atmospheric mercury concentration as less than 40 ngHg/m³. The national average of observed concentrations in 2015 was 1.9 ngHg/m³, while the highest value in the annual average was 3.7 ngHg/m³, well below the guideline value. The emission standards had not been established for mercury as no observation point has ever exceeded the guideline value since the values were established in 2003. This time, the need for emission control was justified for ensuring reliable and smooth implementation of the Convention.

(To realize the *Mercury-Minimum* environment)

Considering the material flow of mercury, the material recycle should be promoted and eventually the atmospheric emissions of mercury and mercury compounds should be reduced as much as possible by establishing effective emission standards for each type and size of the facilities in consideration of the emission status, technology levels, and economic aspects.

(Specific measures)

The 189th National Diet session (the ordinary session of 2015) amended the Air Pollution Control Act to ensure the reliable and smooth implementation of the Convention. Under this Act, mercury emissions from mercury-emitting facilities, such as coal-fired power plants, etc. that are listed in Annex D of the Convention, become under regulations regardless of new or existing ones, based on the emission limit values in accordance with the best available techniques starting from April 1, 2018. The Convention provides the deadlines of the implementing measures by five or ten years after the date of the entry into force of the Convention to the Party for new or existing sources, respectively. Japan starts these regulations, in consideration of the objective of the Convention, simultaneously for both sources from April 1, 2018 (Appendix 1).

In addition, as one of Japan's unique measures, the Air Pollution Control Act designates some types of facilities emitting considerable amount of mercury and mercury compounds in Japan and the emission control is desirable but not listed in Annex D of the Convention, such as iron and steel production facilities, as facilities subject to mercury emission control (Appendix 2). Based on this provision, those who install facilities subject to mercury emission control shall develop voluntary emission control standards, monitor emitting mercury concentrations, and publish the information of emission control activities after April 1, 2018.

In regards to the inventory of emissions, the amount of mercury emitted into the atmosphere has already been estimated based on the material flows of mercury and other information. This estimation will be further refined to prepare, maintain and update the inventories.

7. Measures for mercury releases

(Baseline at the time when the Act was enacted)

The Water Pollution Prevention Act has the pre-notification system to prefectural governments, etc. to comprehensively identify facilities that might discharge mercury. 362 facilities of 41 business types were identified by the system as possible mercury discharge sources (FY2014) and no facility was found exceeding the effluent standard of total mercury (0.005 mg/L). Therefore, Japan has no "relevant source" stipulated in paragraph 2 (b), Article 9 of the Convention. All 4,040 locations of public water monitoring across Japan were in

compliance with the environmental standards (0.0005 mg/L) in FY2015.

(To realize the *Mercury-Minimum* environment)

No point source of release identified as the "relevant source" is allowed.

(Specific measures)

The Water Pollution Prevention Act continues to impose the pre-notification requirements to be submitted to prefectural governments, etc. by those who set the facilities releasing sewer or wastewater containing hazardous substances such as mercury or using or storing such hazardous substances in place, or those who plan new release, use or storage of toxic substances in existing facilities.

When a facility fails to meet the effluent standard under the Water Pollution Prevention Act, prefectural governments, etc. are authorized to order the modification or the abolishment of the operation plans.

In regards to the inventory of releases, the amount of mercury released into public water bodies and soil has already been estimated based on the material flows of mercury and other information. This estimation will be further refined to prepare, maintain and update the inventories.

8. Measures for environmentally sound interim storage of mercury and mercury compounds other than waste mercury

(Baseline at the time when the Act was enacted)

Some businesses in mercury recycling, fluorescent lamp recycling, manufacturers of mercury-using products, and lighthouse administrators store some amount of mercury. Some reagents manufacturers and manufacturers of mercury-using products store mercury compounds.

The Water Pollution Prevention Act requires those who has already designated facilities storing hazardous substances including mercury to comply with the standards for construction, equipment and usage of such facilities to prevent seepage of water containing harmful substances, but this provisions do not cover gaseous or solid forms of mercury compounds. Another provisions, although not intended to protect the

environment, on the storage of mercury and mercury compounds are in place by the Poisonous and Deleterious Substances Control Act (1950, Act number 303) that prohibits manufacturing, import and distribution in commerce of mercury and mercury compounds in principle including their formulations (i.e. mercury oxide, the formulation containing more than 5% of mercury oxide, mercury (II) sulfate and its formulation, mercury (II) nitrate and its formulation) as poisonous substances as well as mercury (I) chloride and its formulation and the formulation containing equal to or less than 5% of mercury oxide as deleterious substances. The permission may be granted under certain conditions and the storage and transport of these substances are restricted for preventing mercury from scattering or leaking. The Fire Service Act (1948, Act number 186) also requires notification of mercury, mercury (II) oxide, and its formulation (excluding mercury (II) oxide content equal to or below 5%) equal to or exceeding 30 kg as the designated substances that would seriously impair fire prevention or firefighting activities, and thus requires those who store or handle mercury mentioned above to notify the fire chief under jurisdiction or fire station chief.

(To realize the *Mercury-Minimum* environment)

Considering the possible change in status of mercury and mercury compounds which are currently traded domestically as commodities but may turn to mercury waste under the definition of the Waste Management and Public Cleansing Act in future due to the shift of demand-supply balance after the entry into force of the Convention, a regulatory system to prevent environmental pollution caused by inappropriate storage of mercury and mercury compounds will be established and implemented.

(Specific measures)

The Act requires those who store mercury, mercury (I) chloride, mercury (II) oxide, mercury (II) sulfate, mercury (II) nitrate, mercury sulfide or cinnabar with the concentration of 95% or higher to comply with technical guidelines specifying measures to prevent environmental pollution caused by the storage of these substances, and authorizes the competent ministers to order corrective measures, when deemed necessary, to prevent environmental pollution. In addition, those who store 30 kg or more of mercury or any of the mercury compounds are required periodical reporting on the breakdown of the annual balances of these substances, including the purposes of the storage, amount used and disposed of per specific purposes for properly identifying the implementation of the guidelines.

When the Conference of the Parties adopts any requirements for the interim storage as stipulated in paragraph 2, Article 10 of the Convention in future, the guidelines will be reviewed and, if deemed necessary, amended based on the requirements, etc.

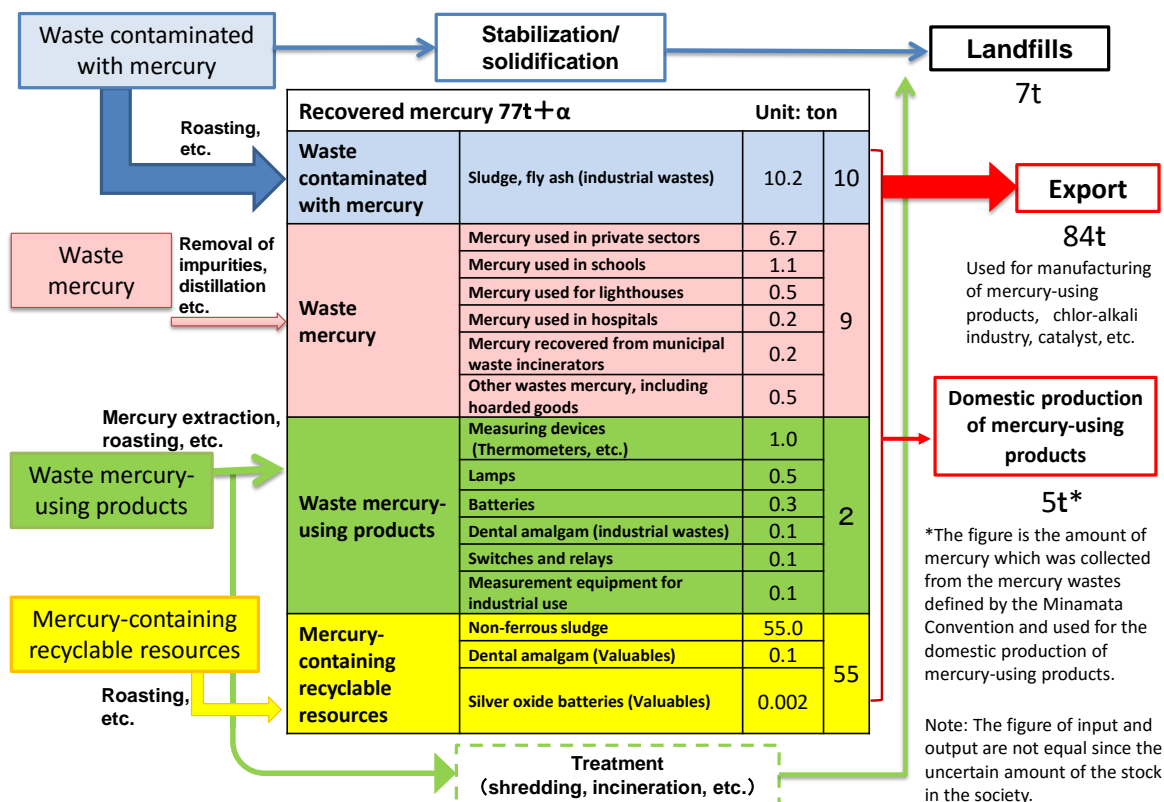
The individual stocks and sources exceeding the amount of mercury stipulated in paragraph 5 (a), Article 3 of the Convention are identified through the regular reporting of the storage of mercury and mercury compounds under the Act after the date of entry into force of the Convention.

9. Measures for mercury wastes

(Baseline at the time when the Act was enacted)

Mercury wastes defined by the Convention is categorized into the following four categories: mercury or mercury compounds that are disposed of (hereinafter "waste mercury or mercury compounds"); dust, ash or sludge, etc. that contains mercury or mercury compounds (hereinafter "waste contaminated with mercury or mercury compounds"); and mercury-using products that are disposed of (hereinafter "waste mercury-using products") defined by the Waste Management and Public Cleansing Act; and mercury-containing sludge from non-ferrous metal smelting, etc. which are currently managed as commodity for material recycling, outside the jurisdiction of Waste Management and Public Cleansing Act (hereinafter "mercury-containing recyclable resources").(Figure 6).

As the Convention stipulates environmentally sound management of mercury wastes, the waste mercury-using products or waste contaminated with mercury or mercury compounds that falls under the definition of waste in the Waste Management and Public Cleansing Act are processed in environmentally sound manner throughout their collection, transportation, disposal, storage, etc. in accordance with the Waste Management and Public Cleansing Act. Meanwhile, mercury or mercury compounds that will fall under the category of waste mercury or mercury compounds are currently not covered by the Waste Management and Public Cleansing Act as they are traded as commodity. No regulatory measure on environmental conservation perspective is in place for mercury-containing recyclable resources.



<Figure 6>Mercury recovery status mercury wastes defined by the Convention (based on the FY2014 data)

(To realize the *Mercury-Minimum* environment)

In regards to the mercury wastes of the Convention that falls under the waste defined by the Waste Management and Public Cleansing Act, waste mercury or mercury compounds will be properly handled when commodity mercury turns to waste mercury defined by the Waste Management and Public Cleansing Act in future due to the shift of demand-supply balance after the entry into force of the Convention.

In regards to the mercury wastes of the Convention that is categorized as the mercury-containing recyclable sources, regulatory measures to prevent environmental pollution due to the inappropriate management of mercury-containing recyclable resources when such commodity material turns to waste defined by the Waste Management and Public Cleansing Act in future due to the shift of demand-supply balance after the entry into force of the Convention.

(Specific measures)

Waste mercury or mercury compounds is categorized as newly established “specially controlled municipal waste” or “specially controlled industrial waste” under Waste Management and Public Cleansing Act. The collection and transportation standards are established reflecting their property, and sulfuration and solidification processes prior to the final disposal become mandatory (collection and transport standards become effective as of 1 April 2016, and disposal standards become effective as of 1 October 2017). In addition, further consideration to optimize overall framework for waste disposal will be enhanced for waste disposal system and long-term monitoring system under the proper share of responsibilities among stakeholders including the national government, which will ensure long-term management of waste mercury or mercury compounds, etc.

Waste contaminated with mercury or mercury compounds and waste mercury-using products are already managed in an environmentally sound manner. In addition, for ensuring environmentally sound management of municipal solid waste, the Act promotes activities as one of Japan’s unique measures under the responsibilities of stakeholders for proper collection of waste mercury-using products as stipulated in Section 3, Part I, of the Plan. For industrial waste, in order to ensure environmentally sound management, waste mercury-using products containing equal to or more than specific level of mercury or mercury compounds are designated as "industrial waste mercury-using products" and waste contaminated with mercury or mercury compounds containing equal to or more than specific level of mercury or mercury compounds are designated as "soot and dust containing mercury or mercury compounds", then, these industrial wastes shall be listed in the contract agreement, manifest etc. If the levels of mercury or mercury compounds used for or contained in the industrial waste exceed specific level, mercury recovery shall be conducted (become effective as of 1 October 2017).

Dead stocks of mercury-using products should be intensively collected and disposed of in short period to reduce future risk of inadequate disposal. Thus, in regards to the dead stock of the mercury-using products in households, the "Guidelines on the Sorted Collection of Mercury-using Products that are Disposed of from Households" provide concerns and specific measures for

collecting dead stock of mercury thermometers etc., and projects on intensive collection of mercury thermometers etc. are implemented in cooperation with relevant businesses. In regards to the dead stocks of mercury-using products in businesses, the "Manual on Collecting unused Clinical Mercury Sphygmomanometers etc. from Medical Institutions (March 2016, Ministry of the Environment)" is published for promoting collection and disposal of mercury sphygmomanometers etc. in collaboration with relevant business associations etc. including implementing enhanced collection projects in cooperation with the relevant businesses.

In regards to the mercury-containing recyclable resources, the Act requires those who handle mercury-containing recyclable resources to comply with technical guidelines on management of mercury-containing recyclable resources after the date of entry into force of the Convention. In addition, the competent minister may order the corrective measures etc. if deemed necessary to prevent environmental pollution. The businesses handling mercury-containing recyclable resources are also required for periodical reports on the breakdown of the annual balances, including the purpose of handling and the amount disposed of etc. for properly identifying the implementation of the guidelines.

If the Conference of the Parties adopts additional requirements on mercury waste as stipulated in paragraph 3 (a), Article 11 of the Convention, the series of measures discussed above will be reviewed and revised if deemed necessary.

In regards to the export and import of mercury wastes, both mercury wastes defined in the Waste Management and Public Cleansing Act and mercury-containing recyclable resources are to be properly managed based on the Waste Management and Public Cleansing Act and the Act on Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes, which are the relevant laws of domestic implementation of the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and its Disposal.

10. Measures for contaminated sites

(Baseline at the time when the Act was enacted)

Site contaminated with mercury or mercury compounds are identified and assessed

based on the Soil Contamination Countermeasures Act and the Water Pollution Prevention Act.

(To realize the *Mercury-Minimum* environment)

Sites contaminated with mercury or mercury compounds are identified and assessed.

(Specific measures)

Sites contaminated with mercury or mercury compounds are identified and assessed based on the Soil Contamination Countermeasures Act and the Water Pollution Prevention Act.

Specifically, the Soil Contamination Countermeasures Act ensures the proper implementation of soil contamination investigations and the countermeasures for the contaminated soil in order to prevent human health damages caused by soil containing mercury or mercury compounds. The Water Pollution Prevention Act ensures proper measures such as the monitoring survey on groundwater pollution and purification of the polluted groundwater in order to prevent human health damages caused by drinking groundwater.

Part II Fundamentals for measures to be taken by the national government, local governments, businesses, and the citizens -Roles of the stakeholders-

The national government has the central authority in promoting measures for preventing environmental pollution of mercury and mercury compounds in a comprehensive and systematic manner and in implementing the Plan to ensure reliable and smooth implementation of the Convention. Still, it is important that members of society such as local governments, businesses and the citizens, in addition to the national government, share common understandings and closely collaborate to take actions based on their responsibilities stipulated in the Basic Environment Act (1993, Act number 91).

1. Measures to be taken by the national government

The national government shall take the following measures:

- Implement measures that are specified in the Plan in a comprehensive and systematic manner with close coordination among relevant government ministries and agencies by utilizing the Inter-Ministerial Coordination Council on the Minamata Convention on Mercury and others.
- Monitor the implementation status of the control measures etc. on mercury and mercury compounds under the Act, the Air Pollution Control Act, and other relevant laws and regulations and if deemed necessary, examine and implement appropriate measures. Also, implement appropriate measures based on the environmental pollution of mercury and mercury compounds and discussions at the Conference of the Parties to the Convention.
- Implement measures that contribute to replacing and discouraging the use of mercury and mercury compounds and mercury-using products and that provide technical advice on proper collection and treatment of mercury and mercury compounds and mercury-using products to be disposed of or in dead stocks by disseminating accurate knowledge on environmental impacts and toxicities to humans of mercury and mercury compounds and by providing information contributing to the promotion of activities for preventing environmental pollution of

mercury and mercury compounds to local governments, businesses and the citizens.

- Implement measures to reduce the use of mercury and mercury compounds, and mercury-using products in administrative work undertaken by the national government.
- Promote international cooperation on financial and technical assistances and human capacity development etc. for preventing environmental pollution of mercury and contribute the implementation of global mercury management benefitted with Japan's technologies and experiences by promoting continuous research on human health and environmental impacts of mercury and its international dissemination.

2. Measures to be taken by local governments

Local governments shall take the following measures:

- Implement such measures etc. in the Plan designated to the local governments in comprehensive and systematic manner;
- Implement measures that contributes the reduction of mercury, mercury compounds and mercury-using products by disseminating accurate knowledge on environmental impacts and toxicities to human of mercury and mercury compounds and by providing information contributing the promotion of activities for preventing environmental pollution caused by mercury or mercury compounds to businesses and the citizens within the jurisdiction of the local governments.
- Implement measures to reduce the use of mercury and mercury compounds and mercury-using products in administrative work undertaken by local governments by taking advantage of the efforts made by advanced local governments etc., and endeavor to implement proper collection and treatment of mercury and mercury compounds, and mercury-using products to be disposed of or in dead stocks in municipal governments by taking the socio-economic condition of the municipality into consideration.

3. Measures to be taken by businesses

Businesses shall take the following measures:

- Properly implement the relevant obligation in the Plan to the businesses in question when storing, using, emitting, or releasing mercury or mercury compounds or when manufacturing, exporting or importing mercury-using products.
- Promote the development and introduction of alternatives of mercury-using products or mercury reduction technologies if the use of mercury or mercury compounds is inevitable.
- Reduce the overall impacts on environment by properly treating when mercury or mercury compounds are disposed of.
- Endeavor to discourage the use of mercury, mercury compounds and mercury-using products in their own administrative work.
- Manufacturers or importers of mercury-using products shall endeavor to provide useful information to ensure that the citizens can properly sort and discharge the mercury-using products by providing for example labeling on those products regarding the use of mercury and mercury compounds.
- Endeavor to cooperate with national and local governments in their measures to discourage the use of mercury, mercury compounds and mercury-using products and to properly collect mercury-using products to be disposed of or in dead stocks along with the businesses' own collection.

4. Measures to be taken by the citizens

The citizens shall take the following measures:

- Endeavor to cooperate with national and local government in their measures to discourage the use of mercury, mercury compounds and mercury-using products as well as the proper collection of mercury-using products to be disposed of or in dead stocks.
- Endeavor to cooperate with businesses in their voluntary collection of mercury-using products to be disposed of or in dead stocks.
- Endeavor to discourage the use of mercury, mercury compounds and mercury-using products, to select alternative products, and to properly sort and discharge mercury-using products.

Part III Other important fundamentals for ensuring reliable and smooth implementation of the Convention: - Supplemental measures -

1. Measures for health aspects

After the official recognition of Minamata disease in 1956, the compensation and relief for the victims of Minamata disease have been provided based on the official opinion of the national government on the cause of Minamata disease released in 1968. In regards to the legal systems, Japan has established a certification system based on the Act on Special Measures Concerning Relief for Health Damage by Pollution (1969, Act number 90) and the Act Concerning Compensation and Prevention of Pollution-Related Health Damage (1973, Act number 111, hereinafter “the Compensation Act”), which was established as a new pollution-related health damage compensation system by strengthening the compensation levels of the aforementioned Act. Certified Minamata disease patients receive consolation money and medical subsidies etc. based on the compensation agreement with the responsible company. Considering the increase of law suits on damage compensation since the Compensation Act is enforced, some measures were implemented in 1995 including an ad hoc payments by the responsible company and the medical subsidies by the government. In addition, after the verdict to a damage compensation suit by the Supreme Court in 2004, where the verdict recognized some responsibility of the government together with the responsible companies, the medical care has been further strengthened and an ad hoc payments by the responsible company and the recuperation subsidies were provided based on the Act on Special Measures Concerning Remedies for the Sufferers of Minamata Disease and Solution to the Problem of Minamata disease (2009, Act number 81). Besides the compensation and relief activities, some other activities have been implemented, which include the strengthening of medical and welfare measures in the area affected by Minamata disease such as the livelihood support for fetal Minamata disease patients etc., and the regeneration and reconciliation programs for local communities divided by discrimination and prejudice toward Minamata disease.

The Provisional Reference Value on Fish and Shellfish Traded as Food (1973, Notification of Ministry of Health and Welfare) sets the provisional control values of 0.4 ppm of total mercury and 0.3 ppm of methylmercury for fish and shellfish traded as food (except tuna, fish or shellfish in deep sea or river), and the provisional consumption limit of 0.17 mg/week of alkylmercuric compounds for an adult weighing 50 kg. The Fisheries

Agency investigates mercury contents in fishery products and published the Data Book on Hazardous Chemicals Survey in Food Products (FY2003–2010) (2012, Ministry of Agriculture, Forestry and Fisheries). Based on these references, the mercury intake from fish and shellfish of concern and the consumption guidelines are set for pregnant women (fetus) etc. as the susceptible population groups who are vulnerable to health damage by mercury exposures through the consumption of fish and shellfish in the "Precautions for the Consumption of Fish and Shellfish containing Mercury (2003, Ministry of Health, Labour and Welfare)" and the "Precautions for Expecting Mothers about the Consumption of Fish and Shellfish (2005 (revised in 2010), Ministry of Health, Labour and Welfare)".

The "Q&A" for the aforementioned Precaution (2005, Ministry of Health, Labour and Welfare) explains that the effects on human health are not at the level of concern for a person with balanced diet. In regards to the public education, the National Institute for Minamata Disease provides information about the relationship between mercury and health and its research findings concerning mercury exposures.

In regards to the measures on the awareness of occupational exposures to mercury or mercury compounds and the prevention of the health damages, the Ministerial Ordinance of the Industrial Safety and Health Act (1972, Act number 57) requires indoor worksites, where the vapor etc. of mercury or mercury compounds diffuse around, to install mechanisms to seal the source of the vapor and spot exhaust systems to maintain the concentration at the worksite below the controlled level (0.025 mg/m³ for mercury and other inorganic compounds excluding mercury sulfide).

Proper implementation of above regulations etc. and appropriate awareness will be promoted.

2. Measures for information exchange

Current legislations regulating mercury and mercury compounds that are not intended primarily to the environmental protection include the Agricultural Chemicals Regulation Act, and the Law on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices mentioned in Section 3, Part I, of the Plan, as well as the Fire Service Act and the Poisonous and Deleterious Substances Control Act mentioned in Section 8, Part I. The Water Supply Act (1957, Act number 177) also requires water suppliers to ensure the concentration of mercury and mercury

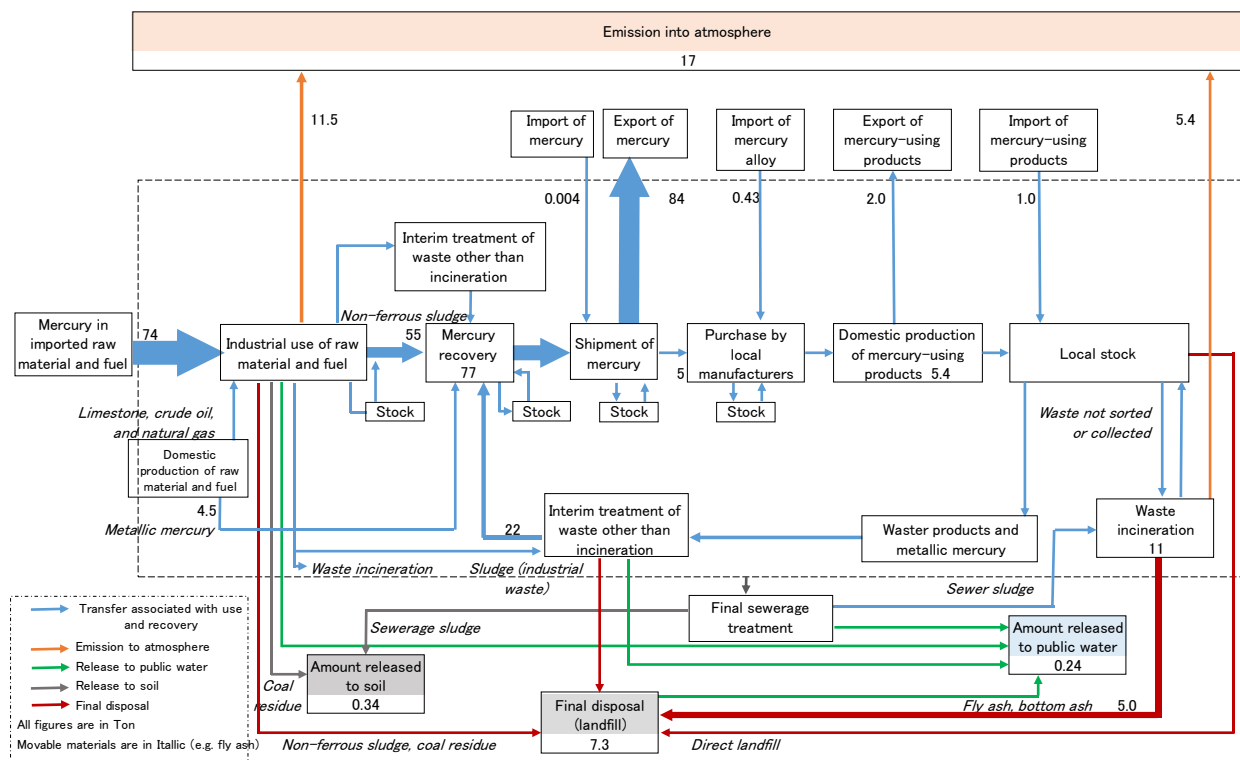
compounds in water via water supply network to 0.0005 mg/L or below.

The booklet "Lessons from Minamata disease and Mercury Management in Japan (2013, Ministry of the Environment)" that provides information on the past production, consumption, trade, emission and release reduction or elimination of mercury and mercury compounds, and information on technologically and economically feasible alternatives to mercury-using products, manufacturing process using mercury or mercury compounds, and activities and processes that emit or release mercury or mercury compounds is published on the website of the Ministry of the Environment in Japanese, English, French, Chinese, Russian, Spanish, and Arabic. On the website of Ministry of the Environment, a brochure summarizing the Convention, activities taken by Japan etc., namely "Japan's Commitment to the Minamata Convention on Mercury: Voice from Minamata to the World (2015, Ministry of the Environment)" is also published in Japanese, English, French, Chinese, Spanish, Arabic, Portuguese, Indonesian, and Vietnamese. The epidemiological information on health risks situation in Japan caused by mercury exposures is reported at relevant meetings and conferences by the World Health Organization (WHO) etc. The exchange of the above information etc. with relevant stakeholders will be promoted.

3. Measures for public information, awareness and education

On the website of Ministry of the Environment, such materials are published as "Lessons from Minamata disease and Mercury Management in Japan", a booklet summarizing the health and environmental effects of mercury and mercury compounds, alternatives to mercury and mercury compounds, outcomes of relevant research, development and monitoring activities, and activities to comply with the Convention, as well as "Japan's Commitment to the Minamata Convention on Mercury: Voice from Minamata to the World", a brochure summarizing the Convention and activities taken by Japan. In regards to the promotion and facilitation of the educational, training and awareness activities on human health and environmental impacts of exposures to mercury or mercury compounds, in addition to the regulatory measures by relevant legislation and provision of above information, other relevant information is provided for necessary public awareness, etc., which includes "Data Book on Hazardous Chemicals Survey in Food Products(FY2003–2010)" "Precautions for the Consumption of Fish and Shellfish containing Mercury", and "Precautions for Expected Mothers about the Consumption of Fish and Shellfish". In addition,

the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (1999, Act number 86) provides a pollutant release and transfer register system for businesses handling a certain amount of mercury or mercury compounds to notify the release and transfer amount to the national government. The system will supplement the information gathering and dissemination activities for estimating the annual amount of mercury and mercury compounds emitted, released, or disposed of using existing system. The material flow analysis has been prepared since FY2007 to identify mercury flow in its entire life cycle including the use of mercury in production activities and mercury emission and releases into the atmosphere, water, and soil, which will be further refined and updated (Figure 7).



Note 1) This material flow was based on information obtained from statistis, articles, surveys, and interviews to businesses that were available at the time of preparation of this chart. It does not necessarily cover all mercury uses, emissions, and transfer.
 Note 2) This chart describes the amount of mercury at each stage in FY2014. It does not reflect the movement of specific mercury in its lifecycle.

<Figure 7> Material flow of mercury in Japan
 (FY2014 basis, prepared in June 2017)

The above measures will be further improved to promote the public awareness of accurate knowledge on mercury and mercury compounds.

4. Measures for research, development, and monitoring

For the environmental protection as the main objectives, the Basic Environment Act stipulates environmental standards, the Air Pollution Control Act and the Water Pollution Prevention Act stipulate emission and effluent standards to the environment, and the Waste Management and Public Cleansing Act stipulates standards for waste disposal etc. (Table 3). Monitoring activities include the hazardous atmospheric pollution monitoring based on the Air Pollution Control Act, public water and groundwater quality monitoring based on the Water Pollution Prevention Act, the oceanic environment monitoring based on the Basic Act on Ocean Policy (2007, Act number 33), and the background monitoring at Cape Hedo in Okinawa prefecture. The compliance status of the environmental quality standards etc. are assessed and reported.

<Table 3>Standard values for mercury in the environmental media in Japan

Medium etc.	Type of standard (relevant legislation etc.)	Standard value	
		Total mercury	Alkyl-mercury
(1) Atmo- sphere	○ No environmental standard designated	—	—
	○ Guideline for hazardous air pollutants requiring prioritized measures (The 7th Report on Future Measures for Controlling Hazardous Air Pollutants)	0.00004 mg/m ³ or less	
	○ Emissions standards (The Ordinance for the Enforcement of Air Pollution Control Act)	See Appendix 1.	—
(2) Water quality	○ Environmental Quality Standards for Areas of Public Waters (Environmental standards concerning water contamination)	0.0005 mg/L or less	Below detection limit
	○ Environmental standards for groundwater (Environmental quality standards for groundwater pollution)	0.0005 mg/L or less	Below detection limit
	○ Effluent standard to public waters (Ministerial Ordinance stipulating effluent standards)	0.005mg/L or less	Below detection limit
	○ Standards for discharge into sewage systems (Order for Enforcement of the Sewerage Act)	0.005mg/L or less	Below detection limit
	○ Standards for drinking water (Ministerial Ordinance on Water Quality Standards)	0.0005 mg/L or less	—
	○ Standards for the structure and material of water supply systems (Ministerial Ordinance concerning Standards for the structure and material of water supply systems)		
	• Standards for leaching test water for water faucets and water supply fixtures installed at the end of water supply systems	0.00005 mg/L or less	—

Medium etc.	Type of standard (relevant legislation etc.)	Standard value	
		Total mercury	Alkyl-mercury
	<ul style="list-style-type: none"> • Standards for leaching test water for water supply fixtures not installed at the end of water supply systems or water supply pipes 	0.0005 mg/L or less	—
	<ul style="list-style-type: none"> ○ Technical standards for water supply facilities (Ministerial Ordinance stipulating technical standards for water supply facilities) 		
	<ul style="list-style-type: none"> • Standard for chemicals etc. injected into purified water or water in the water purification process 	0.00005 mg/L or less	—
	<ul style="list-style-type: none"> • Standard for material of devices which directly contact with purified water or water in the water purification process 	0.00005 mg/L or less	—
	<ul style="list-style-type: none"> ○ Standard for water discharged from final disposal facilities (Ministerial Ordinance determining engineering standards pertaining to final disposal site for municipal solid wastes and final disposal site for industrial wastes) 		
	<ul style="list-style-type: none"> • Effluent standard for water collection and discharge system at final disposal facilities 	0.005mg/L or less	Below detection limit
	<ul style="list-style-type: none"> • Standard for groundwater around final disposal facilities 	0.0005 mg/L or less	Below detection limit
(3) Soil	<ul style="list-style-type: none"> ○ Environmental Quality Standards for Soil Pollution (Environmental standards concerning soil contamination) 	0.0005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	<ul style="list-style-type: none"> ○ Designated standard (Ordinance for the Enforcement of the Soil Contamination Countermeasures Act) 	0.0005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	<ul style="list-style-type: none"> ○ Secondary leaching Standards (Ordinance for the Enforcement of the Soil Contamination Countermeasures Act) 	0.005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
(4) Sedi-ment	<ul style="list-style-type: none"> ○ Provisional standard for removal of contaminated bottom sediment (dry weight basis) (Provisional standard for removal of contaminated bottom sediment) *Estuaries with strong influence of tidal flows should be considered as oceanic area, and the oceanic areas with strong coastal current should be considered as river and lake area. 		
	<ul style="list-style-type: none"> • Oceanic areas (the value found using the formula at the right (C) or larger) 	C(ppm)=0.18 × average	—

Medium etc.	Type of standard (relevant legislation etc.)	Standard value	
		Total mercury	Alkyl-mercury
		tidal difference (m) / Rate of elution / Safety factor	
	• Rivers and lakes	25 ppm or greater	—
(5) Waste	○ Standards for industrial waste that can be disposed of in leachate-controlled landfill sites (including burned residues or ash, sludge, designated sewage sludge, and industrial waste requiring special management) (Ministerial Ordinance Stipulating Criteria for Industrial Waste Containing Metal and Other Substances)	0.005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	○ Standards for mining waste (burnt residue of waste plastics) which can be disposed of in leachate-controlled landfill sites (Ministerial Ordinance Stipulating Standards for Treatment of Mining Waste)	0.005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	○ Target standards for waste solidified in melting processes (leachate standard) (Promotion for the recycling of solidified municipal waste through melting)	0.0005 mg/L or less (in sample solution)	—
	○ Standard for industrial waste that can be disposed of in the ocean (Ministerial Ordinance Stipulating Criteria for Industrial Waste Containing Metal and Other Substances)		
	• Red mud and construction sludge	0.0005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	• Organic sludge and animal and plant residues	0.025 mg/kg or less	Below detection limit
	• Waste acid, waste alkali, and livestock excreta	0.025 mg/L or less	Below detection limit
	○ Standards for bottom sediments that need to be isolated from oceanic areas besides landfill sites (ones that are not applicable to any of above) (Ministerial Ordinance Stipulating Criteria for Waste including Metals that are Disposed in Landfill Sites as stipulated by Paragraph 1, Article 5 of the Order for Enforcement of the Act on Preventing Environmental Pollution of Mercury)	0.005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	○ Standards for acid and alkali that can be filled in the ocean (Same as above)	0.005 mg/L or less (in	Below detection

Medium etc.	Type of standard (relevant legislation etc.)	Standard value	
		Total mercury	Alkyl-mercury
		sample solution)	limit (in sample solution)
	○ Standards for disposal of wastewater from vessels into the ocean (Ministerial Ordinance Stipulating Water Quality Standards for the Disposal of Wastewater Generated from Regular Vessel Operations into the Ocean)	0.005 mg/L or less (in sample solution)	Below detection limit (in sample solution)
	○ Standards for liquid waste that can be disposed of in ice-covered areas (Ordinance for Enforcement of the Act on Protection of the Environment in Antarctica)	0.0005 mg/L or less (in sample solution)	Below detection limit (in sample solution)

The material flow of mercury will be further refined, maintained, and updated to properly implement mercury management and examine its effectiveness. The National Institute for Minamata Disease is conducting surveys and research on the health effects and environmental behavior of methylmercury, and the methods to accurately quantify the methylmercury levels in human samples (hair), seawater, and soil samples developed by the Institute are shared with other countries. The Japan Environment and Children's Study (JECS) is a large-scale, long-term national birth cohort study involving approximately 100,000 mother-child pairs to examine the impact on children's health by the exposure to the chemical substances such as mercury in the ordinary living environment of Japan in the period from the fetal to the childhood. In addition, the Environment Research and Technology Development Fund supports research on the modeling to understand the behavior of mercury in the environment, and another research continues to verify the long-term stability of sulfurized and solidified waste mercury or mercury compounds to ensure long-term waste management. Besides the socio-economic and cultural effects of mercury and mercury compounds, the National Institute for Minamata Disease organized the Social Science Research Group on Minamata Disease in 1997 and released a report summarizing comprehensive lessons on Minamata Disease. In regards to the information on commercial transactions and trade of mercury and mercury compounds, and mercury-using products, the relevant information on the enforcement of the Act and the relevant regulations of the Foreign Exchange and Foreign Trade Act is monitored. The above measures will be continued and enhanced while promoting relevant research, development,

and monitoring.

5. Measures for international cooperation

Japan has been providing funds to the United Nations Environment Programme (UNEP), the interim secretariat of the Convention, and the Global Environment Facility (GEF) to support developing countries' ratification to the Convention. Japan is also providing funds to the UNEP International Environmental Technology Centre (IETC) to support developing countries to improve their capacity on mercury waste management. In addition, at the Diplomatic Conference (Conference of Plenipotentiaries) in 2013, Japan announced the contribution of a total of two billion USD for developing countries as official development assistance (ODA) on environmental activities (including the control of air pollution, water pollution, and solid waste treatment) in three years starting from 2014. Japan has thus provided financial contributions to support global mercury management, and continues to consider appropriate financial assistances. In regards to the capacity building and technical assistances, Japan has been cooperating with developing countries on international application of mercury management technologies, human resource development, mercury monitoring etc. for the ratification and effective implementation of the Convention by developing countries. Japan will continue its supports for the learning of mercury management technologies and the ratification of developing countries through training programmes etc., for the surveys on mercury status in the environment and the development of action plans, for the environmental and human health risk assessment on mercury based on the experiences and knowledge of Minamata disease, for the improvement of mercury monitoring and analytical skills and networking, for the mercury flow analysis throughout its entire lifecycle in developing countries, for the application of Japan's mercury management technologies referring to the needs of developing countries, and for the dissemination of co-benefit technologies that contribute to climate change, air pollution control, etc. in addition to mercury management.

(Appendix 1) Atmospheric emissions standards for mercury in Japan

- Emissions standards for coal-fired boilers

(Converted to 6% oxygen content based on the standard oxygen correction formula)

Control facility	Applicable size	Emissions standard (µg/Nm ³)	
		New facilities	Existing facilities
(1) Coal-fired boiler (not including ones listed in (2) in this table)	Heat transfer area of the facility equals to or exceeds 10 m ² , or combustion capacity of the burner equals to or exceeds 50 L/h-equivalent to heavy oil	8	10
(2) Small-scale mixed-fuel boiler	Heat transfer area of the facility equals to or exceeds 10 m ² , or combustion capacity of the burner equals to or exceeds 50 L/h-equivalent to heavy oil and combustion capacity of the burner: less than 100,000 L/h (when converted to heavy oil)	10	15

- Emissions standard for smelting and roasting processes used for the production on non-ferrous metals (primary smelting facilities)

(Without the conversion of oxygen using the standardized oxygen correction formula)

Target facility	Target scale	Emissions standard ($\mu\text{g}/\text{Nm}^3$)	
		New facilities	Existing facilities
(1) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), calcining furnaces, blast furnaces (including reverberatory furnaces), converter furnaces, and open-hearth furnaces used for refining copper or gold, excluding those specified in section (5) of this table	Processing capacity of raw materials: 1 t/h or more	15	30
(2) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), calcining furnaces, blast furnaces (including reverberatory furnaces), converter furnaces, and open-hearth furnaces used for refining lead or zinc, excluding those specified in section (6) of this table	Processing capacity of raw materials: 1 t/h or more	30	50
(3) Melting furnaces for refining copper or gold, excluding furnaces that refine only raw silver or raw gold, cupola furnaces, and those specified in section (5) of this table	-Area of the fire grate: 1 m ² or more -Cross-section area of the tuyere: 0.5 m ² or more, -Combustion capacity of the burner: 50 L/h or more (when converted to heavy oil), or -Rated capacity of the transformer: 200 kVA or more.	15	30
(4) Melting furnaces for refining lead or zinc, excluding furnaces that refine raw lead or distilled zinc, cupola furnaces, and those specified in section (6) of this table	-Area of the fire grate: 1 m ² or more, -Cross-section area of the tuyere: 0.5 m ² or more -Combustion capacity of the burner: 50 L/h or more (when converted to heavy oil), or -Rating capacity of the transformer: 200 kVA or more	30	50

Target facility	Target scale	Emissions standard ($\mu\text{g}/\text{Nm}^3$)	
		New facilities	Existing facilities
(5) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), blast furnaces (including reverberatory furnaces), converter furnaces, melting furnaces (excluding those that refine raw copper), and drying furnaces used for refining copper	-Processing capacity of raw materials: 0.5 t/h or more -Area of the fire grate: 0.5 m ² or more -Cross-section area of the tuyere: 0.2 m ² or more, or -Combustion capacity of the burner: 20 L/h or more (when converted to heavy oil)	15	30
(6) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), blast furnaces (including reverberatory furnaces), converter furnaces, melting furnaces (excluding those that refine raw lead and distilled zinc), and drying furnaces used for refining lead or zinc	-Processing capacity of raw materials: 0.5 t/h or more -Area of the fire grate: 0.5 m ² or more -Cross-section area of the tuyere: 0.2 m ² or more, or -Combustion capacity of the burner: 20 L/h or more (when converted to heavy oil).	30	50

- Emission standards for smelting and roasting processes used for the production of non-ferrous metal (secondary smelting facilities)

(Without the conversion of oxygen using the standardized oxygen correction formula)

Target facility	Facility size	Emissions standard ($\mu\text{g}/\text{Nm}^3$)	
		New facilities	Existing facilities
(1) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), calcining furnaces, blast furnaces (including reverberatory furnaces), converter furnaces, and open-hearth furnaces used for refining lead, zinc, or copper, excluding those specified in sections (5) and (7) of this table	Processing capacity of raw materials: 1 t/h or more	100	400
(2) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), calcining furnaces, blast furnaces (including reverberatory furnaces), converter furnaces, and open-hearth furnaces used for refining gold, excluding those specified in (4) of this table	Processing capacity of raw material: 1 t/h or more	30	50

Target facility	Facility size	Emissions standard ($\mu\text{g}/\text{Nm}^3$)	
		New facilities	Existing facilities
(3) Melting furnaces for refining lead, zinc, and copper, excluding furnaces that refine only raw copper, raw lead, or distilled zinc, cupola furnaces, and those specified in sections (5), (6), and (7) of this table	-Area of the fire grates: 1 m ² or more, -Cross-section area of the tuyere: 0.5 m ² or more, -Combustion capacity of the burner: 50 L/h or more (when converted to heavy oil), or -Rating capacity of the transformer: 200kVA or more	100	400
(4) Melting furnaces for refining gold, excluding furnaces that refine only raw silver or raw gold and cupola furnaces	-Area of the fire grates: 1 m ² or more, -Cross-section area of the tuyere: 0.5 m ² or more, -Combustion capacity of the burner: 50 L/h or more (when converted to heavy oil), or -Rating capacity of the transformer: 200 kVA or more	30	50
(5) Roasting furnaces, sintering furnaces (including pellet sintering furnaces), blast furnaces (including reverberatory furnaces), converter furnaces, melting furnaces (excluding those that refine raw copper, raw lead, or distilled zinc), and drying furnaces used for refining copper, lead, or zinc, excluding those specified in section (7) of this table	-Processing capacity of raw materials: 0.5 t/h or more, -Area of the fire grates: 0.5 m ² or more, -Cross-section area of the tuyere: 0.2 m ² or more, or -Combustion capacity of the burner: 20 L/h or more (when converted to heavy oil).	100	400
(6) Melting furnaces for secondary refining of lead, excluding those for lead alloy production	-Combustion capacity of the burner: 10 L/h or more (when converted to heavy oil), or -Rating capacity of the transformer: 40 kVA or more.	100	400
(7) Roasting furnaces, sintering furnaces, blast furnaces, melting furnaces, and drying furnaces used for recovering zinc (limited to recovery of zinc from dust collected from dust collectors installed in electric furnaces for steel production)	Processing capacity of raw materials: 0.5 t/h or more	100	400

- Emissions standards for waste incinerators

(Converted to 12% oxygen content based on the standard oxygen correction formula)

Target facility	Target size	Emissions standard (µg/Nm ³)	
		New facilities	Existing facilities
(1) Waste incinerators (Excluding incinerators that exclusively treat industrial waste by themselves, hold permits as waste oil incinerators as defined in Article 7 (5) of the Order for Enforcement of Waste Management and Public Cleansing Act, and incinerate waste, excluding waste oil that generate from the refinery process that uses crude oil as a raw material. Incinerators specified in section (2) of this table are also excluded)	Area of the fire grates: 2 m ² or more or Incineration capacity: 200 kg/h or more	30	50
(2) Waste incinerators that treat either industrial waste or recyclable materials containing mercury with the obligation for mercury recovery	All facilities (no defined threshold)	50	100

- Emissions standards for cement clinker production facilities

(Converted to 10% oxygen content based on the standard oxygen correction formula)

Target facility	Target size	Emissions standard (µg/Nm ³)	
		New facilities	Existing facilities
Combustion furnaces used for cement production	-Area of the fire grates: 1 m ² or more -Combustion capacity of the burner: 50 L/h or more (when converted to heavy oil), or -Rating capacity of the transformer: 200 kVA or more	50	80*

*140 µg/Nm³ if the mercury content is 0.05 mg/kg or more in the limestone used as raw material

(Appendix 2) Facilities subject to mercury emission control in association with the atmospheric emission of mercury

- Sintering furnaces (including pellet sintering furnaces) provided for iron making
- Electric furnaces provided for steel making