

**Information regarding
mercury waste management regulations and programmes in Japan**

In the decision MC-5/10, Parties to the Minamata Convention are invited to submit to the secretariat by 31 October 2024 information regarding their waste management regulations and programmes as mentioned in subparagraph 3(a) of Article 11, with a focus on matters not addressed by the technical guidelines on the environmentally sound management (ESM) of mercury wastes under the Basel Convention.

Japan would appreciate this opportunity and the attached includes such regulations and programmes in Japan to ensure the ESM of mercury wastes.

It should be noted that we understand “matters not addressed by the technical guidelines” refers to “non-hazardous waste under the Basel Convention but falls under the definition of wastes contaminated with mercury under the Minamata Convention”. Regulations and programmes to ensure the ESM of such wastes are mainly covered in section 4 of Annex 1 of this document.

Annex

Annex 1: Measures to ensure the environmentally sound management of mercury wastes in Japan

Annex 1

**Measures to ensure the environmentally
sound management of mercury wastes
in Japan**

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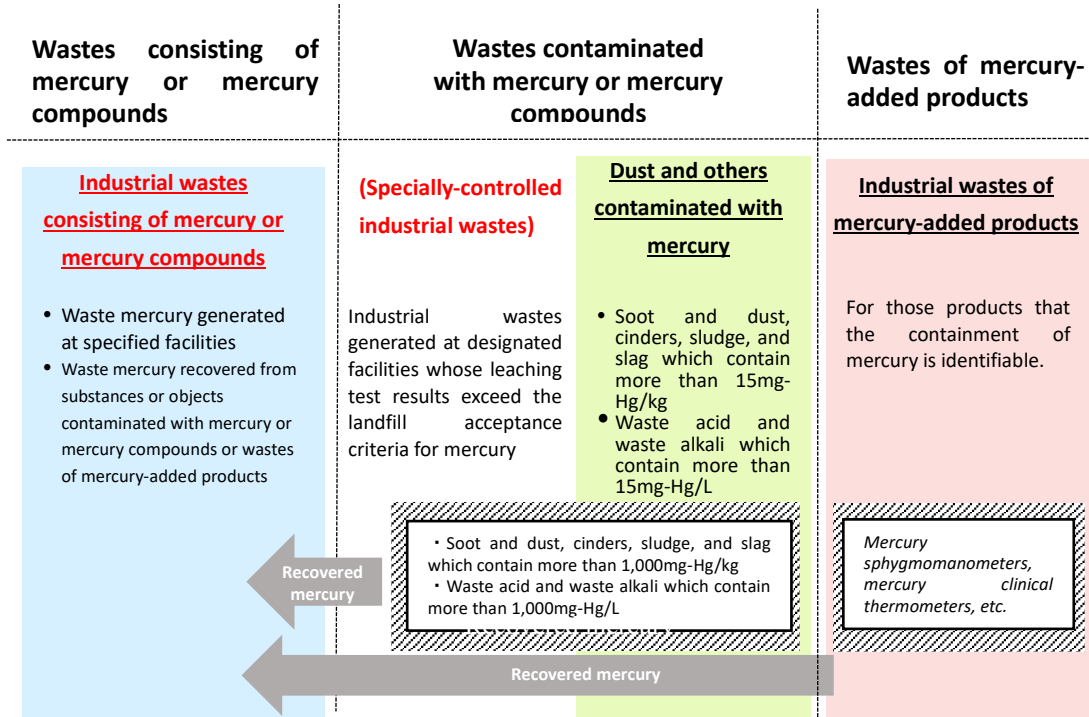
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1. Classification of Mercury Wastes in Japan

In this document, mercury wastes which are not specified as "mercury wastes under the Minamata Convention on Mercury" refer to mercury wastes regulated under the Waste Management and Public Cleansing Act. The classification of mercury wastes in Japan is shown in Figure 1.1.



Underline: New definitions provided by the amendment to the Order for Enforcement of the Waste Management and Public Cleansing Act (2015) established in order to implement the Minamata Convention on Mercury

Red: Specially-controlled industrial wastes

Italic: Examples

▨ Wastes subject to mercury recovery

Figure 1.1 Classification of mercury wastes in Japan

Sludge contaminated with mercury or mercury compounds generated from non-ferrous metal smelting, dental amalgam, and others that fall within the definition of mercury wastes under the Minamata Convention on Mercury, but do not fall within the definition of wastes under the Waste Management and Public Cleansing Act (mercury-containing recyclable resources) are addressed in section 6 “Management of mercury-containing recyclable resources” that are managed as valuable resources on the premise of mercury recovery under the Act on Preventing Environmental Pollution of Mercury.

2. Regarding This Document

2.1 Background and objective

The Minamata Convention on Mercury that entered into force on August 2017 recognizes mercury as a chemical of global concern that exhibits properties of long-range atmospheric transport, circularity and persistence in the environment and bioaccumulability. The convention aims to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. Article 11 (Mercury wastes) of the Minamata Convention on Mercury requires that the Parties to the Convention take appropriate measures so that mercury wastes are managed in an environmentally sound manner as one of the efforts to achieve the objective of the Convention. In Japan, the Order for Enforcement of the Waste Management and Public Cleansing Act and the related regulations were amended in light of the environmentally sound management of mercury wastes outlined in the report "Future Mercury Wastes Management to implement the Minamata Convention on Mercury" consulted on by the Central Environment Council in February 2015. By introducing Japan's measures on the handling, collection, transport or disposal of mercury wastes as stipulated under the amended Order for Enforcement and the related regulations, this document intends to promote the environmentally sound management of mercury wastes in other countries.

2.2 Scope of this document

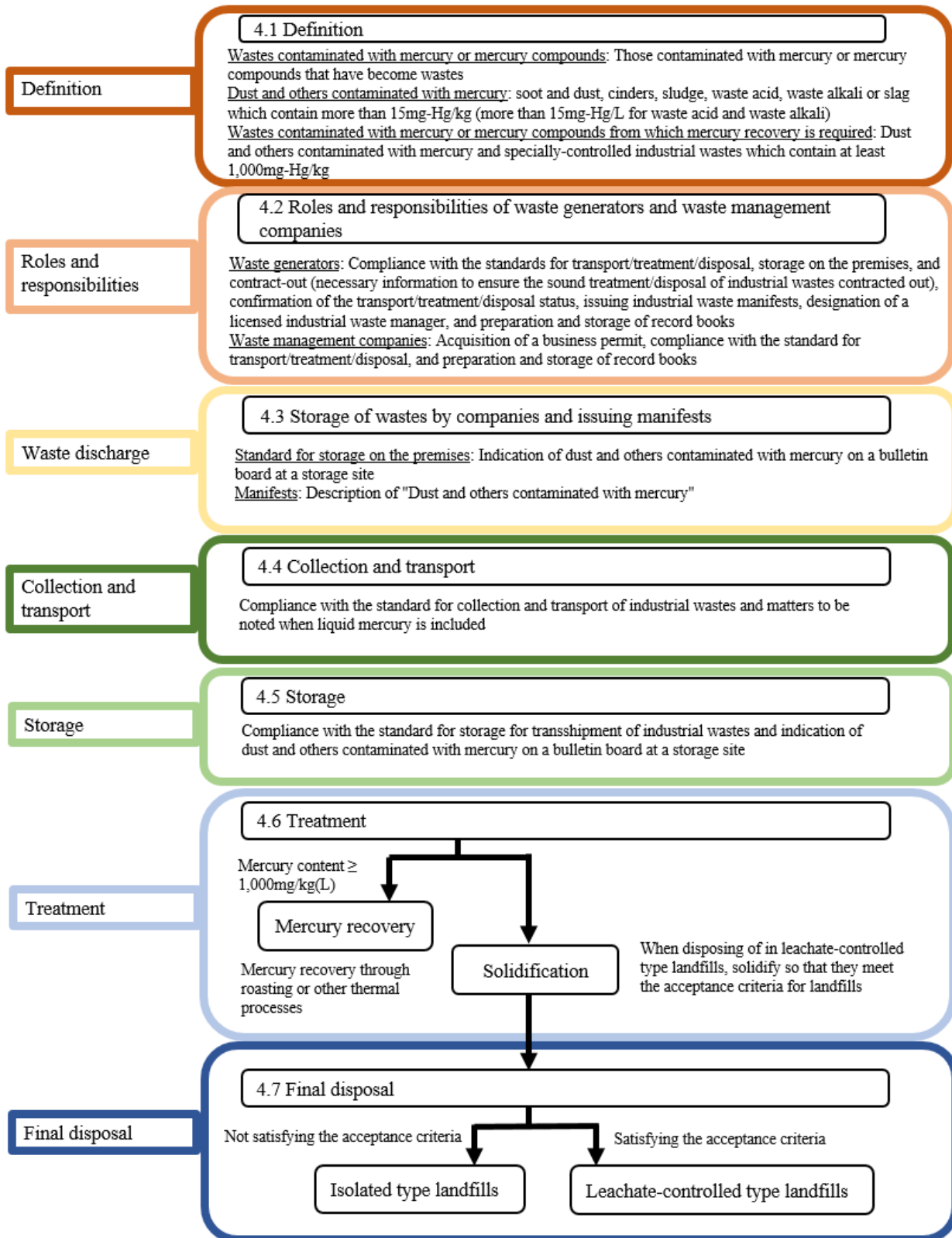
This document outlines the roles and responsibilities of local governments and manufacturers of mercury-added products as well as business operators who generate wastes and collection/transport and disposal companies under the Waste Management and Public Cleansing Act. It should be noted that wastes covered in this document indicate mercury wastes regulated under the Waste Management and Public Cleansing Act unless otherwise described.

2.3 Words of caution when using this document

In preparing this document, "technical guideline on the environmentally sound management of wastes consisting of, containing, or contaminated with mercury or mercury compounds" adopted at the Conference of Parties to the Basel Convention¹ and other information were referred to besides the Waste Management and Public Cleansing Act. Matters subject to the Act and related regulations are described within a box, followed by explanations and examples. Matters that are not subject to the Act and related regulations but need to be noted are described as "matters to be noted". The content of this document is effective as of December 2021 unless otherwise described.

¹ UNEP/CHW.12/5/Add.8/Rev.1

3. Environmentally Sound Management of Wastes Consisting of Mercury or Mercury Compounds



3.1 Wastes consisting of mercury or mercury compounds

Wastes consisting of mercury or mercury compounds are mercury or mercury compounds that have become waste. Industrial wastes consisting of mercury or mercury compounds (specially-controlled industrial wastes) and municipal wastes consisting of mercury (specially-controlled municipal wastes) fall under this category.

<Definition of industrial wastes consisting of mercury or mercury compounds>

- (i). industrial wastes consisting of mercury or mercury compounds generated at the following specified facilities (excluding those included in industrial wastes of mercury-added products):
 - 1. facilities that recover mercury from (a) substances or objects contaminated with mercury or mercury compounds or (b) wastes of mercury-added products;
 - 2. facilities provided for the manufacturing of mercury-added products;
 - 3. lighthouses equipped with mercury bearings;
 - 4. facilities that possess measuring devices which use mercury as a measuring medium (excluding mercury-added products other than porosimeters);
 - 5. public research and testing institutes;
 - 6. universities and their ancillary research and testing institutes;
 - 7. research institutes that conduct research and testing relevant to academic research, product manufacturing, or improvement, development, or invention of technologies;
 - 8. high schools, technical colleges, vocational schools, and other schools, as well as personnel training facilities and vocational training facilities that provide technical education in the field of agriculture, fishery, or industry;
 - 9. health centers;
 - 10. quarantine stations;
 - 11. animal quarantine stations;
 - 12. plant protection stations;
 - 13. livestock hygiene service centers;
 - 14. facilities that provide testing services;
 - 15. facilities that provide product testing services;
 - 16. facilities that provide clinical examination services; and
 - 17. criminal identification centers;
- (ii). waste mercury recovered from (a) substances or objects contaminated with mercury or mercury compounds (excluding municipal wastes) or (b) industrial wastes of mercury-added products.

(i) Table 3.1.1 shows examples of industrial wastes consisting of mercury or mercury compounds generated at the specified facilities.

Table 3.1.1 Examples of industrial wastes consisting of mercury or mercury compounds (i)

| Specified facilities | Examples of industrial wastes consisting of mercury or mercury compounds |
|--|--|
| 1. Facilities that recover mercury from substances or objects contaminated with mercury or mercury compounds, or waste mercury-added products | <ul style="list-style-type: none"> • Among mercury recovered from mercury-containing recyclable resources or waste mercury-added products at mercury-recovering facilities, mercury that had not been treated as waste at the time of recovery, which has become waste due to a decrease of demand for such mercury or other reasons. |
| 2. Facilities provided for the manufacturing of mercury-added products | <ul style="list-style-type: none"> • Mercury or mercury compounds that had been stored for manufacturing of mercury-added products, which has become waste • Mercury recovered when replacing mercury in mercury-added products as part of the maintenance, which has become waste. |
| 3. Lighthouses equipped with mercury bearings | <ul style="list-style-type: none"> • Mercury that had been in the mercury bearing to float and revolve the lens apparatus that has become waste • Mercury that had been stored for refilling mercury in the mercury bearing to float and revolve the lens apparatus that has become waste |
| 4. Facilities that possess measuring devices that use mercury as a measuring medium (excluding mercury-added products other than porosimeters) | <ul style="list-style-type: none"> • Mercury that had been used in a porosimeter, which has become waste <p>* Facilities that possess mercury-added measuring products (e.g., mercury thermometers) do not fall under the specified facilities.</p> |
| 5. Public research and testing institutes | <ul style="list-style-type: none"> • Waste reagents |
| 6. Universities and their ancillary research and testing institutes | |
| 7. Research institutes that conduct research and testing relevant to academic research, product manufacturing, or improvement, development, or invention of technologies | |
| 8. High schools, technical colleges, vocational schools, and other schools, as well as personnel training facilities and vocational training facilities that provide technical education in the field of agriculture, fishery, or industry | |
| 9. Health centers | |
| 10. Quarantine stations | |
| 11. Animal quarantine stations | |

| Specified facilities | Examples of industrial wastes consisting of mercury or mercury compounds |
|---|--|
| 12. Plant protection stations | |
| 13. Livestock hygiene service centers | |
| 14. Facilities that provide testing services | |
| 15. Facilities that provide product testing services | |
| 16. Facilities that provide clinical examination services | |
| 17. Criminal identification centers | |

(ii) Table 3.1.2 shows examples of waste mercury recovered from (a) substances or objects contaminated with mercury or mercury compounds (excluding municipal wastes) or (b) industrial wastes of mercury-added products.

Table 3.1.2 Examples of industrial wastes consisting of mercury or mercury compounds (ii)

| Substances from which mercury is recovered | Examples of industrial wastes consisting of mercury or mercury compounds |
|---|--|
| Substances or objects contaminated with mercury or mercury compounds (excluding municipal wastes) | <ul style="list-style-type: none"> • Waste mercury recovered from mercury-containing recyclable resources • Waste mercury recovered from dust and others contaminated with mercury • Waste mercury recovered from specially-controlled industrial wastes containing mercury • Waste mercury recovered in the process of flue gas treatment at waste incineration facilities • Waste mercury recovered from facilities that process natural resources containing mercury as impurities |
| Mercury-added products that have become industrial wastes | <p>Waste mercury recovered from fluorescent lamps, mercury batteries, mercury switches/relays, and measuring devices which use mercury (barometers, hygrometers, manometers, thermometers, clinical thermometers, and sphygmomanometers)</p> <p>*Waste mercury leaked due to the breakage of mercury-added products does not fall under this category.</p> |

<Definition of municipal wastes consisting of mercury>

Municipal wastes consisting of mercury (specially-controlled municipal wastes) refer to waste mercury recovered from municipal wastes of mercury-added products.

<Explanation of the standard>

Municipal wastes consisting of mercury (specially-controlled municipal wastes) are waste mercury recovered from municipal wastes of mercury-added products, such as fluorescent tubes, button batteries, mercury clinical thermometers, mercury thermometers, and mercury sphygmomanometers.

<Matters to be noted>

Leaked mercury due to breakage of mercury-added products at home and mercury enclosed in containers that have been discarded as waste from home do not fall into the category of waste mercury defined as specially-controlled municipal waste; however, they should be treated in an environmentally sound manner like the industrial/municipal wastes consisting of mercury.

3.2 Roles and responsibilities of waste generators and waste management companies

3.2.1 Roles and responsibilities of waste generators

<Specially-controlled industrial wastes>

Companies shall treat/dispose of their industrial wastes by themselves and take the following responsibilities for the transport/treatment/disposal of specially-controlled industrial wastes:

- Compliance with the standard for transport/treatment/disposal of specially-controlled industrial wastes when transporting or treating/disposing of specially-controlled industrial wastes by themselves
- Compliance with the standard for storage of specially-controlled industrial wastes on the premises
- When contracting out management of such wastes to waste management companies, ensure the following.
 - ✓ contract-out to specially-controlled industrial waste collection/transport and treatment/disposal companies;
 - ✓ compliance with the contract-out standard;
 - ✓ confirmation of the transport/treatment/disposal status;
 - ✓ implementation of necessary measures to ensure sound transport/treatment/disposal; and
 - ✓ issuing manifests
- Designation of a specially-controlled industrial waste manager; and
- Preparation and storage of record books.

<Specially-controlled municipal wastes>

Municipalities shall collect, transport or treat/dispose of specially-controlled municipal wastes in accordance with the standard for transport/treatment/disposal of specially-controlled municipal wastes before such wastes cause disturbance to the living environment.

3.2.2 Roles and responsibilities of waste management companies

<Specially-controlled industrial wastes>

A person who intends to collect, transport, or treat/dispose of industrial wastes consisting of mercury or mercury compounds (specially-controlled industrial wastes) as a business shall bear the following responsibilities:

- obtain a business permit for the collection/transport or treatment/disposal of industrial wastes consisting of mercury or mercury compounds (specially-controlled industrial wastes) from a prefectural governor who has jurisdiction over the area where the person intends to conduct the business;
- collect, transport, or treat/dispose of industrial wastes consisting of mercury or mercury compounds in accordance with the standard for transport/treatment/disposal of specially-controlled industrial wastes;
- prepare and store record books; and
- send a copy of the manifest to the person who issued the manifest.

<Specially-controlled municipal waste>

A person who intends to collect, transport or treat/dispose of municipal waste consisting of mercury (specially-controlled municipal waste) as a business shall take the following responsibilities:

- obtain a business permit from a mayor of the municipality who has jurisdiction over the area where the person intends to conduct the business;
- collect, transport or treat/dispose of municipal waste consisting of mercury in accordance with the standard for transport/treatment/disposal of specially-controlled municipal wastes; and
- prepare and store record books.

3.2.3 Safety management and emergency response

<Common>

Companies shall measure mercury concentration in indoor air at the workplace where operations that involve the handling of mercury and inorganic mercury compounds (excluding mercury sulfide) are conducted, evaluate it by referring to the work environment standard, establish or develop facilities or equipment to control it, conduct health checks, and take other appropriate measures, as needed.

Table 3.2.1 Work Environment Standard for mercury

| Substance | Concentration |
|---|---------------------------|
| Alkyl mercury compounds (limited to those alkyl group is methyl group or ethyl group) | 0.01mg-Hg/m ³ |
| Mercury and inorganic mercury compounds (excluding mercury sulfide) | 0.025mg-Hg/m ³ |

Companies shall investigate the risk and degree of hazard at the workplace and take necessary measures based on the results.

3.3 Waste discharge

3.3.1 Storage by waste generators

<Specially-controlled industrial wastes>

Waste generators shall store their industrial wastes consisting of mercury or mercury compounds in accordance with the standard for storage of specially-controlled industrial wastes on the premises so that they do not cause disturbance to the living environment until they are transported. Waste generators shall take the following measures for the storage of such wastes in addition to measures required to store other types of specially-controlled industrial wastes:

- (i). measures necessary for preventing the dispersal, spread, or volatilization of the wastes, such as by putting the wastes in containers and sealing them;
- (ii). measures necessary for avoiding exposure to high temperatures; and
- (iii). measures necessary for preventing corrosion.

3.3.2 Issuing manifests

(1) Issuance of manifests by waste generators

When contracting out collection, transport or treatment/disposal of industrial wastes consisting of mercury or mercury compounds to waste management companies, waste generators shall describe the waste as "industrial wastes consisting of mercury or mercury compounds" in the "type of industrial wastes" column in the manifest.

(2) Sending manifests by waste management companies

Waste management companies shall confirm that the "type of industrial wastes" column in the manifest is filled as "industrial wastes consisting of mercury or mercury compounds."

3.4 Collection and transport

<Specially-controlled industrial/municipal wastes>

During the collection or transport of specially-controlled industrial/municipal wastes, the person in charge shall comply with the standard for the collection and transport of such wastes so that adverse effects on the human health and the living environment do not occur. For industrial wastes consisting of mercury or mercury compounds, one shall take the following measures:

- (1) whenever collecting or transporting industrial/municipal wastes consisting of mercury or mercury compounds, put such wastes in containers for transport; and
- (2) ensure that the structure of the containers for industrial/municipal wastes consisting of mercury or mercury compounds is as follows:
 - (i). air/water-tight;
 - (ii). easy to store; and
 - (iii). intact structural integrity.

3.5 Storage

<Specially-controlled industrial/municipal wastes>

1. The storage of specially-controlled industrial/municipal wastes for the collection or transport shall not be done unless they are transshipped in accordance with the following standards:
 - (1) destination of transport after the transshipment has been fixed in advance;
 - (2) amount of the specially-controlled industrial/municipal wastes carried in does not exceed the capacity of the transshipment area to ensure its appropriate storage; and
 - (3) specially-controlled industrial/municipal wastes are carried out from the storage area before their properties change.
2. The following measures shall be taken when transshipping industrial/municipal wastes consisting of mercury or mercury compounds:
 - (i). measures necessary for preventing the dispersal, spread or volatilization of the wastes, such as by putting the wastes in containers and sealing them;
 - (ii). measures necessary for avoiding exposure to high temperatures; and
 - (iii). measures necessary for preventing corrosion.
3. The following measures shall be taken when storing stabilized and solidified mercury for their collection or transport:
 - (i). measures necessary for preventing the dispersal, spread or volatilization of the wastes, such as by putting the wastes in containers and sealing them;
 - (ii). measures necessary for avoiding exposure to high temperatures; and
 - (iii). measures necessary for preventing corrosion.

3.6 Treatment

3.6.1 Standard for treatment

Sulfurization and solidification

<Specially-controlled industrial/municipal wastes>

When municipal waste consisting of mercury or industrial wastes consisting of mercury or mercury compounds are disposed of, they shall be sulfurized and solidified in accordance with the following requirements.

(1) Sulfurization shall be conducted in compliance with the following conditions:

- (i). mercury shall be purified in advance by using purifying equipment;
- (ii). mercury to be sulfurized shall be at least 99.9% of purity by weight or residues shall be 0.1% or less, or they are comparable or better than these levels;
- (iii). the molar ratio of sulfur to mercury (S/Hg) to be mixed with is at least 1.05 but not greater than 1.1; and
- (iv). sulfur used for sulfurization is in a powder form and its purity is at least 99.9%.

(2) Solidification shall be conducted in compliance with the following conditions:

- (i). mercury sulfide shall be solidified by using solidification equipment;

- (ii). the binding agent shall be modified sulfur (those polymerized between mixed powdery sulfur and additives that are melted together to react) and the amount of modified sulfur to be reacted is at least 1kg per 1kg of mercury sulfide:
- (iii). the strength of stabilized and solidified mercury shall be at least 0.98MPa, which is the uniaxial compressive strength during landfilling. In this case, the uniaxial compressive strength is to be measured by the method stipulated in JIS A1108 (1993). The diameter and height of the sample are 5cm and 10cm, respectively, which was measured by the method stipulated in JIS A1108 (1993); and
- (iv). the shape and size of stabilized and solidified mercury shall be as follows:
 - ✓ the ratio between volume (cm³) and surface area (cm²) (volume/surface area) is at least one;
 - ✓ the ratio between the longest and the shortest size (longest size/shortest size) is two or less; and
 - ✓ the minimum size is at least 5cm.

<Explanation of the standard>

1. It has already been confirmed that mercury sulfide produced from mercury whose purity is at least 99.9% (or the mass of residues is 0.1% or less) and stabilized and solidified mercury produced from such mercury sulfide meets the acceptance criteria for landfills (0.005mg-Hg/L or less in the leaching test stipulated under Notification No.13 (JLT-13); hereinafter referred to as "acceptance criteria for landfills"). Therefore, it is necessary to purify mercury at least to the same degree.
2. Regarding the mixture ratio between sulfur and mercury in sulfurization, existing literature has found that it becomes more stable when the amount of sulfur slightly surpasses that of mercury in the molar ratio. However, it has also been reported that the excessive addition of sulfur causes an increase in the leaching of mercury. Therefore, the molar ratio between sulfur and mercury (S/Hg) shall be at least 1.05 but 1.1 or less. It should be noted that there are two types of mercury sulfide, black and red ones, and this explanation is not limited to either one of these.
3. Foreign substances removed prior to purifying mercury shall be treated as wastes contaminated with mercury or mercury compounds.

3.6.2 Facilities that sulfurize industrial wastes consisting of mercury or mercury compounds

<Specially-controlled industrial wastes>

1. A person who intends to establish a facility that sulfurizes industrial wastes consisting of mercury or mercury compounds (designated as an industrial waste treatment facility) shall obtain a business permit from a prefectural governor who has jurisdiction over the areas where the person intends to conduct the business.

2. A facility that sulfurizes industrial wastes consisting of mercury or mercury compounds shall meet the following standards in addition to the general technical standards:
 - (1) dikes and other equipment necessary for preventing mercury from spreading out of a reaction facility on the occasion of an accident are prepared. Also, the floor or ground on which such dikes or equipment is constructed shall be coated with materials into which mercury does not penetrate;
 - (2) equipment to be used for reaction should meet the following requirements:
 - (i). having a reaction device capable of carrying out a uniform chemical reaction between purified mercury and sulfur; and
 - (ii). being disconnected from outside air or capable of maintaining negative pressure within the reaction device; and
 - (iii). mercury gas treatment equipment is installed in a vent and a stack of the facility to prevent the atmospheric emission of mercury from causing disturbance to the living environment.

3. A facility that sulfurizes industrial wastes consisting of mercury or mercury compounds shall be operated and maintained so as to meet the following standards in addition to the general technical standard for operation and maintenance:
 - (1) purified mercury and sulfur can react evenly;
 - (2) for a reaction device that is not disconnected from outside air, negative pressure is maintained within the device during the reaction; and
 - (3) measures are taken to prevent mercury gas from causing disturbance to the living environment.

3.7 Final disposal

The standard for final disposal of stabilized and solidified mercury (specially-controlled industrial wastes) also applies to treated municipal waste consisting of mercury. In this section, "stabilized and solidified mercury." refers to stabilized and solidified mercury (specially-controlled industrial/municipal wastes).

3.7.1 Standard for final disposal

<Specially-controlled industrial/municipal wastes>

1. Water disposal of stabilized and solidified mercury shall not be carried out.

2. When the result of JLT-13 does not meet the following leachate-controlled type landfill acceptance criteria, stabilized and solidified mercury shall be disposed of at isolated-type landfills. When the result meets the criteria, stabilized and solidified mercury can be disposed of at leachate-controlled type landfills if additional measures are taken.
 - Alkyl mercury compounds: Not detected
 - Mercury or mercury compounds: 0.005mg-Hg/L or less

3. When stabilized and solidified mercury is disposed of at isolated-type landfills, the standard for disposal stipulated in the Enforcement Order and the standard stipulated in the Ministerial Ordinance for final disposal shall be met.
4. When stabilized and solidified mercury is to be disposed of at a leachate-controlled type landfill, in addition to satisfying the standard for disposal stipulated in the Enforcement Order and the standard stipulated in the Ministerial Order for final disposal, the landfilling should be carried out in the following manner to ensure that the adverse effects on human health and the living environment do not occur:
 - (i). dispose of stabilized and solidified mercury at specific areas in the landfill site while also ensuring the prevention of dispersion of stabilized and solidified mercury;
 - (ii). separate stabilized and solidified mercury from other wastes so that it cannot be mixed with other wastes;
 - (iii). take necessary measures to prevent stabilized and solidified mercury from spreading; and
 - (iv). take necessary measures to prevent rainwater infiltration into stabilized and solidified mercury.

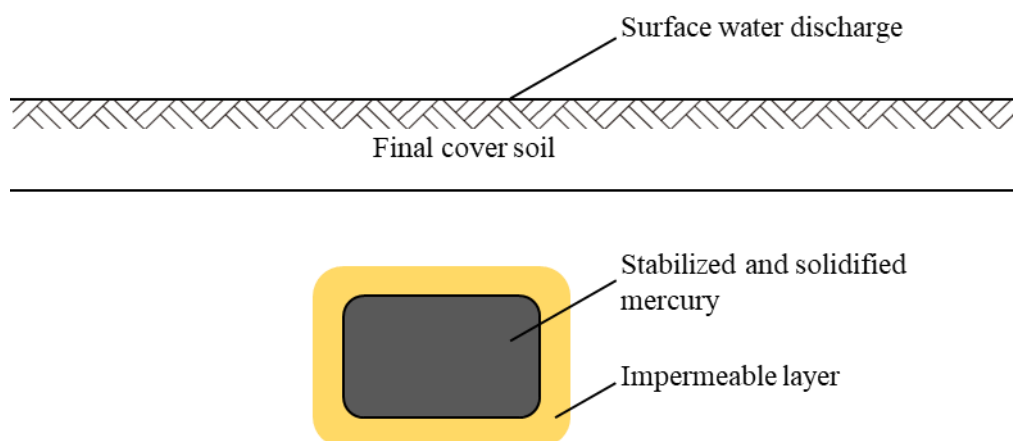


Figure 3.7.1 Image of disposing of stabilized and solidified mercury in a leachate-controlled type landfill

<Examples of how to landfill in leachate-controlled type landfills>

Examples of specific measures to landfill solidified and stabilized mercury are shown below.

<Container structures to prevent rainwater infiltration>

- To prevent rainwater infiltration, a partition that has sufficient strength against load from the outside of the container structure and pressure related to compaction of granular bentonite layer, being made of materials such as waterproof concrete, is to be installed and the inside of the structure is to have an impermeable layer of granular bentonite with sufficient thickness. By establishing the bentonite layer, the long-term waterproof effect can be expected even if rainwater infiltrates inside the structure.

- When installing the impermeable layer, selection of appropriate material and quality control during construction are required taking into account dry density and particle size distribution of granular bentonite, performance of bentonite itself (density and impermeable function of montmorillonite), etc. Therefore, it is desirable that a person who has expertise in handling bentonite designs and constructs the bentonite layer.

<Specific landfill location >

- Avoid landfilling of solidified and stabilized mercury in an area where retained water within the landfill is more likely to be present (e.g., near artificial structures such as retaining walls, downstream areas of mountainous disposal sites, above the intermediate soil cover) to prevent mercury from being soaked in rainwater.
- The specific position within the landfill is to be chosen such that there is no interaction between water and the landfilled stabilized and solidified mercury even in case of heavy rain. Furthermore, from the perspective of post-closure landfill management and the mercury adsorption effect of the waste layer and intermediate cover soil layer under the container structure, it is desirable to dispose of stabilized and solidified mercury at the upper part of the landfill as much as possible. In addition, the level of retained water is to be managed in an appropriate manner.
- Ensure that the position of stabilized and solidified mercury is far from landfill gas pipes and slopes, which are likely to be bleeding channels of water within the landfill.
- Avoid landfilling stabilized and solidified mercury in a compartment where intensive subsidence which may impair the function of measures to prevent the spread of stabilized and solidified mercury and rainwater infiltration is foreseeable. When stabilized and solidified mercury is landfilled above the existing waste layer, landfill it in an area where the load-bearing capacity is sufficient.
- When landfilling structures containing stabilized and solidified mercury closely, ensure sufficient distance between each container structure to avoid contact during an earthquake and impairment of their stability.

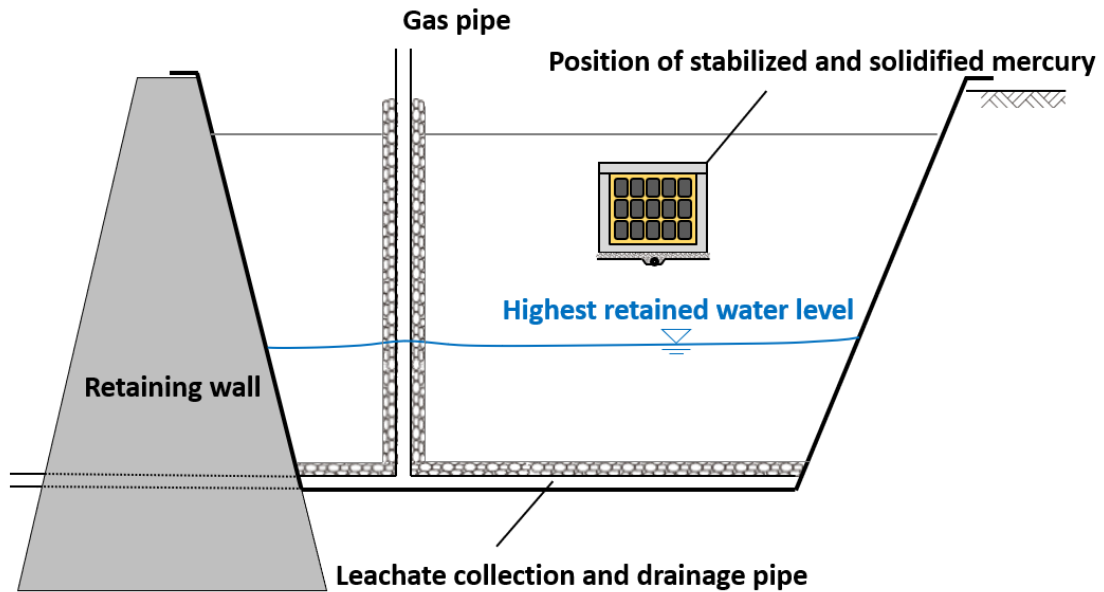


Figure 3.7.2 Example of the position of stabilized and solidified mercury (a container structure) in a landfill

<Measures during the landfilling>

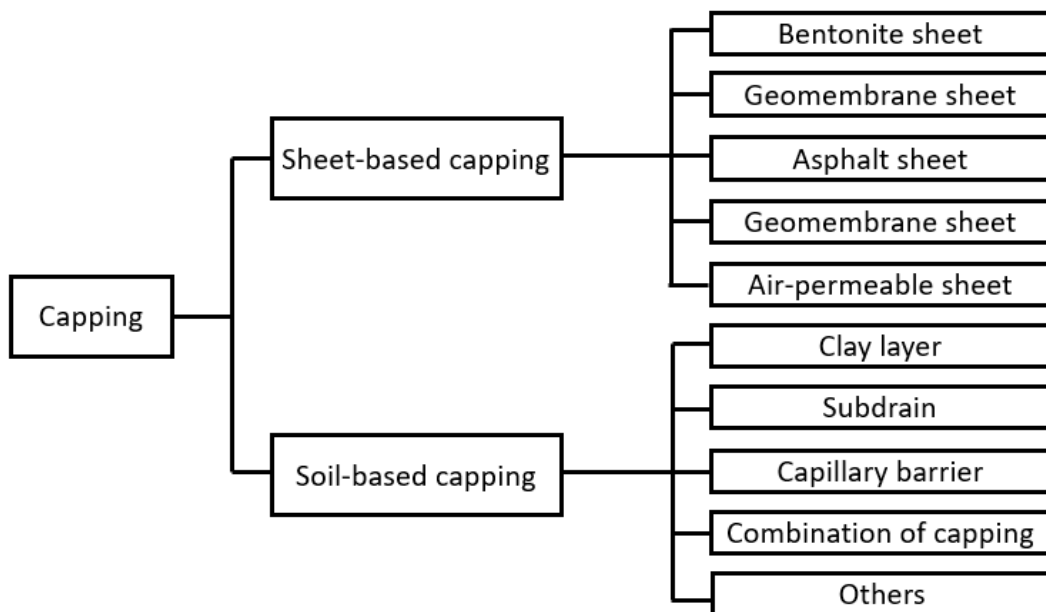
- Take measures to prevent the incursion of rainwater into the structure (e.g., construction of a roof, covering the surface of the structure with an impermeable sheet). Avoid the landfilling operation of stabilized and solidified mercury in the rain.
- Cover the bottom of the partition with granular bentonite with sufficient thickness, line up stabilized and solidified mercury thereon, fill up the gap between stabilized and solidified mercury and the structure as well as that between stabilized and solidified mercury with granular bentonite, and compact sufficiently to maximize the function of rainwater infiltration prevention. However, make sure not to crack stabilized and solidified mercury due to the compaction.
- When piling up stabilized and solidified mercury, prepare a granular bentonite layer, etc. between each stabilized and solidified mercury to prevent damage from their contact while maintaining its stability.
- Cover the upper surface of stabilized and solidified mercury with granular bentonite and compact it as well, and put a lid made of concrete or other materials.

<Measures after landfilling>

- After landfilling the container structure for stabilized and solidified mercury, take appropriate measures to maintain its stability in the event of an earthquake; for example, by burying the surrounding area with wastes promptly.
- After landfilling stabilized and solidified mercury and covering it with soil, it will be useful to take measures to prevent rainwater infiltration into stabilized and solidified mercury in the area.

Column: Prevention of rainwater infiltration into stabilized and solidified mercury

Measures to prevent rainwater infiltration into stabilized and solidified mercury are as described in <Examples of how to landfill in leachate-controlled type landfills> above, but capping can also be applied as a further additional measure. Capping is mainly carried out for the purpose of suppressing rainwater infiltration into landfills by removing rainwater running the surface and then reducing the amount of leachate generated. As shown in Fig. 3.7.3, the capping method is classified into sheet-based capping and soil-based capping. The structure, material, and quality differ depending on the required permeation suppression amount and durability.



Source: Guidelines on the change of form or nature of ruins of landfill sites.

Figure 0.1 Classification of capping method

However, suppressing water supply into the landfill can be a factor in delaying the ending of post closure period of the landfill since it also suppresses microbial decomposition of organic wastes and wash-out of pollutants. Therefore, unless there are special circumstances, the following measures could be taken when the soil-based or sheet-based capping method is carried out as an additional measure to prevent rainwater infiltration into stabilized and solidified mercury;

- Carry out the capping after landfilled wastes other than stabilized and solidified mercury have been stabilized to some extent.
- Cap only a specific compartment or limited area where stabilized and solidified mercury are landfilled. Alternatively, take measures such as providing a soil layer only in the area around the landfilled container structure or covering and sealing the area with a sheet.

<Matters to be noted>

1. In determining conformity with the leachate-controlled type landfill acceptance criteria, stabilized and solidified mercury should be sampled in accordance with JIS K0060 (1992) "Sampling method for industrial wastes" to ensure the appropriate representativeness.
2. When concrete is used for the outer frame of the container structure to contain stabilized and solidified mercury and Na-type bentonite is chosen as granular bentonite to be filled, Na-type bentonite can be changed to Ca-type bentonite, which has a higher permeability, due to eluted Ca ions from the cement. Therefore, it is desirable to take measures to get the water-proof performance of bentonite fully (e.g. designing the thickness of bentonite considering the thickness of Na-type bentonite to be changed to Ca-type, and coating inside of the concrete box with resin to prevent the bentonite layer from contact with Ca ions).
3. When piling up stabilized and solidified mercury, it is effective to insert a geotextile in between to make it more stable.

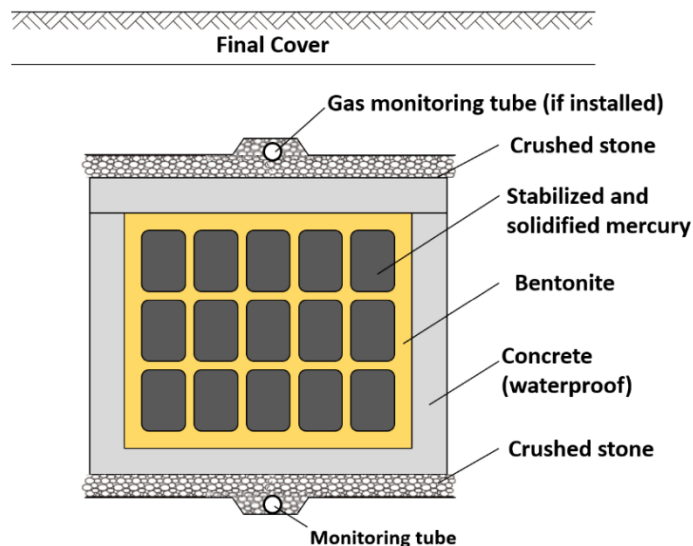


Figure 3.7.4 Example of a prevention measure for rainwater infiltration into stabilized and solidified mercury

4. When concrete is used for the outer frame of the container structure for stabilized and solidified mercury and there is concern about corrosion due to the contact with surrounding wastes, it is effective to coat the outer frame with resin as a careful measure. In addition, measures such as cover and seal with a sheet shown in the column "Prevention of rainwater infiltration into stabilized and solidified mercury", will prevent not only rainwater infiltration but corrosion equivalent to the effect of resin coating.

5. It is desirable to install monitoring equipment for infiltrated rainwater below the structure to identify the situation in case rainwater infiltrates into and leaks from the structure even if stabilized and solidified mercury is landfilled at a position not likely to contact with rainwater.
6. If stabilized and solidified mercury is appropriately sulfurized, mercury is not in the form of elemental mercury which is likely to be volatile, but in the form of mercury sulfide which is not volatile. However, out of caution, gas monitoring equipment can be installed between the upper surface of the structure and the cover soil to confirm that no mercury volatilization has happened.
7. When landfilling stabilized and solidified mercury on the upper part of the existing landfill waste layer, it is to be confirmed in advance whether the waste layer has sufficient strength as a supporting ground for stabilized and solidified mercury. When compacting the existing landfill waste layer or intermediate cover soil layer under stabilized and solidified mercury, or improving the ground with cement-based materials to ensure the strength of the supporting ground, measures should be taken to prevent water retention on it. In addition, wastes landfilled around stabilized and solidified mercury are to be sufficiently compacted to ensure the stability of stabilized and solidified mercury.

3.7.2 Operation and maintenance of landfills (post-closure period)

<Specially-controlled industrial/municipal wastes>

The following additional standard shall be met for the operation and maintenance of landfills as post-closure care where stabilized and solidified mercury is landfilled, in addition to the general standard:

- store the record of stabilized and solidified mercury disposed of and a drawing that shows the location thereof until the end of the post-closure period.

3.7.3 End of post-closure

<Specially-controlled industrial/municipal wastes>

The following additional standard shall be met to end the post-closure care where stabilized and solidified mercury is landfilled, in addition to the general standard:

- necessary measures have been taken to prevent rainwater infiltration into stabilized and solidified mercury disposed of.

In addition, when submitting the notification of the completion of landfilling and the application for confirmation of the end of post-closure care, indicate "stabilized and solidified mercury" in the "waste type landfilled" column in the form. Attach a drawing that shows the location where stabilized and solidified mercury is landfilled.

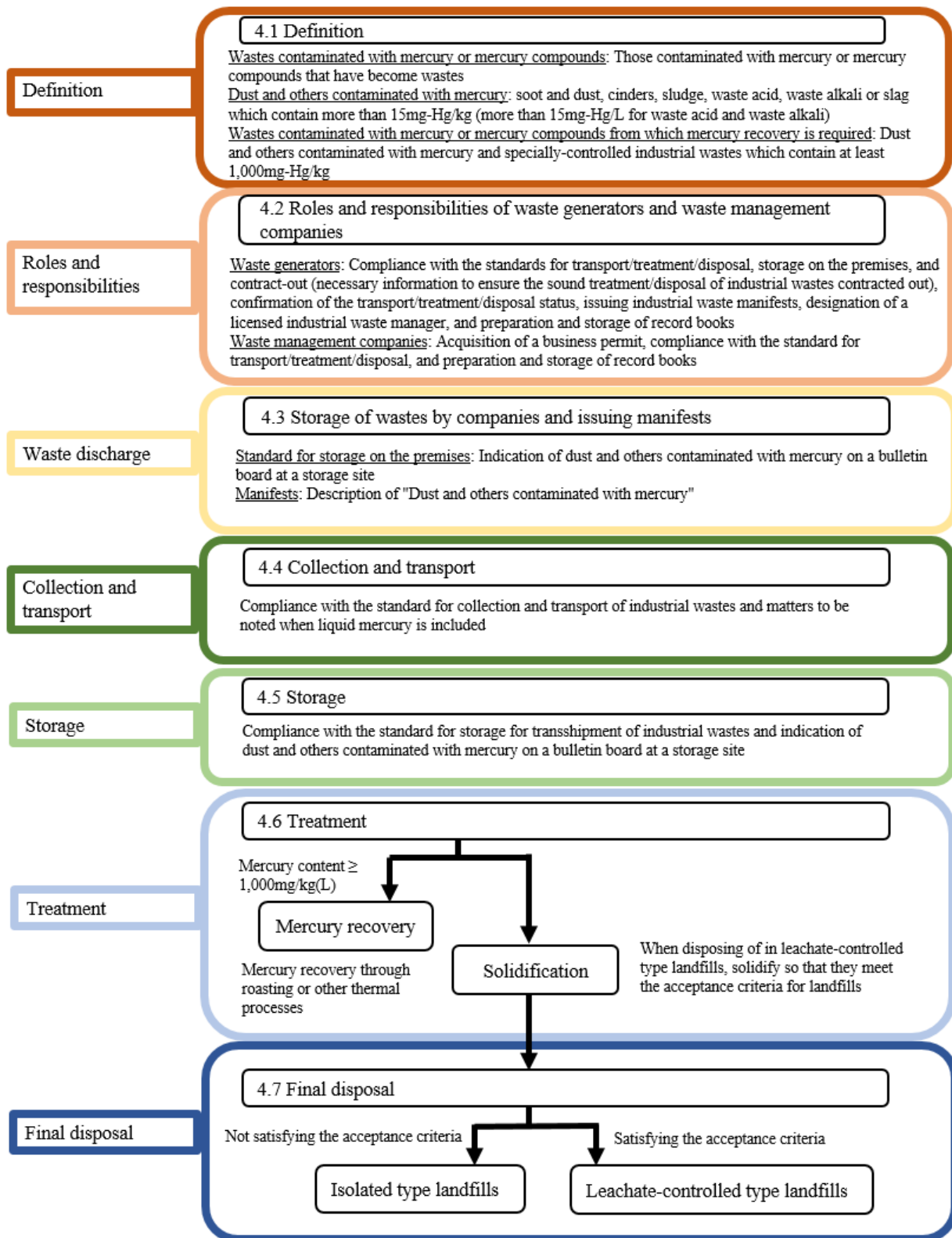
3.7.4 Restriction on the change of form or nature after the end of the post-closure period

<Specially-controlled industrial/municipal wastes>

When it is clear from the designated area registry that stabilized and solidified mercury exists below the ground, the following standard shall be met for changing the form or nature of the land, in addition to the general standard:

- take necessary measures to prevent leaching of mercury due to the change of the form or nature of the land which may cause disturbance to the living environment.

4. Environmentally Sound Management of Wastes Contaminated with Mercury or Mercury Compounds



4.1 Wastes contaminated with mercury or mercury compounds

Wastes contaminated with mercury or mercury compounds are items contaminated with mercury or mercury compounds that have become wastes. Wastes contaminated with mercury or mercury compounds include waste that falls under the category “specially-controlled industrial/municipal wastes” and other items such as soot and dust, cinders, sludge, waste acid, waste alkali, slag, scrap paper, scrap wood, scrap textile.

Out of industrial wastes other than specially-controlled industrial wastes, soot and dust, cinders, sludge, waste acid, waste alkali or slag which contain a certain level of mercury or mercury compounds are designated as "dust and others contaminated with mercury."

4.1.1 Dust and others contaminated with mercury

<Industrial wastes>

Dust and others contaminated with mercury are as follows:

- soot and dust, cinders, sludge, waste acid, waste alkali and slag that contain more than 15ppm of mercury or mercury compounds

4.1.2 Wastes contaminated with mercury or mercury compounds from which mercury recovery is required

<Industrial wastes>

Recover mercury from the following dust and others contaminated with mercury in advance when disposing of or recycling them:

- soot and dust, cinders, sludge, waste acid, waste alkali or slag which contain at least 1,000ppm of mercury (including that in mercury compounds).

<Specially-controlled industrial wastes>

Recover mercury from the following specially-controlled industrial wastes contaminated with mercury in advance when disposing of or recycling them:

- slag, soot and dust, or sludge, waste acid or waste alkali which contain at least 1,000ppm of mercury (including that in mercury compounds).

<Explanation of the standard>

Mercury recovery is required for wastes contaminated with a certain level of mercury since chelating or solidification by cement may not be able to prevent the leaching of mercury. See "4.6.1 Mercury recovery" for the method to recover mercury. Figure 4.1.1 shows the flow chart on how to treat wastes contaminated with mercury or mercury compounds.

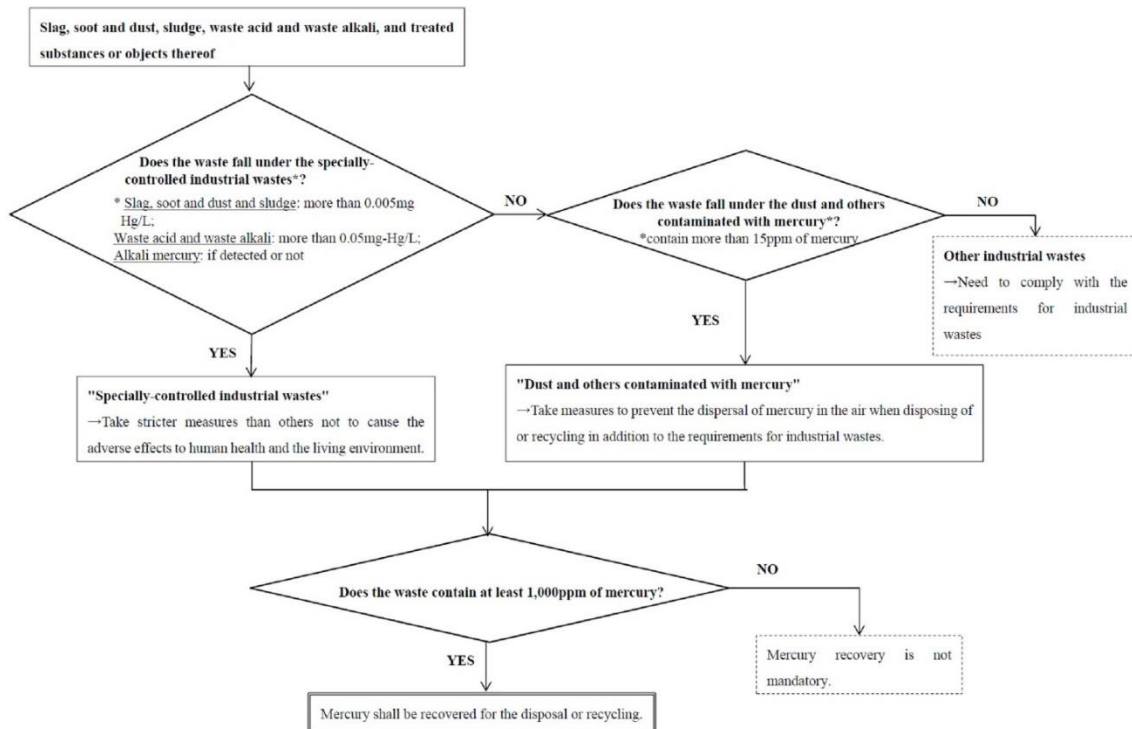


Figure 4.1.1 Standard for treatment of specially-controlled industrial wastes contaminated with mercury

4.2 Roles and responsibilities of waste generators and waste management companies

4.2.1 Roles and responsibilities of waste generators

<Industrial wastes>

Companies shall treat/dispose of their industrial wastes by themselves and take the following responsibilities for the transport/treatment/disposal of dust and others contaminated with mercury.

When transporting or treating/disposing of industrial wastes by themselves:

- compliance with the standard for transport/treatment/disposal of industrial wastes
- compliance with the standard for storage of industrial wastes on the premises
- designation of a licensed industrial waste manager
- preparation and storage of record books (including a description of dust and others contaminated with mercury)

When contracting out transporting or treating/disposing of industrial wastes to waste management companies:

- compliance with the standard for storage of industrial wastes on the premises
- contract-out to industrial waste collection/transport and treatment/disposal companies
- compliance with the contract-out standard (it should be noted that wastes contracted out include dust and others contaminated with mercury in the contract document)
- confirmation of the transport/treatment/disposal status

- implementation of necessary measures to ensure the sound transport/treatment/disposal
- issuing manifests (quantity of dust and others contaminated with mercury shall be noted)

4.2.2 Roles and responsibilities of waste management companies

<Industrial wastes>

A person who intends to collect, transport or treat/dispose of dust and others contaminated with mercury as a business shall take the following responsibilities:

- obtain a business permit for the collection/transport or treatment/disposal of dust and others contaminated with mercury from a prefectural governor who has jurisdiction over the area where the person intends to conduct the business;
- collect, transport, or treat/dispose of dust and others contaminated with mercury in accordance with the standard for transport/treatment/disposal of industrial wastes;
- prepare and store record books (including a description of dust and others contaminated with mercury); and
- send a copy of the manifest to the person who issued it.

4.2.3 Safety management and emergency response

See "3.2.3 Safety management and emergency response" regarding wastes consisting of mercury or mercury compounds.

4.3 Waste discharge

4.3.1 Storage by waste generators

<Industrial wastes>

Waste generators shall store dust and others contaminated with mercury in accordance with the standard for storage of industrial wastes on the premises so that they do not cause disturbance to the living environment until being transported:

- (1) store industrial wastes at a location that meets the following requirements:
 - (i). a fence is established around the location. If the fence must directly bear the load of the stored industrial waste, ensure that the structural integrity of the fence is strong enough;
 - (ii). a bulletin board (at least 60cm by 60cm) is displayed in a conspicuous location which meets the following requirements:
 - a. the location is a place used to store industrial waste;
 - b. the type of industrial wastes stored (including a description of dust and others contaminated with mercury);
 - c. the name and contact information of the person who manages the storage area; and
 - d. when storing industrial wastes outside without using containers, the maximum height permitted is the height of piled-up industrial wastes.

- (2) take the following measures to prevent industrial wastes from dispersing, spreading, seeping into the ground, and exuding strong odors from the storage area:
 - (i). if there is a risk of discharge of contaminated water from the storage of industrial wastes, prepare drain ditches and other equipment necessary for preventing the contamination of public water and groundwater, cover the bottom face of industrial wastes with impermeable materials; and
 - (ii). when storing industrial wastes outside without using containers, ensure that the maximum height of piled-up industrial wastes does not exceed the stipulated height.
- (3) ensure that rats do not make their habitat in the storage area of industrial wastes and that mosquitos, flies, and other pests do not enter there.

4.3.2 Issuing manifests

(1) Issuing manifests by waste generators

<Industrial wastes>

When issuing manifests, in the “type of industrial wastes” column in the manifests, waste generators shall indicate that the waste includes “dust and others contaminated with mercury” and their quantity thereof.

(2) Sending of manifests by waste management companies

1. A person who is contracted out the transport or treatment/disposal of wastes contaminated with mercury or mercury compounds (dust and others contaminated with mercury, specially-controlled industrial wastes, and other industrial wastes contaminated with mercury) shall send manifests when the transport or treatment/disposal is completed.
2. When wastes to be collected, transported, or disposed of are dust and others contaminated with mercury, the waste management company shall confirm the description of dust and others contaminated with mercury in addition to the description of any soot and dust, cinders, sludge, waste acid, waste alkali, and slag in the “type of industrial wastes” column in the manifests.

4.4 Collection and transport

<Industrial wastes>

Industrial wastes shall be collected or transported as follows:

- (1) prevent the dispersion and spreading of industrial wastes;
- (2) take necessary measures not to cause disturbance to the living environment by strong odors, noise, or vibration associated with the collection or transport of industrial wastes;
- (3) take necessary measures not to cause disturbance to the living environment when constructing facilities to collect or transport industrial wastes;

- (4) use transport vehicles, containers, and pipelines that neither disperse nor spread industrial wastes nor leak strong odors;
- (5) when collecting or transporting industrial wastes by means of the ship, display on the outer side of the ship where conspicuous that the ship is provided for the collection and transport of industrial wastes as well as other matters, and keep necessary documents in the ship; and
- (6) display on the outer side of the transport vehicle where conspicuous that the vehicle is provided for the collection and transport of industrial wastes as well as other matters and keep necessary documents in the vehicle.

4.5 Storage

<Industrial wastes>

1. The storage of industrial wastes for the collection or transport shall not be done unless they are transshipped in accordance with the following standards:
 - (1) destination of transport after the transshipment has been fixed in advance;
 - (2) amount of dust and others contaminated with mercury carried in does not exceed the capacity that the transshipment area can appropriately store; and
 - (3) industrial wastes carried in are carried out before their properties change.

In addition, ensure that the quantity stored is always less than the daily average quantity carried out multiplied by seven, except for the case where industrial wastes are transported by means of a ship and its load capacity is larger than the upper limit of the storage for transshipment.
2. Transshipment for the collection or transport of industrial wastes shall be done as follows:
 - (1) transship at the area around which a fence is established and there is a description that shows this area is for transshipment of dust and others contaminated with mercury;
 - (2) take necessary measures to prevent dust and others contaminated with mercury from dispersing, spreading, seeping into the ground, and exuding strong odors from the transshipment area;
 - (3) ensure that rats do not make their habitat in the transshipment area and that mosquitos, flies, and other pests do not breed there.
3. Storage during collection or transport of industrial wastes shall be conducted as follows:
 - (1) industrial wastes shall be stored in an area that meets the following requirements:
 - (i). a fence is established around the area. If the fence must directly bear the load of the stored industrial waste, ensure that the structural integrity of the fence is strong enough;
 - (ii). a bulletin board (at least 60cm by 60cm) is displayed where conspicuous which meets the following requirements:
 - a. type of industrial wastes stored (description of dust and others contaminated with mercury);
 - b. name and contact information of the person who manages the storage area;
 - c. when industrial wastes are stored not in containers outside, the maximum height stipulated as the height of piled-up industrial wastes; and
 - d. capacity of the storage area;
 - (2) take the following measures to prevent industrial wastes from dispersing, flowing out, seeping into the ground, and exuding strong odors from the storage area:

- (i). if there is a risk of discharge of contaminated water from the storage of industrial wastes, prepare drain ditches and other equipment necessary for preventing the contamination of public water and groundwater, cover the bottom face of industrial wastes with impermeable materials; and
 - (ii). when industrial wastes are stored not in containers outside, ensure that the maximum height of piled-up industrial wastes does not exceed the height provided by the Order of the Ministry of the Environment; and
 - (iii). other necessary measures; and
- (3) ensure that rats do not make their habitat in the storage area of industrial wastes and that mosquitos, flies, and other pests do not breed there
4. The storage of industrial wastes waiting for treatment/disposal shall be done as follows in addition to 3 above:
- (1) do not store longer than the period deemed indispensable for the sound disposal or recycling at industrial waste treatment/disposal facilities; and
 - (2) ensure that the quantity stored is always less than the daily average capacity of the treatment/disposal facilities of industrial wastes multiplied by 14.

4.6 Treatment

<Industrial wastes>

Upon treating/disposing of or recycling dust and others contaminated with mercury, necessary measures shall be taken to prevent the atmospheric emission of mercury.

4.6.1 Mercury recovery

<Industrial wastes> <Specially-controlled industrial wastes>

For wastes contaminated with mercury or mercury compounds from which mercury recovery is required (see "4.1.2 Wastes contaminated with mercury or mercury compounds from which mercury recovery is required"), mercury shall be recovered in the following way.

- Roasting or other thermal methods provided for the recovery of mercury, and recovering gaseous mercury emitted from such processes with devices provided for the recovery of gaseous mercury.

<Explanation of the standard>

For mercury recovery from dust and others contaminated with mercury and specially-controlled industrial wastes contaminated with mercury or mercury compounds, apply roasting or thermal methods provided for the recovery of mercury (e.g., heating with thermal vacuum equipment). After the thermal process, cool down the generated mercury vapor to collect mercury while taking necessary

measures to prevent the atmospheric emission of mercury from such equipment, for example, by using mercury absorbents such as activated carbon.

4.6.2 Solidification

<Industrial wastes>

1. When disposing of soot and dust, cinders, and sludge that do not meet the leachate-controlled type landfill acceptance criteria, they shall be either treated to meet the criteria or solidified as shown in 2, in advance.
2. Solidification with concrete shall be done in a manner that meets the following conditions:
 - (1) the bonding material shall be hydraulic cement, and use at least 150kg per 1m³ of solidified concrete product;
 - (2) the strength of the solidified product shall be at least 0.98MPa which is the uniaxial compressive strength during landfilling; in this case, the uniaxial compressive strength is to be measured by the method stipulated in JIS A1108 (1993). The diameter and height of the sample are 5cm and 10cm, respectively which was produced by the method stipulated in JIS A1108 (1993); and
 - (3) the shape and size of the solidified product shall be as follows:
 - (i). ratio of volume (cm³) to surface area (cm²) is at least one;
 - (ii). the ratio of the maximum size to the minimum size is two or less; and
 - (iii). the minimum size is at least 5cm.

4.6.3 Other treatment

In order to prevent the atmospheric emission of mercury, it is appropriate not to treat dust and others contaminated with mercury by incineration. However, if it is deemed appropriate to treat them by incineration after consideration of their properties, they can be treated at facilities that can achieve the stipulated mercury emission standard.

4.7 Final disposal

4.7.1 Standard for final disposal

<Industrial wastes>

1. Dust and others contaminated with mercury can be disposed of in leachate-controlled type landfills if they meet the landfill acceptance criteria.
2. Soot and dust, cinders, sludge or their treated products (excluding solidified products) that fall under “dust and others contaminated with mercury” and do not meet the leachate-controlled type landfill acceptance criteria shall be treated to meet the criteria or subjected to solidification with concrete in advance.

3. Solidified products shall be landfilled in isolated-type landfills if they do not meet the leachate-controlled type landfill acceptance criteria.
4. The acceptance criteria, in reference to the result of JLT-13, are as follows:
 - alkyl mercury compounds: Not Detected (ND); and
 - Mercury or mercury compounds: 0.005mg-Hg/L or less
5. Waste acid and waste alkali that fall under “dust and others contaminated with mercury” shall not be disposed of in landfills.

<Explanation of the standard>

Soot and dust, cinders, sludge or their treated products that fall under “dust and others contaminated with mercury” can be disposed of in leachate-controlled type landfills if they meet the acceptance criteria. However, if they do not meet the criteria, they need to be treated to meet the criteria or solidified with concrete. If solidified products do not meet the leachate-controlled type landfill acceptance criteria, they shall be disposed of in isolated-type landfills (see Figure 4.7.1).

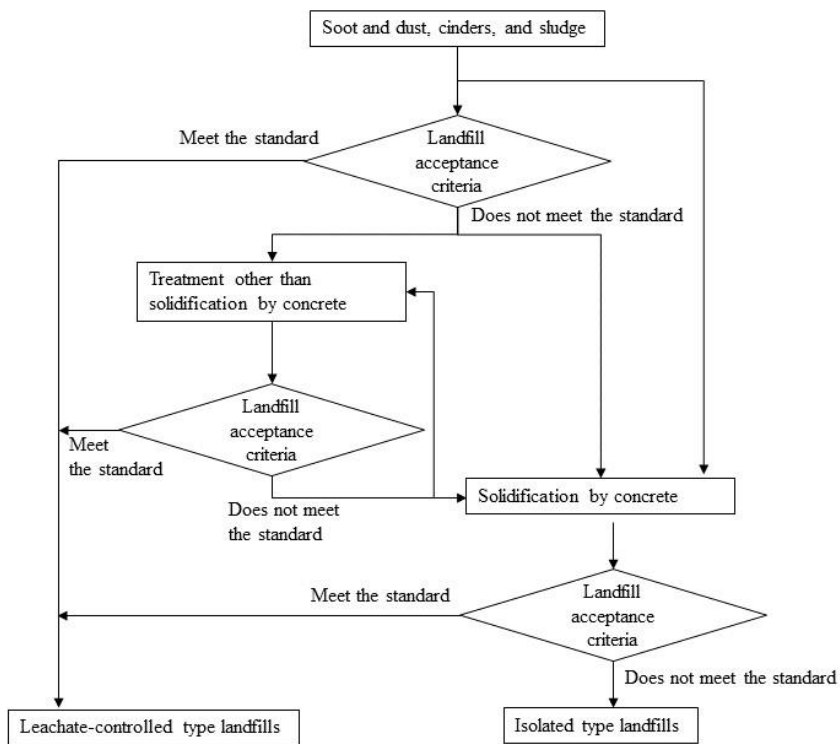


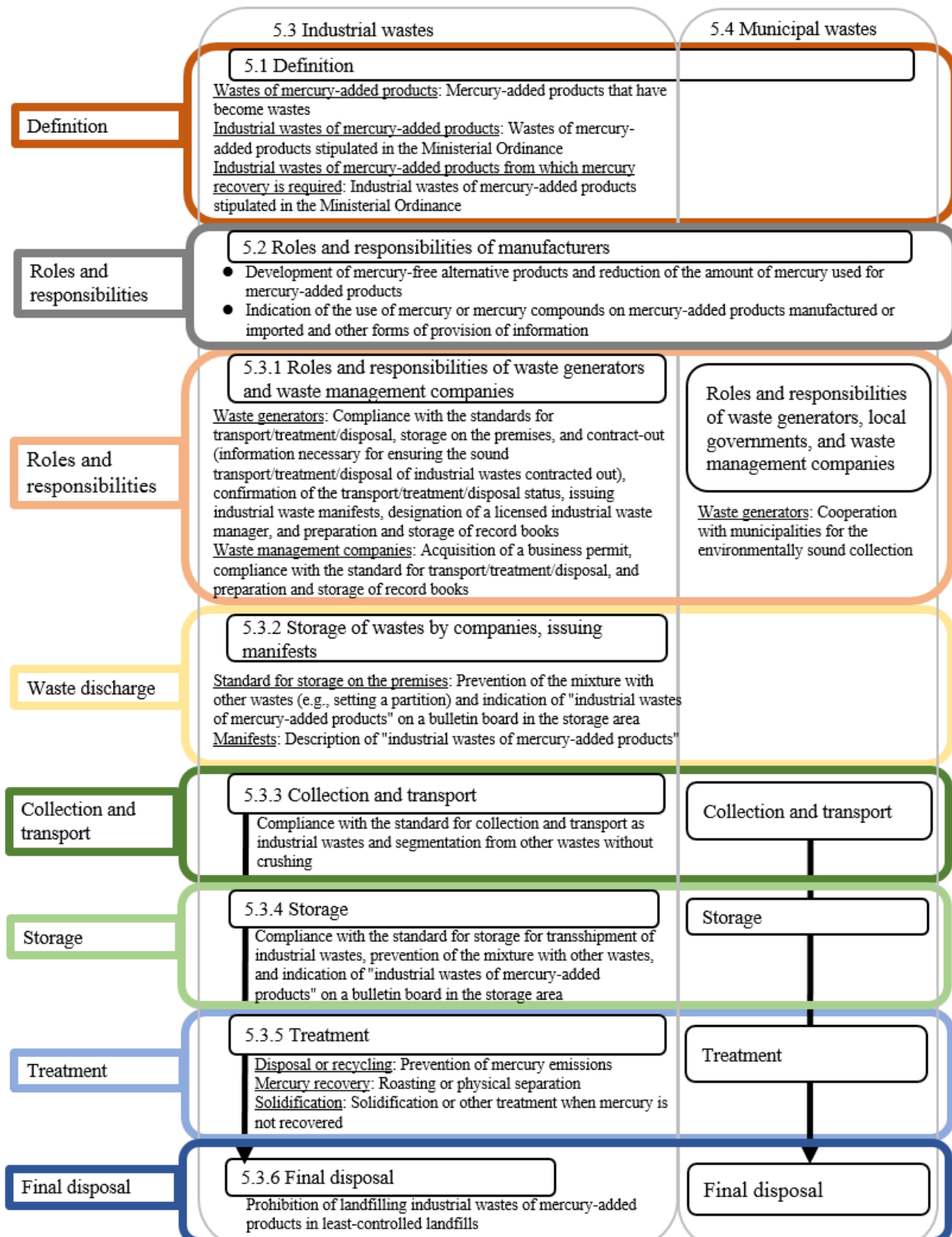
Figure 4.7.1 Standard for treatment of soot and dust, cinders, and sludge (out of dust and others contaminated with mercury)

4.7.2 Operation and maintenance of landfills

<Industrial wastes>

A person who operates a landfill for disposing of dust and others contaminated with mercury shall operate and maintain the facilities in accordance with the relevant standard for operation and maintenance as well as the operation and maintenance plan.

5. Environmentally Sound Management of Wastes of Mercury-added Products



*For municipal wastes, see the "Guidelines on the Separate Collection of Mercury-Added Products Discharged from Households (December 1, 2015; Waste Management Division, Waste Management and Recycling Department, Ministry of the Environment)."

5.1 Industrial wastes of mercury-added products

5.1.1 Industrial wastes of mercury-added products

<Industrial wastes of mercury-added products>

Industrial wastes of mercury-added products are those falling under items (i) through (iii) below that have become industrial wastes:

- (i). those listed in Table 5.1.1;

Table 5.1.1 Industrial wastes of mercury-added products

| | | | | | |
|----|---|---|---|--|---|
| 1 | Mercury batteries | | 23 | Discharge tubes (limited to those for which mercury is visibly confirmable; excluding discharge lamps including fluorescent/HID lamps) | × |
| 2 | Zinc-air batteries | | 24 | Mercury resistance standards | |
| 3 | Switches/relays (limited to those mercury is visually identifiable) | × | 25 | Differential pressure flowmeters | |
| 4 | Fluorescent lamps (including cold cathode fluorescent lamps- CCFL, and external electrode fluorescent lamps- EEFL. The same applies hereinafter.) | × | 26 | Clinometers | |
| 5 | High-intensity discharge (HID) lamps | × | 27 | Porosimeters | |
| 6 | Discharge lamps (excluding fluorescent lamps and HID lamps) | | 28 | Frequency standards | × |
| 7 | Agricultural chemicals | | 29 | Gas analyzers (excluding those using mercury as a reference standard) | |
| 8 | Barometers | | 30 | Volume-type power meters | |
| 9 | Hygrometers | | 31 | Dropping mercury electrode | |
| 10 | Liquid manometers | | 32 | Reference electrodes | |
| 11 | Elastic manometers (limited to diaphragm type) | × | 33 | Mercury vapor generators (limited to those vaporizing enclosed mercury by heating or reduction) | |
| 12 | Pressure transmitters (limited to diaphragm type) | × | 34 | Grip dynamometers | |
| 13 | Vacuum gauges | × | 35 | Pharmaceutical products | |
| 14 | Glass thermometers | | 36 | Formulation of mercury | |
| 15 | Mercury-filled pressure thermometers | | 37 | Formulation of mercury (I) chloride | |
| 16 | Mercury clinical thermometers | | 38 | Formulation of mercury (II) chloride | |
| 17 | Mercury sphygmomanometers | | 39 | Formulation of mercury (II) iodide | |
| 18 | Temperature fixed-point cells | | 40 | Formulation of mercury (I) nitrate | |
| 19 | Pigment | × | 41 | Formulation of mercury (II) nitrate | |
| 20 | Boilers (limited to those used in a two-phase fluid cycle) | | 42 | Formulation of mercury (II) thiocyanate | |
| 21 | Rotating lens assembly of a lighthouse | | 43 | Formulation of phenylmercury (II) acetate | |
| 22 | Mercury trim and heel-adjusting devices | | For pigment, only those to which mercury-added products are applied are subject to x. | | |

- (ii). mercury-added products manufactured by using (i) as a material or part (excluding those for which an “x” mark is placed in the right column of Table 5.1.1); and
- (iii). In addition to (i) and (ii), mercury-added products on which the use of mercury or mercury compound is indicated.

<Explanation of the standard>

1. This classification "industrial wastes of mercury-added products" was established for the purpose of (a) ensuring environmentally sound management by imposing additional standards for transport/treatment/disposal (e.g., prevention of atmospheric dispersal of mercury or mercury compounds), and (b) reducing the amount of mercury to be carried-in to waste incineration facilities by indicating how to handle these wastes in business permits, contract documents, and manifests.

2. Considering that industrial wastes of mercury-added products are subject to additional standards besides the general standard for transport/treatment/disposal of industrial wastes, the following products have been designated as industrial wastes of mercury-added products:
 - products that waste generators can identify as mercury-added products from their product name or number thereon, labeling on its container, or its application; or
 - the use of mercury is visually identifiable.

Specifically, among wastes of mercury-added products, those that fall under any of the items (i) through (iii) in the box above that have become industrial wastes are industrial wastes of mercury-added products.

5.1.2 Industrial wastes of mercury-added products from which mercury recovery is required

Out of industrial wastes of mercury-added products, those listed in Table 5.1.2 need mercury recovery prior to disposal or recycling.

Table 5.1.2 Industrial wastes of mercury-added products from which mercury recovery is required

| | |
|---|---|
| 1. Switches/relays | 14. Discharge tubes (excluding discharge lamps including fluorescent/HID lamps) |
| 2. Barometers | 15. Differential pressure flowmeters |
| 3. Hygrometers | 16. Float-type densitometers |
| 4. Liquid manometers | 17. Clinometers |
| 5. Elastic manometers | 18. Elapsed time indicators |
| 6. Pressure transmitters | 19. Volume type power meters |
| 7. Vacuum gauges | 20. Strain gauge sensors |
| 8. Glass thermometers | 21. Dropping mercury electrode |
| 9. Mercury-filled pressure thermometers | 22. Coulometers |
| 10. Mercury clinical thermometers | 23. gyrocompasses |
| 11. Mercury sphygmomanometers | 24. Grip dynamometers |
| 12. Rotating lens assembly of a lighthouse | |
| 13. Mercury trim and heel-adjusting devices | |

<Explanation of the standard>

Products from which mercury recovery is required prior to disposal or recycling (Table 5.1.2) are those containing elemental mercury since there is a risk that the elementary mercury could become exposed due to breakage or other means.

5.1.3 Wastes of mercury-added products discharged from households

Wastes of mercury-added products discharged from households fall under municipal wastes.

5.2 Roles and responsibilities of manufacturers

Manufacturers or importers of mercury-added products shall make efforts to indicate the use of mercury on the products that they manufacture or import and provide relevant information in order to encourage consumers to properly segregate and discharge wastes of mercury-added products.

5.3 Industrial wastes

5.3.1 Roles and responsibilities of waste generators and waste management companies

(1) Roles and responsibilities of waste generators

<Industrial wastes>

Companies shall treat/dispose of their industrial wastes by themselves and take the following responsibilities for the management of industrial wastes of mercury-added products.

When transporting or treating/disposing of industrial wastes by themselves:

- compliance with the standard for transport/treatment/disposal of industrial wastes
- compliance with the standard for storage of industrial wastes on the premises
- designation of a licensed industrial waste manager
- preparation and storage of record books (including a description of industrial wastes of mercury-added products)

When contracting out transporting or treating/disposing of industrial wastes to waste management companies:

- compliance with the standard for storage of industrial wastes on the premises
- contract-out to industrial waste collection/transport and treatment/disposal companies
- compliance with the contract-out standard (information necessary to ensure the sound transport/treatment/disposal includes stating the fact that the waste in question is “industrial wastes of mercury-added products”)
- confirmation of the transport/treatment/disposal status
- implementation of necessary measures to ensure the sound transport/treatment/disposal
- issuing manifests (quantity of industrial wastes of mercury-added products shall be noted)

(2) Roles and responsibilities of waste management companies

A person who intends to collect, transport, or treat/dispose of industrial wastes of mercury-added products as a business shall bear the following responsibilities:

- obtain a business permit for the collection/transport or treatment/disposal of industrial wastes of mercury-added products from a prefectural governor who has jurisdiction over the area where the person intends to conduct the business;
- collect, transport, or treat/dispose of industrial wastes in accordance with the standard for transport/treatment/disposal of industrial wastes;
- prepare and store record books (including a description of industrial wastes of mercury-added products); and
- send a copy of the appropriate manifest to the person who issued the manifest.

(3) Safety management and emergency response

See "3.2.3 Safety management and emergency response" regarding wastes consisting of mercury or mercury compounds.

5.3.2 Waste discharge

(1) Storage by waste generators

Waste generators shall store industrial wastes of mercury-added products in accordance with the following additional standards besides the general standard for storage of industrial wastes so that they do not cause disturbance to the living environment until the wastes are transported:

- indicate the storage of industrial wastes of mercury-added products on a bulletin board in the storage area; and
- take measures necessary to prevent the mixture of industrial wastes of mercury-added products with others (e.g., setting a partition).

(2) Issuing manifests

1) Issuance of manifests by waste generators

<Industrial wastes>

Waste generators shall describe the wastes to be delivered include industrial wastes of mercury-added products and their quantity thereof in the "type of industrial wastes" column in the manifests.

2) Sending of manifests by waste management companies

1. A person who is contracted out the transport or treatment/disposal of industrial wastes of mercury-added products shall send a copy of the appropriate manifest when the transport or disposal is completed.
2. When wastes to be collected, transported or treated/disposed of are industrial wastes of mercury-added products, the contracted-out companies shall confirm that the description in the "type of industrial wastes" column in the manifest includes industrial wastes of mercury-added products

besides the description of industrial waste type such as scrap glass, scrap metal, and sludge considering the properties of industrial wastes of mercury-added products.

5.3.3 Collection and transport

Industrial wastes of mercury-added products shall be collected or transported as follows in addition to the general standard for collection and transport:

- Industrial wastes of mercury-added products shall be collected or transported in a way that does not lead to its crushing, and, by segregation to prevent the mixture with other types of wastes.

5.3.4 Storage

Industrial wastes of mercury-added products shall not be stored except for the storage for transshipment. Further, in addition to the general standard for the storage of industrial wastes, necessary measures shall be taken to prevent the mixture with other types of wastes (e.g., setting a partition).

5.3.5 Treatment

During disposal or recycling of industrial wastes of mercury-added products, necessary measures shall be taken to prevent the atmospheric emission of mercury or mercury compounds.

(1) Crushing and sorting

<Explanation of the standard>

1. In sorting industrial wastes of mercury-added products, prevent their breakage, for example, by the following means:
 - segregating them in such a way that fragile products (e.g., fluorescent lamps) are not piled; and
 - preparing a buffer in between.In addition, even if the products break, ensure that the atmospheric emission of mercury is prevented through means such as sorting them within facilities equipped with equipment that can absorb volatilized mercury.
2. When crushing industrial wastes of mercury-added products, prevent the atmospheric emission of mercury in the products, for example, by crushing in closed facilities and by treating gas emitted from facilities with dust collectors and activated carbon filters.
3. Mercury and residues (e.g., wastewater treatment sludge, mercury absorbents) generated as a result of crushing or storing industrial wastes of mercury-added products shall be appropriately

treated in accordance with their properties. "4. Environmentally sound management of wastes contaminated with mercury or mercury compounds." can be referenced.

(2) Mercury recovery

For industrial wastes of mercury-added products from which mercury recovery is required, mercury shall be recovered in advance by either of the following ways:

- Roasting and collecting gaseous mercury; or
- Using a method that can separate mercury from industrial waste of mercury-added products, whilst ensuring that measures to prevent the atmospheric dispersion of mercury are in place.

<Explanation of the standard>

1. Mercury recovery by roasting includes the following steps; mercury in wastes of mercury-added products is vaporized in a roasting equipment; mercury vapor is cooled down; and subsequently, the mercury is recovered. Other methods to recover mercury include distillation and the method of removal of mercury from mercury containers without thermal processes. Irrespective of which method is used to recover mercury, measures to prevent the atmospheric dispersion of mercury such as exhaust/flue gas treatment are necessary.
2. When recovered mercury is categorized as waste, treat it as industrial waste consisting of mercury (specially-controlled industrial wastes) in reference to "3. Environmentally sound management of wastes consisting of mercury or mercury compounds".
3. Residues after mercury is recovered from industrial wastes of mercury-added products (e.g., scrap glass) are to be used as recyclable resources whenever possible. In addition, residues are to be appropriately disposed of or recycled based on the result of JLT-13 because mercury may be attached thereto.
4. Residues generated in the process of mercury recovery from industrial wastes of mercury-added products, including wastewater treatment sludge and mercury absorbents, are to be appropriately treated in accordance with their properties in reference to "4. Environmentally sound management of wastes contaminated with mercury or mercury compounds".

<Matters to be noted>

When landfilling industrial wastes of mercury-added products, treat them, as appropriate (e.g., insolubilization). For the insolubilization, See 4.6.2 "Solidification" applied for dust and others contaminated with mercury.

5.3.6 Final disposal

(1) Standard for final disposal

Industrial wastes of mercury-added products shall not be disposed of in least-controlled landfills.

(2) Operation and maintenance of landfills

A person who operates a landfill for disposing of industrial wastes of mercury-controlled products shall operate and maintain the facilities in accordance with the relevant standard for operation and maintenance as well as the operation and maintenance plan.

5.4 Municipal wastes

Generators of wastes of mercury-added products need to cooperate with municipalities for the sound collection thereof. In collecting, transporting, storing, treating, and disposing of such wastes, they are required to refer to the "Guidelines on the Separate Collection of Mercury-Added Products discarded from Households²".

² Waste Management Division, Waste Management and Recycling Department, Ministry of the Environment, "Guidelines on the Separate Collection of Mercury-Added Products Discarded from Households"(in Japanese) (December 2016); https://www.env.go.jp/recycle/waste/mercury-disposal/h2712_guide1.pdf.

6. Management of mercury-containing recyclable resources

6.1 Background

Article 11 of the Minamata Convention requires Parties to take appropriate measures to ensure the environmentally sound management of mercury waste. As a Party to the Minamata Convention, Japan has ensured the environmentally sound management of mercury waste through the Waste Management and Public Cleansing Act and the Act on Preventing Environmental Pollution of Mercury (hereinafter referred to as the “Mercury Pollution Prevention Act”). Mercury wastes under the Minamata Convention that are not defined as “waste” under the Waste Management Act, such as substances or objects consisting of, containing, or contaminated with mercury or mercury from which valuable materials are recovered, are regulated as “mercury-containing recyclable resources” under the Mercury Pollution Prevention Act and measures are stipulated in the said Act to ensure the environmentally sound management.

6.2 Mercury-containing recyclable resources

6.2.1 Definition

Mercury-containing recyclable resources are defined as resources that contain mercury or mercury compounds in a concentration not less than the standards indicated in the Ordinance of the Competent Ministry, and that are intended for resource recovery, recycling, reclamation, direct re-use or alternative uses. Mercury-containing recyclable resources do not cover wastes defined under the Waste Management Act, radioactive materials and wastes contaminated with radioactive materials. For example, valuable substances containing not less than 0.1% by weight of mercury and that disposal operation listed in Annex IV B under the Basel Convention is conducted fall under the category of mercury-containing recyclable resources.

6.2.2 Measures to ensure mercury-containing recyclable resources

Business operators who manage mercury-containing recyclable resources shall take measures to manage them in accordance with the Technical Guidelines for Measures to be Taken to Prevent Pollution of Environment Concerning the Management of Mercury-containing Recyclable Resources. The following are measures that business operations shall take.

<Common measures (storage, transport or disposal operations)>

1. Ensure that mercury-containing recyclable resources are not dispersed and spilled.
2. Take necessary measures to ensure that odors, noise or vibrations associated with the management of mercury-containing recyclable resources do not cause problems for the preservation of the living environment.

3. When outsourcing the storage, transport or disposal operations of mercury-containing recyclable resources (i.e. the disposal operations listed in Annex IV B of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal) to another party, the operator shall take the necessary measures to ensure the protection of the living environment, necessary information shall be provided to that party so that measures equivalent to those listed in 1, 2 and this paragraph and, when storage is entrusted, those listed in *Matters related to storage* are taken at the party to whom the entrustment is made.
4. When mercury-containing recyclable resources are transferred, information shall be provided to the other party to the transfer to the effect that what is transferred is mercury-containing recyclable resources

<Matter related to storage>

1. Containers of mercury-containing recyclable resources shall be such that there is no risk of mercury-containing recyclable resources being dispersed or spilled.
2. The container of the mercury-containing recyclable resources and the place where the mercury-containing recyclable resources are stored shall be marked to the effect that what is stored is the mercury-containing recyclable resources.
3. Locking facilities shall be provided in places where mercury-containing recyclable resources are stored. However, this shall not apply if the place cannot be locked due to its nature.
4. If the place where mercury-containing recyclable resources are stored is not by its nature lockable, a solid fence shall be provided around the place.

6.2.3 Reporting on mercury-containing recyclable resources

The manager of mercury-containing recyclable resources is required to periodically report the management status of those resources pursuant to Article 24 of the Mercury Pollution Prevention Act. The applicable business operator must prepare a report in a designated format per business place every fiscal year and submit it to the national government (the Competent Minister for the business) by the end of June of the following fiscal year. It should be noted that a maximum of 300,000 yen would be fined to the manager if they did not submit a report or provide correct information.