

Part VI

Guidelines for Specified Waste (Tentative Translation)

March 2013, 2nd Edition

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1.1 Definition of Terms

Definition of terms used herein is indicated below.

Term	Explanation
Act	Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District - Off the Pacific Ocean Earthquake that Occurred on March 11, 2011 (Act No. 110 of 2011)
Ordinance	Ordinance for Enforcement of the Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District - Off the Pacific Ocean Earthquake that Occurred on March 11, 2011 (Ordinance of the Ministry of the Environment No. 33 of 2011)
Countermeasure Area	The areas which are designated by the Minister of the Environment as requiring management of the waste in the areas due to contamination of the waste in the area by radioactive materials discharged by the accident to a level requiring special controls (the Act, Article 11, paragraph (1))
Waste in the Countermeasure Area	Waste in the countermeasure area (if the waste was carried out of the countermeasure area, including the waste carried out and excluding those determined by the Ordinance of Ministry of the Environment (the Act, Article 13, paragraph (1)))
Designated Waste	Waste generated from water facilities, public sewerage, basin sewerage, industrial water facilities, incineration facilities, which are specified municipal solid waste disposal facilities or specified industrial waste disposal facilities and rural community sewerage systems, designated by the Minister of the Environment as not conforming to the requirements provided for in the Ordinance of Ministry of the Environment based on the survey of the administrators, etc., of the facilities with regard to the pollution state by radioactive materials discharged by the accident. For waste other than that, if waste is regarded as not conforming to the requirements provided for in the Ordinance of Ministry of the Environment as a result of a survey by the possessor of the waste, waste may be applied to the Minister of the Environment to be designated to designated waste (Act, Article 16 -- Article 18)
Specified Waste	Waste in the countermeasure area or designated waste (Act, Article 20)
Standard Conformable Specified Waste	Specified waste regarded as having radioactivity of cesium-137 and cesium-134 not more than 8000 Bq/kg in total
Debris	In the Guidelines, it refers to the waste generated by the East Japan Great Earthquake (wreckage of buildings collapsed by the Earthquake and tsunami and cars and ships, etc., damaged by tsunami)
Contaminated Waste, etc.	Waste in the countermeasure area, designated waste or removed soil (Act, Article 46)
Measures for Decontamination of the Soil, etc.	Removal of soil, fallen leaves and twigs, sludge piled up in waterways related to the contamination, prevention of spread of the contamination and any other measures, which are carried out for the soil, plants and structures, etc., contaminated by radioactive materials discharged by the accident (Act, Article 2, paragraph (3))
Removed Soil	Soil generated from measures for decontamination of the soil, etc., in the specific area for decontamination or decontamination zone (Act, Article 2, paragraph (4))
Removed Soil, etc.	Removed soil and waste generated from measures for decontamination of the soil, etc. (Act, Article 31, paragraph (1))
Measures including Decontamination, etc.	Measures for decontamination of the soil, etc., and collection, transportation, storage and disposal of the removed soil (Act, Article 25, paragraph (1))
Specific Area for Decontamination	The area designated by the Minister of the Environment as it is necessary for the national government to conduct decontamination, etc., due to significant environmental contamination by radioactive materials discharged by the accident in the area and for any other reasons (Act, Article 25, paragraph (1))
Intensive Contamination Survey Area	Area designated by the Minister of the Environment as it is necessary to conduct a focused survey of the contamination state of the environment by radioactive materials discharged by the accident in the area (the Act, Article 32, paragraph (1))

Decontamination Plan	Plan of implementation of measures, including decontamination, etc., with respect to the area in the intensive contamination survey area, whose status of environmental contamination by radioactive materials discharged by the accident is recognized as not satisfying the requirements provided for in the Ordinance of the Ministry of the Environment as a result of a survey under the Act. The plan shall be developed by governors of prefectures or mayors of municipalities (the Act, Article 36, paragraph (1)).
Decontamination Zone	Zone covered by the decontamination plan (Act, Article 35, paragraph (1))
Specified Waste, etc.	Specified waste and wastewater generated by specified waste
WDS Guidelines	Guidelines for Provision of Waste Information (March 2006, the Ministry of the Environment, Minister's Secretariat, Waste and Recycling Measures Department)
Designation Standards	Standards for designation of waste contaminated with radioactive materials discharged by the accident to a level requiring special controls. It means the radiation concentration of the radioactive materials discharged by the accident exceeds 8,000Bq/kg. It indicates the radioactive concentration of radiocesium is 8,000 Bq/kg.
Waste Management Act	The Waste Management and Public Cleansing Act
Primary Entrustee	A person who was commissioned to collect or transport specified waste by the national government (Ordinance, Article 23, paragraph (1))
Asbestos-Containing Specified Waste	Specified waste containing asbestos, designated by the Minister of the Environment (except for Specified waste asbestos, etc.) (Ordinance, Article 23, paragraph (1))
Specified Waste Asbestos, etc.	Waste asbestos (only limited to specified waste) and asbestos-containing specified waste or to which asbestos is attached, designated by the Minister of the Environment as these might disperse (Ordinance, Article 23, paragraph (1))
Specified Soot and Dust	Soot and dust (only limited to specified waste) (Ordinance, Article 23, paragraph (1))

1.2 Purpose of the Guideline

The purpose of this guideline is to describe the standards for specified waste disposal stipulated in Article 20 of the Act and points to consider in the use of the standards ensure that such standards can be used appropriately and efficiently for the disposal of waste contaminated with radioactive materials discharged by the accident in compliance with law.

1.3 Overview of Specified Waste

(Standards for Specified Waste Disposal)

Article 20 of the Act

Those who collect, transport, store or dispose waste in the countermeasure area or designated waste (hereinafter called “specified waste”) shall comply with the standards prescribed by the Ordinance of the Ministry of Environment and collect, transport, store or dispose specified waste.

[Purpose of Measures]

Specified waste is defined as “waste in the countermeasure area or designated waste” and its disposal standards are set by Ordinance.

- Ordinance, Article 23 the standards for collection and transportation of specified waste (Chapter 3)
- Ordinance, Article 24 the standards for storage of specified waste (Chapter 2)
- Ordinance, Article 25 the standards for disposal of specified waste (Chapter 4)
- Ordinance, Article 26 the standards for disposal of specified waste (Chapter 5)

See “Guideline for Designated Waste” for the overview of designated waste.

1.4 Outline of Waste in the Countermeasure Area

(Treatment plan for waste in the countermeasure area)

Act, Article 13, paragraph (1)

The Minister of the Environment shall, when he/she has designated a countermeasure area, in order to properly dispose of waste in the said countermeasure area (including that which was originally located in the area but has been transferred outside the said countermeasure area except for that as specified by an Ordinance of the Ministry of the Environment; hereinafter referred to as “waste in the countermeasure area”), formulate a treatment plan for waste in the countermeasure area (hereinafter referred to as a “plan for treatment of waste in the countermeasure area”) without delay.

(Government’s implementation of treatment of waste in the countermeasure area)

Act, Article 15

The national government shall collect, transfer, store, and dispose of waste in the countermeasure area in accordance with the plan for treatment of waste in the countermeasure area.

(Waste excluding waste in the countermeasure area)

Ordinance, Article 3

The waste prescribed by the Ordinance of the Ministry of the Environment as under the Act, Article 13, paragraph (1) shall be that listed below among the waste in the countermeasure area.

- (i) Waste generated accompanying business activities in the countermeasure area (excluding waste generated accompanying disaster reconstruction projects that the national or local governments implement, and waste generated accompanying measures for decontamination of the soil, etc., applicable to the land, etc., in the countermeasure area).
- (ii) Waste generated in the zones (including a zone out of the zones subject to these orders if the zone out of the zones subject to these orders is a municipality designated as a countermeasure area after the orders are lifted) that was subject to the Instruction to Establish Cautionary Zones (referring to the instruction given with regard to the accident in accordance with the provisions of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Act No. 156 of 1999), Article 15, paragraph (3), or Article 20, paragraph (2) by the Prime Minister or the Director-General of the Nuclear Emergency Response Headquarters (referring to the director-general of the nuclear emergency response headquarters provided under the same Act, Article 17, paragraph (1); the same shall apply hereafter in this item) to municipal mayors to establish cautionary zones pursuant to the provisions of the Basic Act on Disaster Control Measures (Act No. 223 of 1961), Article 63, paragraph (1), applied with certain replacement of terms as appropriate as under the provisions of the same Act, Article 27 (4), paragraph (1) or Article 28, paragraph (2)) or the Planned Evacuation Instruction (referring to the instruction given pursuant to the provisions under the Act on Special Measures Concerning Nuclear Emergency Preparedness, Article 20, paragraph (2), by the Director-General of the Nuclear Emergency Response Headquarters to municipal mayors to implement planned relocation for evacuation) after such instructions are lifted (excluding any waste generated from measures for decontamination of the soil, etc., applicable to the land, etc., within such zones).
- (iii) Waste brought into the countermeasure area after the designation of such countermeasure area pursuant to the provisions of the Act, Article 11, paragraph (1) was made (excluding waste falling under the preceding item (ii)).

[Purpose of Measures]

In Article 13, paragraph (1) of the Act, waste in the countermeasure area falling under the predetermined

requirements is defined as “waste in the countermeasure area”. Waste to be excluded from the Waste in the Countermeasure Area is specified in detail in the Ordinance, Article 3.

Article 15 of the Act specifies that the national government shall collect, transport, store, and dispose of waste in the countermeasure area according to the plan for treatment of waste in the countermeasure area developed based on Article 13 of the Act.

The overview of designated countermeasure areas is as follows (Ministerial Notification No. 106 of the Ministry of the Environment on December 28, 2011):

- The area of 20 km radius from Tokyo Electric Power Company’s Fukushima Daiichi Nuclear Power Station
- Katsurao-mura, Namie-machi, Naraha-machi (excluding the above areas)
- Part of Minamisoma-shi (excluding the above areas)
- Iitate-mura
- Part of Kawamata-machi

Pursuant to Article 20 of the Act, standards on storing specified waste are set in the Ordinance, Article 24. The storage standards are applied to storage in a temporary storage site for designated waste after the waste is received by the national government or a contractor commissioned by the national government, etc., and storage in a temporary storage site etc. for waste in the countermeasure area.

Pursuant to Article 17, paragraph (2) or Article 18, paragraph (5) of the Act, for standards on storage until designated waste is delivered to the national government or a contractor commissioned by the national government, etc., refer to “Guidelines for Designated Waste” published separately by the Ministry of the Environment.

Table 1-1 shows the overview of the storage standards. Specific measures are described from 2.1 and onward. When you refer to “designated waste” in the provisions of the Ordinance for each item, see “specified waste”.

Table 1-1: Outline of Storage Standards pursuant to the Act on Special Measures

	Content of Storage Standards	1. Storage Standards for Designated Waste (Site, etc.)	2. Storage Standards for Specified Waste		3. Storage Standards for Decontaminated Waste (Site, etc.)
		Over 8,000Bq/kg	Over 8,000 Bq/kg [2.1 of the guidelines]	Under 8,000 Bq/kg [2.2 of the guidelines]	Under 8,000 Bq/kg
1	Requirements for Storage Site (installation of fence and notice board)	Applied	Applied (there are requirements for notice board)	Applied (there are requirements for notice board)	Applied
2	Prevention of Scattering and Outflow of Waste	Applied (storage in containers and packaging, etc., are required)	Applied (storage in containers and packaging, etc., are required)	Applied	Applied
3	Prevention of Contamination of Public Water Area and Groundwater	Applied	Applied	Applied	Applied
4	Prevention of Infiltration of Rainwater or Groundwater	Applied	Applied	Not applied *1	Not applied *1
5	Prevention of Emission of Foul Odors	Applied	Applied	Applied	Applied
6	Prevention of Emergence of Harmful Insects	Applied	Applied	Applied	Applied
7	Prevention of Mixing of Specified Waste, etc., with Other Materials	Applied	Applied	Applied	Not applied
8	Prevention of Mixing with Waste, etc., Containing Asbestos	Applied	Applied	Applied	Applied
9	Storage Method of Perishable Waste	Applied	Applied	Applied	Applied
10	Prevention of Radiation Hazard	Applied	Applied	Not applied *2	Not applied *2
11	Measurement and Record of Amount of Radiation	Applied (before and after start of storage)	Applied (at least once every seven (7) days)	Applied (at least once every seven (7) days)	Applied (before and after start of storage)
	Water Quality Inspection of Surrounding Groundwater	Not applied	Applied	Applied	Not applied

12	Retention of Records of Measurement of Amount of Radiation (until elimination of the storage site)	Applied	Applied	Applied	Applied
13	Retention of Records of Storage	Not applied	Applied	Applied	Not applied

- *1 Measures for reducing contact with water. For disposal of waste exceeding 8,000 Bq/kg, measures for reducing contact with water shall be taken at every stage from transport to the final disposal to prevent elution of radiocesium from the waste to ensure safety.
- *2 For treatment of waste under 8,000 Bq/kg, if waste, which might outflow or wastewater might be generated by rainwater, are stored outdoors, provisions of prevention of scattering and outflow (Storage Standards 2) and provision of prevention of contamination of public water area and groundwater (Storage Standards 3) are applied and outflow of waste in suspension with water by rainwater and outflow and permeating into the ground of wastewater from the waste shall be regulated.
- *3 For the waste below 8,000 Bq/kg, as it is not necessary to take particular isolation measure, such isolation measures as cover soil, etc., are not provided.

2.1 Standards on Storing Specified Waste (Excluding Standard Conformable Specified Waste)

2.1.1 Requirements for Storage Site

Ordinance, Article 24, paragraph (1), item (ii)

Storage shall be carried out at a place that meets the requirements specified under Article 15, item (i), (a) and where a notice board satisfying the following requirements is installed at a clearly viewable location.

- (a) 60 cm or greater both vertically and horizontally; provided, however, that this shall not apply to cases where waste (limited to that falling under the category of waste in the countermeasure area and that pertaining to the designation pursuant to the Act, Article 17, paragraph (1)) generated from measures for decontamination of the soil, etc., applicable to the land, etc., within the specific area for decontamination or decontamination zone is stored on the land on which measures for decontamination of the soil, etc., has been implemented.
- (b) Following matters shall be displayed:
1. That it is a storage site of specified waste;
 2. The kind of specified waste stored (if such specified waste includes any of the specified waste listed from Article 23, paragraph (1), item (v), (a) through (c) or any specified waste which has putrefied or poses a risk to become putrefied (hereinafter referred to as “Asbestos-Containing Specified Waste, etc.”), such fact shall be included);
 3. Contact information in case of emergency; and
 4. In cases where specified waste is stored outdoors without using a container, the maximum of the heights prescribed under Article 15, item (ii), (b), that shall be governed by the provision of the preceding item.

Ordinance, Article 15, item (i) (a)

Storage shall be carried out at a place that meets the following requirements.

- (a) An enclosure shall be set up surrounding the place (if it is of a structure where the specified waste stored is loaded directly against such enclosure, then it shall be restricted to an enclosure which is safe enough from the point of view of structural strength).

[Purpose of Measures]

It is necessary to clearly separate the specified waste storage site from other areas and enclose the storage site as well as provide a notice board to indicate the specified waste storage site.

[Example of Measures]

The enclosure shall conform to the following example.

If waste is stored in a warehouse, tent or pipe house, an enclosure is not required.

(In case of storage at the place where no person other than the related persons enter, such as on the premises of intermediate treatment facilities, etc.)

- In order to indicate the scope of the storage site, such measures shall be taken as laying out road cones (Figure 2-1) or extending rope (Figure 2-2), etc.
- The enclosure needs to be secured not to be blown away where it is exposed to wind and rain.

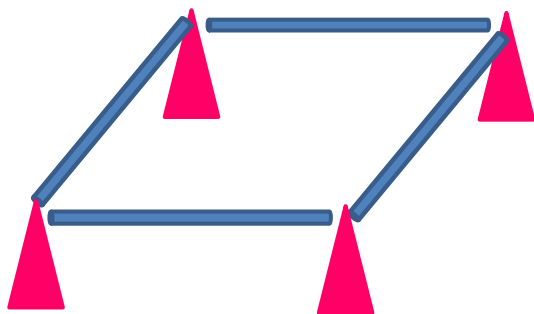


Figure 2-1: Road cones (Example)

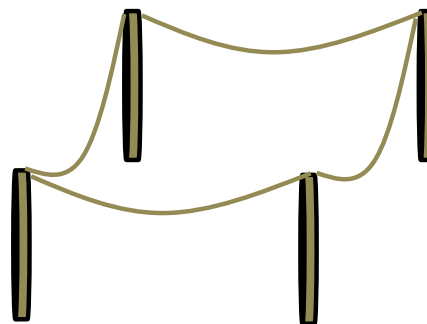


Figure 2-2: Rope (Example)

(In case waste is stored in a place such as outside the facility site where unauthorized people can enter)

- It is important to install an enclosure such as an iron wire fence (Figure 2-3), net fence or metal fence (Figure 2-4) in order to prevent people from entering the storage site without authorization.
- If the weight of specified waste is directly put on the fence, it is necessary to use a fence which has the structure and strength to bear such weight.
- The fence should be installed in such a way that it will not fall down if it is exposed to wind and rain.
- If a fence is installed, it is recommended to get the door locked to prevent people from entering the storage site without authorization.
- To prevent radiation hazard during the storage, see “2.1.10 Prevention of Radiation Hazard” hereinafter described.

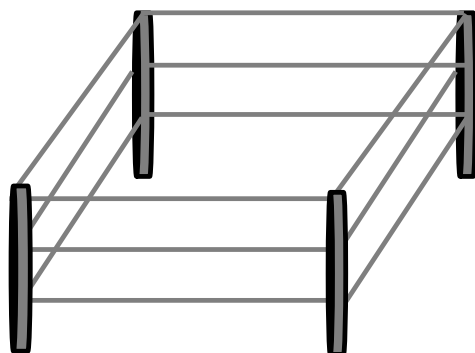


Figure 2-3: Iron Wire Fence (Example)

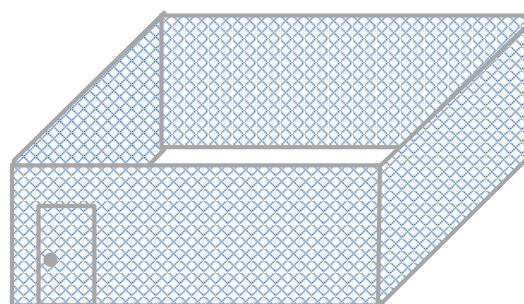


Figure 2-4: Fence (Example)

The notice board shall be in accordance with **Figure 2-5**.

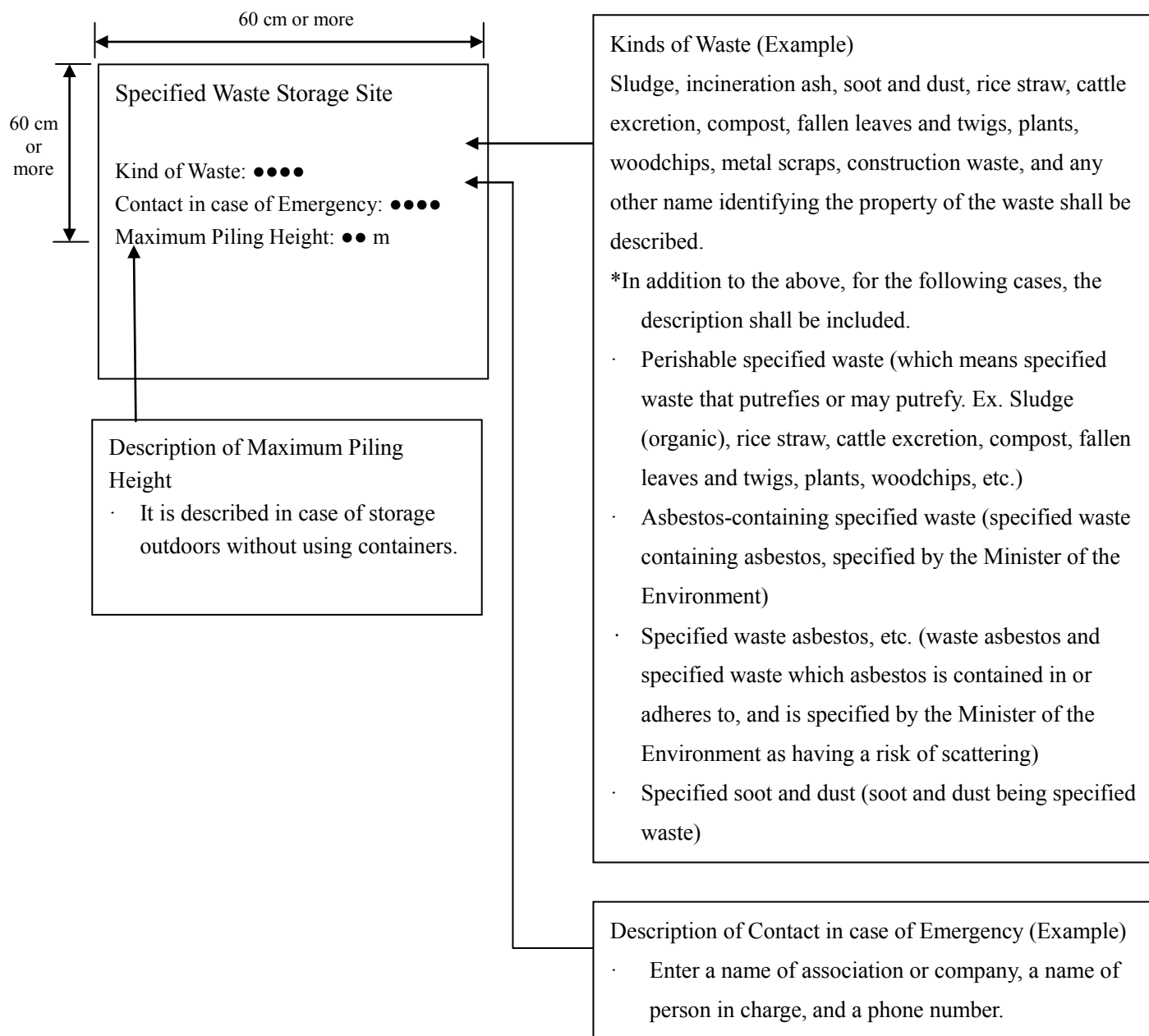


Figure 2-5: Notice Board (Example)

2.1.2 Prevention of Scattering and Outflow of Specified Waste

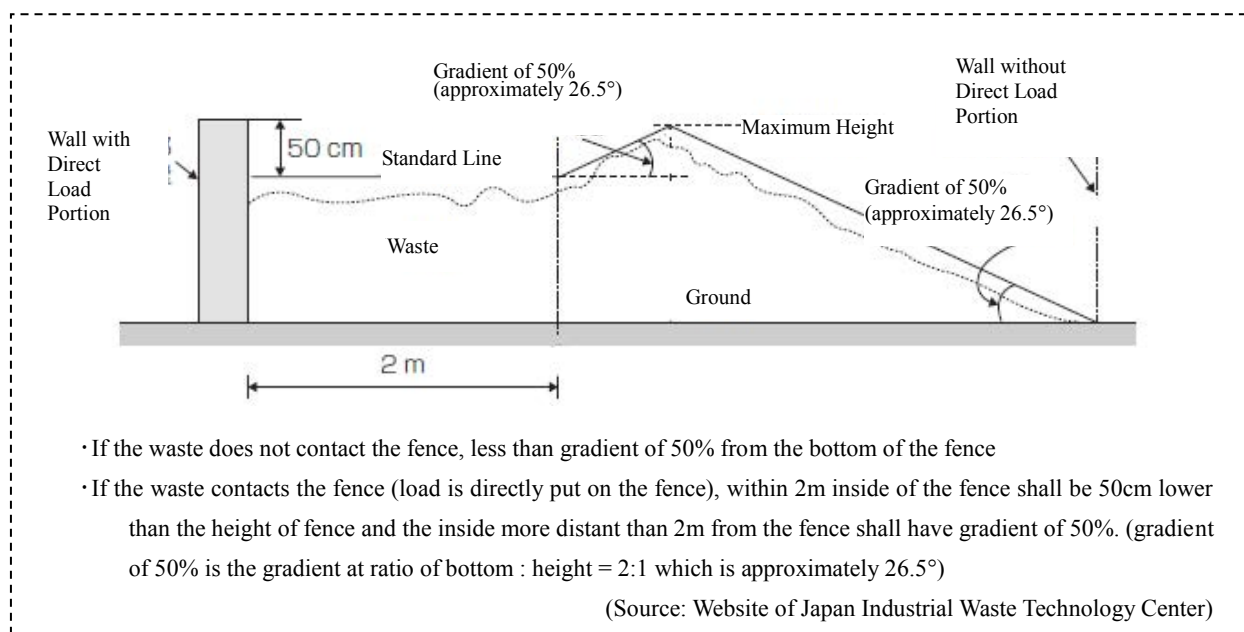
Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (ii)

In order that no specified waste will scatter or flow out of the storage site, the following measures shall be taken.

- (a) Necessary measures shall be taken such as putting the specified waste in a container or in a package, etc.
- (b) In cases where the specified waste is stored outdoors without using a container, the height of such specified waste piled up shall not exceed such height prescribed in the following 1., or 2., depending on the situation as classified under such 1., or 2.:
 1. If it is without a structure which has an area where the specified waste stored is loaded directly against the enclosure of the storage site (hereinafter referred to as “directly loaded area”), for any given point of such storage site, the height from the ground to the intersecting point of a vertical line that goes through such given point and a surface that goes through the bottom of that enclosure (if the bottom is not touching the ground, the intersecting line of the surface that is vertically extended from that bottom and the ground) and has a gradient of 50% upward from a level surface (if there are 2 or more intersecting points, it shall be the one nearest to the ground).
 2. If it is with a directly loaded area against the enclosure of the storage site, the height as prescribed under the following a., and b., for the areas specified under such a., and b.:
 - a. For the area within 2 meters horizontally to such storage site side from the vertical downward line of 50 cm from the top of the directly loaded area (if the height of such enclosure of the directly loaded area is less than 50 cm, this shall be its bottom) (hereinafter referred to as “base line”): for any given point of such area within 2 meters, the height prescribed under the following i., (If the enclosure of such storage site includes any area which is not a directly loaded area, the lower of the heights prescribed under i., and ii.):
 - i. The height from the ground to the intersecting point of the vertical line which goes through such given point and the horizontal surface which goes through the base line with a minimum horizontal distance to such vertical line
 - ii. The height prescribed under 1.
 - b. For the area beyond 2 meters horizontally to such storage site side from the base line: for any given point in such area beyond 2 meters, the height prescribed under the following i., (If the enclosure of such storage site includes any area which is not a directly loaded area, the lower of the heights prescribed under i., and ii.):
 - i. The height from such given point to the intersecting point of a vertical line which goes through such point and a surface which goes through the line that is 2 meters horizontally to the storage site side from the base line and has a gradient of 50% upward from a level surface (if there are 2 or more intersecting points, it shall be the one nearest to the ground)
 - ii. The height prescribed under 1.



[Purpose of Measures]

- In order to prevent scattering and outflow of specified waste from affecting maintenance of the living environment, it is required to store waste at an appropriate piling height.
- If there is a risk of scattering and outflow of specified waste due to infiltration of rainwater or groundwater, it is required to take measures to prevent infiltration of rainwater or groundwater.

[Example of Measures]

- If there is a risk of scattering and outflow of specified waste due to its type and properties, it is effective to store waste in a container.
- If there is a risk of scattering and outflow of specified waste due to infiltration of rainwater or groundwater, it is effective to store waste in a waterproof container, cover waste with a waterproof sheet or store waste at a higher place.

(Storage in Flexible Containers)

- Types of flexible containers are as shown in **Table 2-1**. The properties of specified waste to be stored and its storage period should be considered. General cross-type (**Figure 2-6**) can be used to store lighter specified waste. However, if specified waste is stored for a certain period of time (several years) or waste containing a large amount of water or heavier waste is stored, it is effective to use durable containers such as cross-type and running-type (**Figure 2-7**), which have a weather-resistant inner bag.
- If specified waste contains a large amount of water such as sludge is stored in a flexible container or specified waste is mixed with a large amount of water such as snow, it is required to avoid piling storage as there is a risk of wastewater seeping out due to its weight. However, this does not apply if waste is stored in a place where wastewater does not seep out, such as inside a building with a drainage fitting.
- If specified wastes in flexible containers are piled up to store, it is effective to keep the piling height up to 2–3m (2–3 layers) to prevent falling and damage. However, for perishable waste, see “2.1.9 Storage Method of Perishable Specified Waste” hereinafter described.

Table 2-1: Type of Flexible Containers

Type of Flexible Container	Features, etc.
Cross-type*	<ul style="list-style-type: none"> One-way use is expected. Less weather-resistant and waterproof compared to running-type. Some have high weather-resistance with UV processing, an inner bag or internal coating.
Running-type*	<ul style="list-style-type: none"> Use by repeating filling and discharge is presumed. It has superior weather resistance and waterproof property.

*According to JIS Z 16512

Note) In addition to the above, bags similar to sandbags are marketed, conformity to JIS of which was not confirmed. It is necessary to select for use after confirming that it is suitable for storage conditions.



Figure 2-6: Cross-type (Example)



Figure 2-7: Running-type (Example)

(Source: A pamphlet of a manufacturer)

*Notes: at the time of storing waste in flexible containers

When specified waste with high tendency to produce dust such as specified soot and dust from incineration facilities is stored in flexible containers, it is important to prevent scattering of waste in the surrounding area by using a hopper, etc. to prevent workers removing ash from exposure.

(Storage in Drum Cans)

- If there is a risk of outflow of wastewater from stored specified waste containing a large amount of water such as sludge, it is effective to use drum cans as storage containers.
- For perishable specified waste including organic sludge, cattle manure, compost, plants, fallen leaves and twigs, if there is a high risk of decay, heat accumulation can occur due to fermentation. It is effective to store waste in containers with high heat resistance such as drum cans (with a lid), not in flexible containers.
- As drum cans are normally made of metals, it is effective to use chemical drum cans to prevent decay of waste.

(Storage in Plastic Bags)

- For storage of a small amount of plants and fallen leaves and twigs, plastic bags with a certain level of strength can be used (Household refuse bags should not be used as they are not durable enough).
- It is effective to use double packaging to store waste to prevent plastic bags from breaking open.

(Packaging by Packaging Net)

- It is recommended to pack waste from farmland including rice straws in packaging nets to prevent waste from scattering and to store waste indoors such as in a warehouse and plastic greenhouse.
- It is necessary to pack the waste as the entire surface of waste can be covered to prevent scattering and outflow of waste from gaps in packaging materials.

(Storage in Removable Container)

- If waste is stored in removable containers that will be loaded onto a detachable truck for transport, it is effective to cover the top surface with a waterproof sheet to prevent scattering and outflow of waste and infiltration of rainwater and to raise the center of the waterproof sheet higher to give a slant to the sheet to prevent pooling of rainwater.

(Storage outdoors without using containers)

- If waste is stored outdoors without using containers, it is effective to fix the sheet to the ground or the waste to prevent the sheet being rolled up or slipping off due to wind and rain, store waste at a higher place and take necessary measures to prevent infiltration of rainwater into the gap between the sheets and contact between waste and rainwater. (Figure 2-8, Figure 2-9).
- If cover sheets are patched together, it is required to check whether the patched part is damaged when the weight of waste is put on the sheet due to a sunken or deformed pile of waste.
- It is effective to raise the center of a cover sheet higher to give a slant to the sheet to prevent pooling of rainwater on the sheet.
- If there is a slope near the storage site and there is a risk of infiltration of water (i.e. surface water) from the surrounding area, it is effective to install a drainage system around the storage site.
- If there is a risk of infiltration of rainwater into the base of the storage site, it is effective to place a pallet used for cargo transport at the base and store specified waste on top of it.

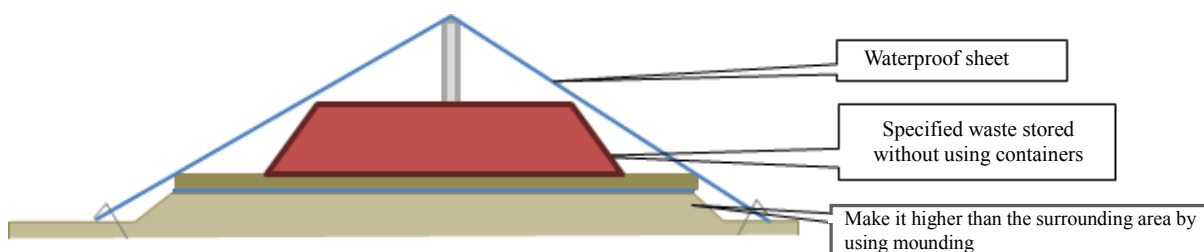


Figure 2-8: Prevention of scattering/outflow of specified waste that is not stored in containers (Example 1)

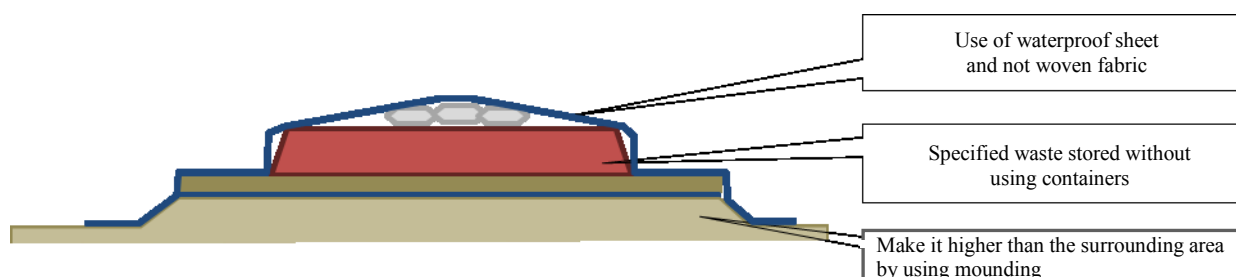


Figure 2-9: Prevention of scattering/outflow of specified waste that is not stored in containers (Example 2)

*When any damage is found on the seepage control sheet, it is required to repair it quickly to prevent infiltration of rainwater.

(Storage on sloping ground)

- If the storage site is installed on sloping ground, it is particularly required to prevent waste from falling.
- For example, it is effective to install an earth retainer or an enclosing bund at the base according to the slope, or place cut earth and embank according to the steep angle to create flat ground (**Figure 2-10**).
- When creating such ground, it is required to check the strength of the ground and the groundwater level in advance, carry out the ground maintenance and take measures against surface water.

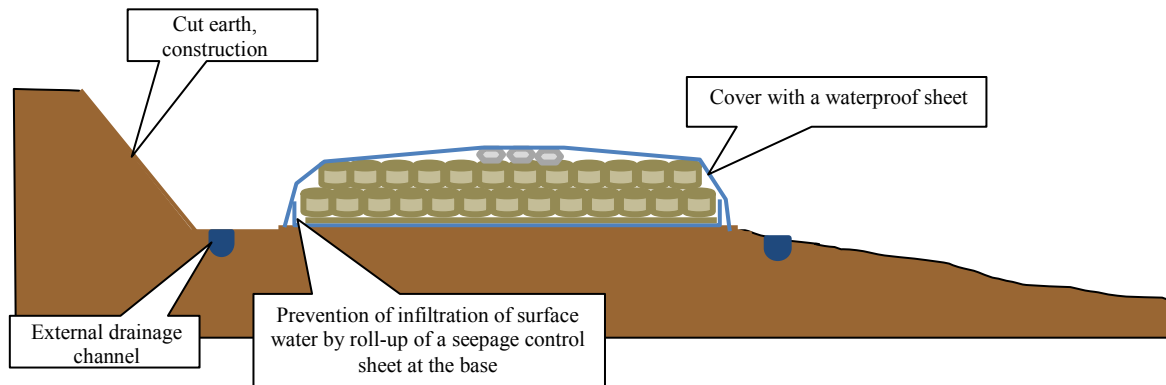


Figure 2-10: Installation of the storage site on the sloping ground (Example)

(Storage indoors without using containers)

- If specified waste is stored in buildings without using containers, it is required to prevent scattering or outflow of waste from going outside the buildings.

(Storage of specified waste containing asbestos)

- It is effective to store specified waste asbestos, etc. in dual packages of plastic bags with sufficient strength (thickness of 0.15 mm or more is recommended) or in robust containers (sealed containers such as drum cans), after moistening specified asbestos waste by sprinkling with water or anti-scattering agents to prevent scattering asbestos.
- It is effective to cover asbestos-containing specified waste with sheets or pack it in bags to prevent scattering.

“(Manual of Treatment of Waste containing Asbestos, 2nd Edition)” (March 2011, the Ministry of the Environment))

(Reference) When waste in containers is stored in a cargo container or indoors

- It is effective to store waste in flexible containers or drum cans indoors to prevent scattering and outflow of waste.

[Notes]

(Documentation)

- To manage containers storing specified waste, you can display the types of stored specified waste (display for containers storing specified waste asbestos, etc. needs to include the indication of asbestos) and concentration of radiocesium (i.e., attaching a tag or card to containers, put up a signboard near containers if only the same type of waste is stored), and create a separate list of information on specified waste, including information on overview of the original place of generation and the time of generation and keep records and manage the information.

2.1.3 Prevention of Contamination of Public Water Area and Groundwater

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (iii)

In order to prevent contamination of public water area and groundwater by the sewage water generated from the storage of specified waste, necessary measures shall be taken such as covering the bottom surface of the storage site with a seepage control sheet, etc.

[Purpose of Measures]

- It is required to prevent outflow of wastewater and its infiltration into the ground that may be caused by the storage of specified waste to prevent contamination of public water area and groundwater around the storage site.
- There is a risk of outflow of wastewater generated by a large amount of water such as snow getting into specified waste.

[Example of Measures]

- If there is a risk of outflow of wastewater into the surrounding areas caused by the storage of specified waste containing a large amount of water such as sludge, it is effective to use airtight containers such as drum cans.
- If there is a risk of outflow of wastewater and its infiltration into the ground caused by the storage of specified waste, it is effective to create a drainage channel to install drains. Also, if wastewater is released into public water area, it is effective to carry out wastewater treatment through sedimentation separation and by using absorbent.
- If any damage is found on seepage control sheets or airtight containers, the land owner shall replace or repair them as required. If such replacement or repair is difficult, consult with governmental agencies.

(Installation of seepage control sheets)

- If there is a risk of outflow of wastewater and its infiltration into the ground, it is required to install seepage control sheets.
- When you choose the structure and material of a seepage control sheet, refer to the standards of seepage control work sheets used at the final landfill site (see below).
- It is a basic rule not to store waste that may damage seepage control sheets. However, if there is a risk of damage to seepage control sheets as stored waste contains protruding objects, it is effective to place a protection mat (i.e. non-woven fabric) or protection soil between seepage control sheets and the ground to protect seepage control sheets.
- Also, if there is a risk of damage to seepage control sheets from using heavy equipment nearby, protecting soil or iron board can be installed in the route that heavy equipment passes through.

(Reference)

Matters of Note in connection with Operation of the Order determining the Technical Standards for Final Landfill Site of Municipal Solid Waste and Final Landfill Site of Industrial Waste (July 16, 1998, Kansuiki No. 301, Eikan No. 63)

6. Seepage Control Sheet

It is common to use seepage control sheets as the seepage control material of surface seepage control work and for the materials, synthetic rubber, synthetic resin and asphalt are commonly used.

The thickness of a seepage control sheet shall be more than 1.5mm for seepage control sheets other than asphalt and seepage control sheet of asphalt shall be more than 3mm, considering that it shall ensure sufficient strength and seepage control even after the surface is damaged or the quality is deteriorated and the possibility of repair, etc.

Seepage control sheet having effect of seepage control, strength and durability necessary for prevention of infiltration of retained water provided for in the Order, Article 1, paragraph (1), item (v) a. 1. shall be the seepage control sheet having the following properties. In this regard, it is necessary that the joint parts of seepage control sheets shall have similar properties and capacities.

[1] Effect of Seepage Control

For the material of seepage control sheet, it shall have sufficient seepage control property in which the retained water, etc., in the landfill site would not seep. There is no hole or crack, etc., is found on the surface of seepage control sheet.

[2] Strength

It shall have the capacity to respond by strength and extension to the load presumed by waste or retained water, etc., the impact power by vehicles of landfill work, etc., changes in base ground which might arise from them and tolerable in stable computation and presumed temperature stress.

[3] Durability

a. Weather Resistance

As the quality of seepage control sheet might deteriorate by the impact of ultraviolet rays, it shall have the property in which the strength and extension rate of seepage control sheet would not deteriorate significantly even after long time exposure to ultraviolet rays compared with the conditions before exposure to ultraviolet rays.

b. Heat Stability

The surface temperature of seepage control sheet might increase to approximately 60°C through 70°C in summer by direct sunshine, while the temperature might decrease to approximately -20°C in winter. Also the inside temperature of a landfill site might increase due to decomposing reaction of waste, seepage control sheet shall have resistance to such temperature fluctuations.

c. Acid resistance and alkaline resistance, etc.

Presuming the hydrogen ion concentration of retained water, etc., of a landfill site, seepage control sheet shall have the property resistant to acid and alkaline.

In addition, seepage control sheet shall have resistance to oil and other chemical conditions of reclaimed waste.

d. Other

Seepage control sheet shall have resistance to the quality deterioration by the impact of ozone in the air and cracks emerging in case of continued stress by bent.

[4] Other

Seepage control sheet shall have good workability so that defect shall not occur in laying and jointing, etc., of seepage control sheets.

(Reference) Please note the following points when installing a seepage control sheet.

- Install a seepage control sheet that is larger than the area where specified waste is placed to ensure specified waste to be stored will not spill over outside the sheet.
- If the ground has an uneven surface, level the ground before installing the sheet to prevent damage to the sheet.
- Normally, a single seepage control sheet is installed. However, if waste is stored for a certain period of time, double laying can be considered.
- A seepage control sheet with appropriate thickness shall be selected, considering the conditions of the storage site and expected storage period. While thickness of 0.5 mm, 1.0 mm, and 1.5 mm is available for a seepage control sheet, 1.5 mm is the required thickness for a seepage control work sheet used at the final landfill site. However, a thinner sheet can be used, depending on the conditions of the storage site.
- The following measures shall be taken in order to prevent wastewater leaked from specified waste from stagnating on the seepage control sheet.
 - Soil (with a certain level of viscosity. Fine-grain fraction 15–50%) shall be laid on the seepage control sheet and containers shall be placed on it. It is effective to use soil mixed with cesium-absorptive substances such as bentonite and zeolite.
 - Prevent a pool of wastewater by creating a slant.

(Laying viscous soil)

- Soil layers such as bentonite sheets or viscous soil can be laid instead of seepage control sheets. If specified waste containing a large amount of water is stored for a certain period of time, it is effective to lay viscous soil such as bentonite mixed soil and cesium absorbing soil.

(Storage of waste in containers)

- If there is a risk of outflow of wastewater into the surrounding areas caused by the storage of specified waste containing a large amount of water such as sludge, it is effective to use highly anti-corrosive and airtight containers such as chemical drum cans. However, if chemical drum cans cannot be used, both drum cans and seepage control sheets can be used to prevent corrosion of drum cans during the storage period (**Figure 2-11**).
- If specified waste containing water is stored in flexible containers, it is effective to use cross-type containers with double structure and inner coating or running-type flexible containers (**Figure 2-12**).

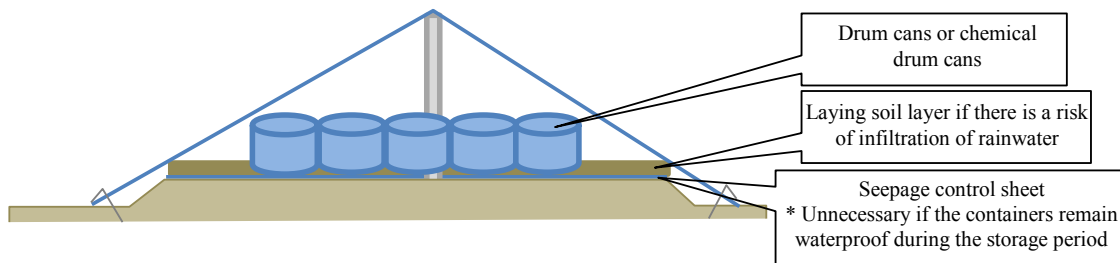


Figure 2-11: Prevention of wastewater leak when specified waste containing a large amount of water is stored in airtight containers (Example)

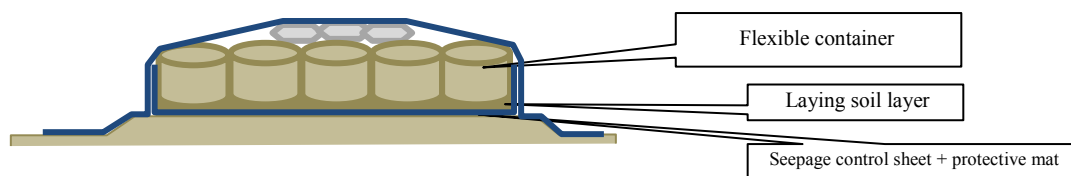


Figure 2-12: Prevention of wastewater leak when specified waste containing water is stored in flexible containers (Example)

(Storage of waste without using containers)

- If specified waste containing water is stored without using containers, it is effective to lay soil layers as well as a seepage control sheet to prevent public water area and groundwater from being contaminated by wastewater (**Figure 2-13**).

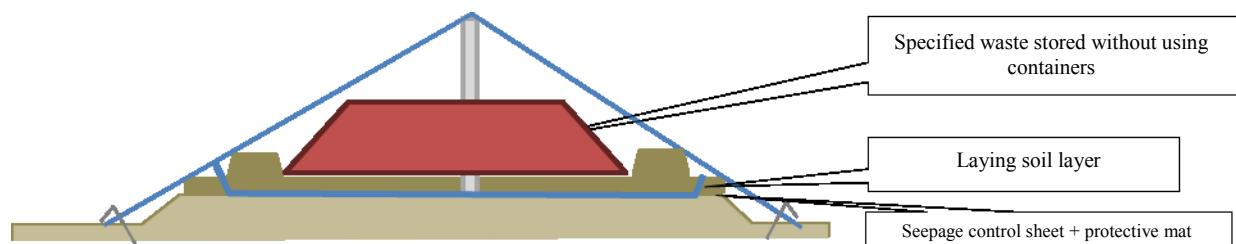


Figure 2-13: Prevention of wastewater leak when specified waste containing water is stored without using containers (Example)

(Storage of waste by drilling the ground)

- If the ground is drilled and specified waste is stored in semi-underground, it is required to prevent fall and outflow of such waste caused by infiltration of surface water (**Figure 2-14**).
- When creating such ground, it is required to check the strength of the ground and the groundwater level in advance, carry out the ground maintenance and take measures against surface water.
- If there is a risk of infiltration of groundwater into the storage site for specified waste due to a high groundwater level, such a storage method should not be used.
- If there is a risk of leachate from specified waste, it is important to take measures against leachate, for example, laying a leachate collection pipe in the soil layer underneath and draw water into the water collection basin installed on the ground.
- In case surface water infiltrates the storage site from the ground, it is effective to place a sheet in a way where the bottom edge of sheet is turned up and the waste is wrapped by the sheet to prevent the waste being submerged.

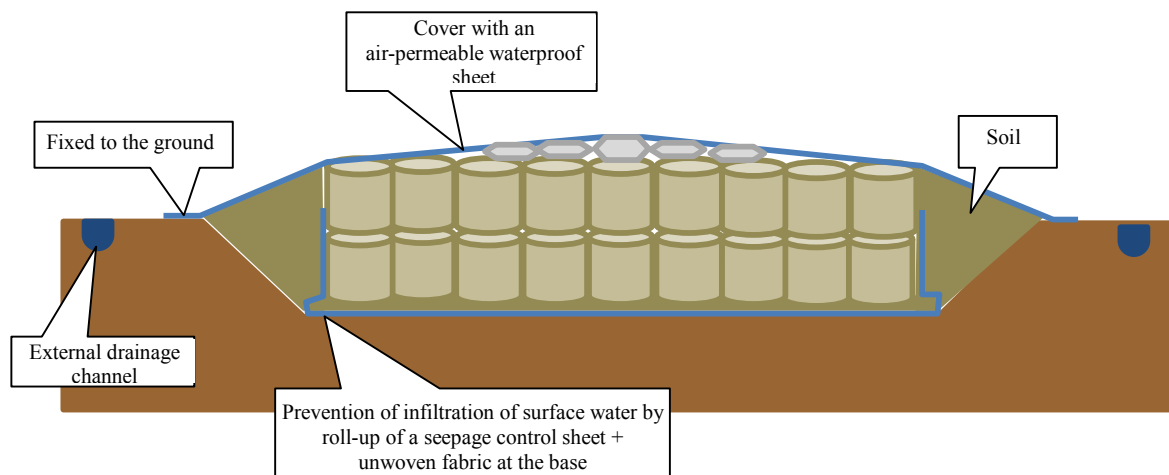


Figure2-14: Prevention of scattering/outflow and infiltration of rainwater when waste is stored by drilling the ground (Example)

(Storage of waste indoors)

- If specified waste containing a small amount of water is stored indoors (concrete floor structure), it can be stored without using a seepage control sheet, provided that prevention of wastewater leak is ensured due to the nature of specified waste and the conditions of the site, to the same extent as when a seepage control sheet is placed. However, it is effective to protect the concrete floor with coating as it is hard to remove radioactive materials infiltrated into concrete (it is required to rip out the whole concrete).
- It is effective to ensure wind and rain does not come into the building where specified waste is stored and install a container to collect wastewater that seeps out from such waste to prevent the outflow of wastewater from the building.

2.1.4 Prevention of Infiltration of Rainwater or Groundwater

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (iv)

In order that no rainwater or groundwater infiltrates into the specified waste, necessary measures shall be taken such as covering the surface of the specified waste with a seepage control sheet, etc.

[Purpose of Measures]

If specified waste is stored, there is a risk of infiltration of rainwater into the waste as it is exposed to wind and rain and infiltration of groundwater into the waste due to increased groundwater level. Therefore, it is required to take measures to prevent such infiltration of rainwater or groundwater into the specified waste.

[Example of Measures]

- When selecting a storage site, it is required to avoid a basin where rainwater tends to pool or a place where the groundwater level is high.
- If there is a slope near the storage site and there is a risk of infiltration of water from the surrounding areas, it is required to install a drainage system around the storage site.
- To prevent infiltration of rainwater or groundwater into specified waste when the waste is stored outdoors, it is required to adopt an appropriate infiltration prevention method according to the waterproof properties

of the containers storing waste.

- As radiocesium can be easily eluted from some soot and dust, it is important to wrap such waste with a seepage control sheet when it is stored or to store it in a place with a roof such as a building or a tent.

(Storage of waste indoors or in a place with a roof)

- It is effective to store waste indoors to prevent infiltration of rainwater (**Figure 2-15**).
- If specified waste is stored in a place with a roof and a waterproof sheet where there is a risk of damage to the waste due to wind and rain or in a makeshift tent, it is required to use containers with a certain level of waterproofing to store waste (i.e. drum cans or running-type flexible containers) (**Figure 2-16**).

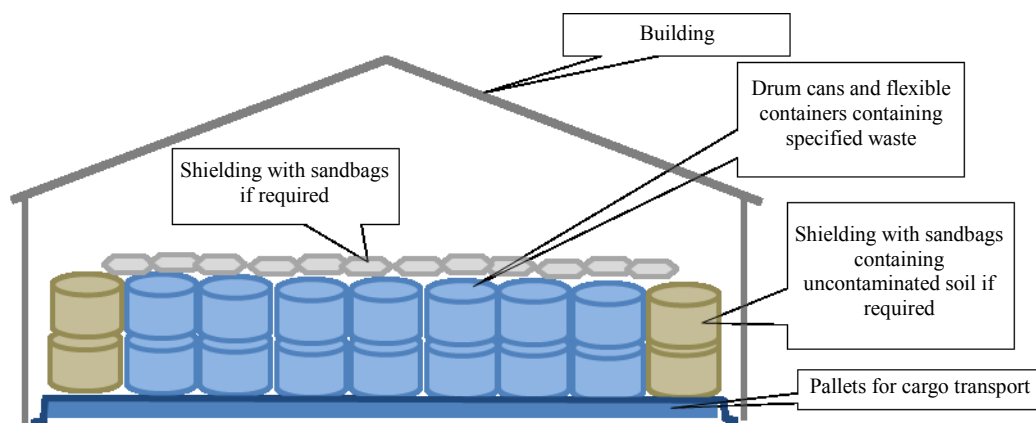


Figure 2-15: Storage indoors (Example)

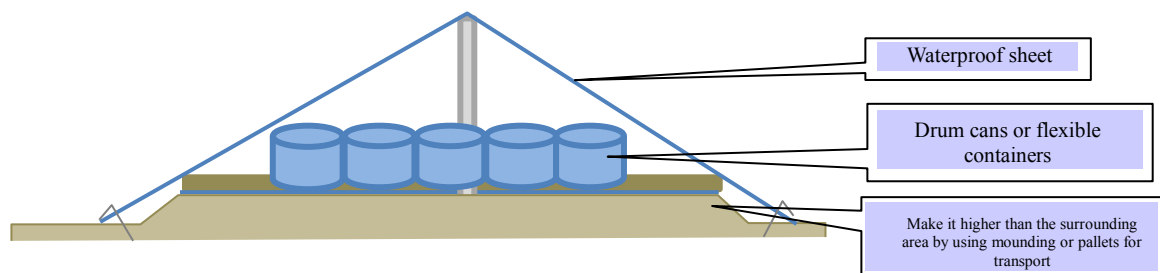


Figure 2-16: Storage under a roof of a waterproof sheet (Example)

(Storage outdoors)

- It is required to prevent infiltration of rainwater or groundwater by covering the entire surface of specified waste with seepage control sheets (**Figure 2-17**).
- See “2.1.3 Prevention of Contamination of Public Water Area and Groundwater” for the structure and material of a seepage control sheet.
- It is important to fix the edge of a seepage control sheet to prevent it from being rolled up by strong wind.
- It is effective to raise the center of the waterproof sheet higher to give a slant to the sheet to prevent pooling of rainwater on the sheet.
- See “2.1.9 Methods for storage of perishable specified waste” for storage of perishable specified waste.

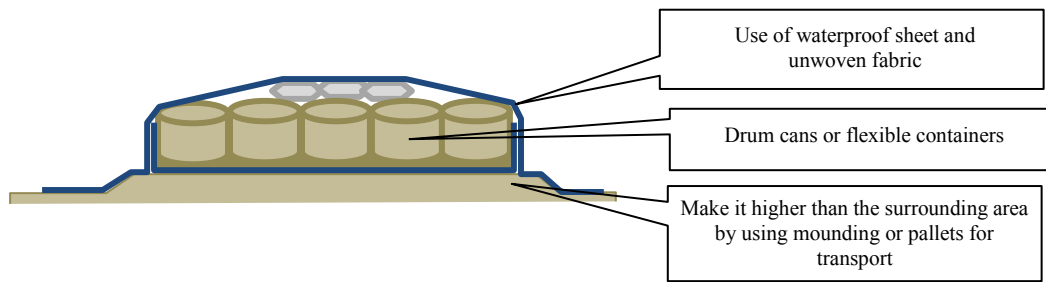


Figure 2-17: Storage outdoors (Example)

2.1.5 Prevention of Emission of Foul Odors

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (v)

Necessary measures shall be taken to prevent any foul odors from emitting from the storage site.

[Purpose of Measures]

It is required to ensure foul odor is not emitted from the stored specified waste to maintain the living environment around the storage site.

[Example of Measures]

- If specified waste such as sludge that may emit foul odor is stored, it is effective to increase air-tightness of containers by using drum cans or running-type flexible containers or covering waste with a sheet.
- As perishable specified waste may store heat and catch fire when air-tightness is increased, it is effective to keep a certain distance between the storage site and other facilities, considering the conditions of surroundings.

2.1.6 Prevention of Emergence of Harmful Insects

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (vi)

It shall be ensured that neither any rodents will live nor any mosquitoes or flies or any other harmful insects will break out at the storage site.

[Purpose of Measures]

It is required to prevent infestation of rats and emergence of mosquitoes, flies and other pests to maintain the living environment around the storage site.

[Example of Measures]

(Measures for Prevention of Emergence, etc.)

- It is effective to regularly conduct a visual inspection around the storage site to assess emergence of rats and hygiene pests and use insecticides/rodenticides if required.
- It is effective to pile up the same type of perishable specified waste at one place and not spread it to make

it easier to spray insecticides on the waste.

- If waste (i.e. waste tires and bath tubs) that water tends to pool inside is stored, it is effective to remove water in advance and take a measure to keep the waste from water during the storage period in order to reduce the risk of emergence of mosquitoes.
- It is effective to pack perishable specified waste in containers to reduce factors to attract flies such as heat and odor. If the waste is stored without using containers, it is recommended to cover it with a sheet or soil.
- It is effective to cover perishable specified waste with a sheet to prevent rats infestation in the waste.

(Reference: Risk of emergence of rats and hygiene pests)

- As the temperature of perishable specified waste (i.e., organic sludge, cattle manure, compost) can be increased by fermentation, flies breed even in winter time and there is a risk of plague of flies in the season when the temperature increases.
- This also applies to rats, given food and high temperature.
- There is a risk of emergence of mosquitoes around drainage channels and a pool of water.

2.1.7 Prevention of Mixing of Specified Waste with other Materials

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (vii)

In order that the specified waste will not be mixed with any other materials, take necessary measures such as setting up partitions, etc., at the storage site.

[Purpose of Measures]

It is required to separate specified waste from other materials by partitions at the storage site.

[Example of Measures]

- It is required to cover specified waste with a sheet or place a partition of sandbags according to the storage site to prevent specified waste from being mixed with other waste and removed soil, or use separate storage sites.
- It is effective to use sandbags or concrete blocks that have a shielding effect to separate specified waste from other waste and removed soil.

(Storage of specified waste at the controlled final landfill site)

- If specified waste is stored on other landfill waste, it is important to store specified waste over the soil layer (50 cm) such as the final (or interim) cover soil of other landfill waste to ensure the separation between specified waste and other waste and keep a record of the storage site (**Figure 2-18**).
- It is required to store specified waste over the soil layer of 50cm or higher, not to pile it up directly on seepage control work at the bottom (**Figure 2-19**).
- It is required to cover specified waste with a seepage control sheet or soil as required to prevent scattering and outflow of specified waste to other landfill waste after final carry-in on the day.

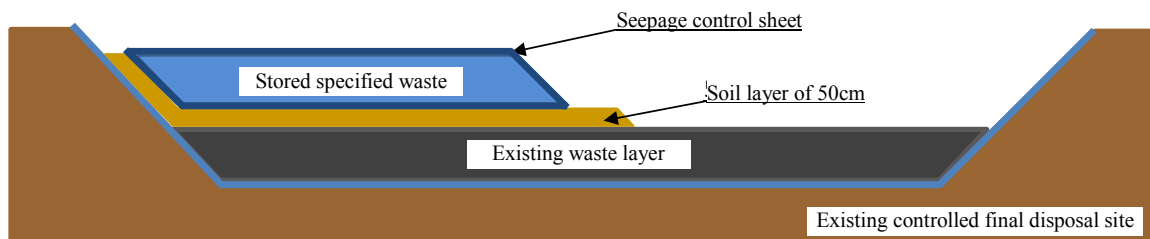


Figure 2-18: Storage at a controlled disposal site (Example 1)

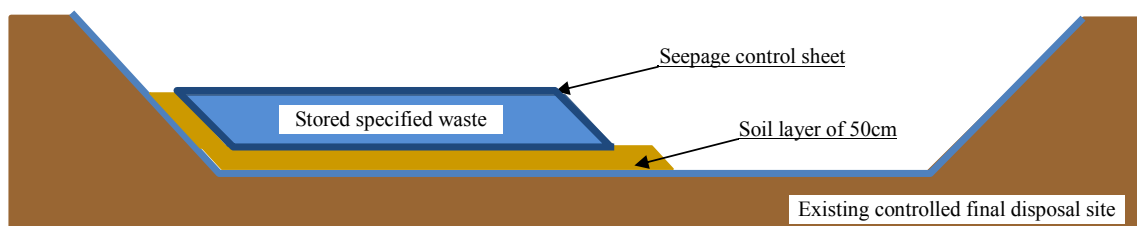


Figure 2-19: Storage at a controlled disposal site (Example 2)

2.1.8 Prevention of Mixing of the Specified Waste Containing Asbestos, etc.

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (viii)

In the event that the specified waste prescribed under item (i), (b), 2., a., b., and d., is stored, necessary measures shall be taken such as setting up partitions, etc., so that such specified waste will pose no risk of mixing with any specified waste other than such specified waste.

[Purpose of Measures]

- The Waste Management Act stipulates the standards for treatment of each type of waste containing asbestos (i.e. asbestos-containing waste, waste asbestos), as it may pose a risk of being detrimental to human health and the living environment.
- It is required to store waste containing asbestos to be treated in accordance with the specific treatment standards in a way that makes it easier to continue the subsequent treatment. If such waste is specified waste, it is required to store it separately from other specified waste.
- Specified waste containing asbestos is as follows (Ministerial Notification No. 10 of the Ministry of the Environment on February 13, 2012)

“Asbestos-containing specified waste”: Waste that is generated through new construction, renovation or removal of structures and contains asbestos of more than 0.1% of the total weight (Asbestos-containing specified waste excludes specified asbestos waste).

“Specified waste asbestos, etc.”: Specified waste that falls under the categories described in Article 1 (2), paragraph (7), item (i) – (vii) of the Waste Treatment Regulation.

[Reference: Article 1 (2), paragraph 7, of the Ordinance for Enforcement of the Waste Management Act]

- (i) Materials that are used for buildings and other structures (hereinafter called “buildings”), including sprayed asbestos and asbestos removed by the asbestos removal project.
- (ii) The following asbestos-containing materials used for buildings, which are removed by the asbestos removal project.
 - (a) Asbestos lagging material
 - (b) Diatomite lagging material
 - (c) Perlite lagging material
 - (d) Lagging materials, insulating materials and fire-resistant coating materials that may pose a risk of scattering asbestos of either equaling or surpassing level compared to the materials described in (a) —(c) due to human contact, airflow and vibration.
- (iii) Plastic sheets, respirators, work clothes and other tools and equipment which are used in the asbestos removal project and disposed, and may have asbestos attached to them.
- (iv) Asbestos that is generated at work places that have specified dust generation facilities stipulated in Article 2, paragraph 11 of the Air Pollution Control Act and collected by dust collecting facilities (excluding imported ones).
- (v) Respirators, dust collecting filters and other tools and equipment that are used in factories or work places that have specified dust generation facilities described in the precedent item or dust collection facilities and disposed, and may have asbestos attached to them (excluding imported ones).
- (vi) Asbestos that is collected by dust collecting facilities (only imported one that is generated through business activities).
- (vii) 7. Respirators, dust collecting filters and other tools and equipment that are disposed of, and may have asbestos attached to them (only imported ones that are generated through business activities).

[Example of Measures]

- If specified waste containing asbestos is stored, it is effective to set up a storage site exclusive to such waste to prevent it from being mixed with other specified waste.
- If specified waste containing asbestos is stored in containers, it is recommended to attach tags or cards to each container to prevent it from being mixed with other specified waste.

(Handling of specified waste containing asbestos)

- Please note the following points when handling specified waste containing asbestos.
 - Specified waste containing asbestos shall be divided into “specified waste asbestos, etc.” and “asbestos-containing specified waste” and properly stored (see **Table 2-2** and **Table 2-3**).
 - If dismantling work of damaged houses is carried out, check whether building materials containing asbestos are used in advance and collect asbestos-containing waste and other waste separately and store them, ensuring that asbestos-containing waste is not mixed with other waste.
 - It is expected to separate asbestos-containing specified waste from other waste before carrying it into the storage site. However, screening shall be done at the site or at the time of carrying it into the site by checking whether the waste contains building materials containing asbestos or not. If it is difficult to determine whether the building materials contain asbestos or not, or if you suspect the building materials contain asbestos, they should be treated as asbestos-containing specified waste.
 - For preventive methods of scattering of asbestos, see the ‘Manual of Treatment related to Prevention of Scattering of Asbestos at the Time of Disaster’ (August 2007, Ministry of Environment) and the “Manual of Treatment of Waste Containing Asbestos (2nd Edition)” (March 2011, Ministry of Environment).

<Reference>

Table 2-2: Specific Examples of Asbestos Building Materials Falling under Waste Asbestos, etc.

Category	Specific Examples of Asbestos Building Materials
Blowing asbestos	Blowing asbestos
	Blowing rock wool containing asbestos (dry and wet)
	Vermiculite blowing materials containing asbestos
	Pearlite blowing materials containing asbestos
Lagging material	Asbestos lagging material
	Diatomite lagging material
	Pearlite lagging material
	Calcium silicate lagging material
	Heat insulating cement
Insulating material	Asbestos insulating material of shingle back-stone for roof
	Chimney asbestos insulating material
Fire resistant coating material	Fire resistant coating plate containing asbestos
	2nd Class calcium silicate board containing asbestos
	Fire resistant coating paint material containing asbestos

Excerpts from “Manual of Treatment of Waste containing Asbestos, etc. (2nd Edition)” (March 2011, Ministry of the Environment)

Table 2-3: Specific Examples of Asbestos Building Materials falling under Asbestos-Containing Waste

Category	Specific Examples of Asbestos Building Materials
Interior material (wall, ceiling)	Slate board containing asbestos
	Pearlite board containing asbestos
	Slag plaster board containing asbestos
	Pulp cement containing asbestos
	1st Class calcium silicate board containing asbestos
	Plaster board containing asbestos
	Wall paper containing asbestos
Fire resistant partition	1st Class calcium silicate board containing asbestos
Floor material	Plastic floor tile containing asbestos
	Plastic floor sheet containing asbestos
Exterior material (outer wall, eave)	Nitrogen siding containing asbestos
	1st Class calcium silicate board containing asbestos
	Slate corrugated plate containing asbestos
	Extruding cement board containing asbestos
Roof material	Decoration slate for housing roof containing asbestos
	Roofing containing asbestos
Chimney material	Asbestos cement cylinder
Facility pipe	Asbestos cement pipe
Facility and equipment parts	Asbestos foam

Excerpts from “Visual Asbestos Building Materials (2nd Edition)” (2008, Ministry of Land, Infrastructure, Transport and

2.1.9 Storage Method of Perishable Specified Waste

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (ix)

Storage of any Perishable Specified Waste shall be in accordance with the following.

- (a) In order to eliminate the gas that is generated from the Perishable Specified Waste, necessary measures shall be taken such as installing a vent, etc.
- (b) Necessary measures shall be taken to prevent fire from breaking out, as well as fire extinguishers and other firefighting equipment shall be installed.

[Purpose of Measures]

There are occurrences of fire caused by generation of heat and methane gas as a result of biological and chemical reaction in the piled up waste layers at the storage site of waste including organic materials. Therefore, it is required to conduct adequate management of the storage of perishable specified waste, such as installation of a degassing system to prevent fire.

[Example of Measures]

(Storage in Flexible Containers)

- If perishable specified waste is stored in flexible containers, it is required not to use a piling storage method as much as possible to prevent falling of the waste, heat accumulation due to fermentation, and fire.
- If waste is piled up, keep its height up to approximately 2 m (two layers of flexible containers) and keep each pile as small as possible, for example, up to approximately 5 m long (5 flexible containers) and 20 m or less wide (**Figure 2-20**). After the waste is piled up, it is required to check the condition of the waste periodically (approximately one a month).

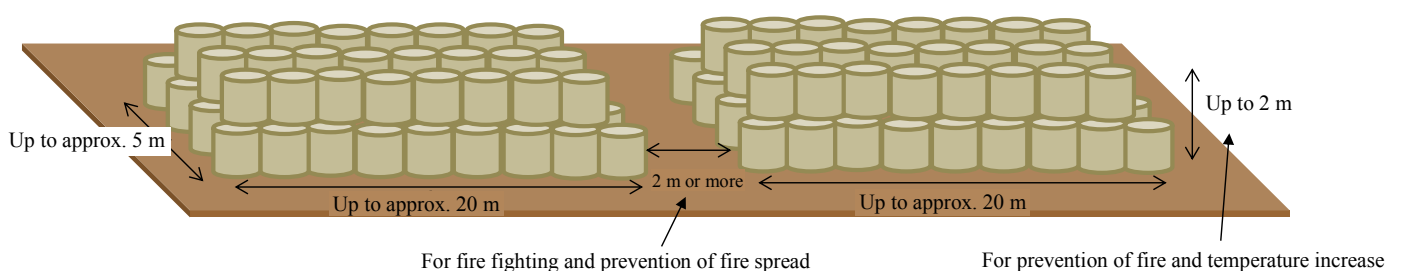


Figure 2-20: Image figure of the pile up and storage of perishable specified waste at a temporary storage site.

Source: Prevention of Fire of Flammable Waste at the Temporary Storage Site (2nd Edition), Network Responding to Earthquake Disaster (Field of Waste and Human Waste, etc.), National Institute for Environmental Studies, September 19, 2011

(Storage in sealed containers such as drum cans)

- If perishable specified waste is stored in sealed containers such as drum cans, it is required to carry out

degassing procedures, according to the conditions during the routine check.

(Storage in cargo containers or buildings)

- If perishable specified waste is stored indoors, it is required to carry out air ventilation procedures to lower the temperature of the inside of perishable specified waste to prevent fire, according to the conditions during the routine check.

(Storage outdoors without using containers)

- If perishable specified waste is stored outdoors without using containers, it is important to keep a pile up to approximately 2 m and the area per pile 200 m² or less to prevent fire. It is also effective to keep the distance between piles 2 m or more to prevent heat accumulation and fire spread and for fire fighting (**Figure 2-20**).
- If perishable specified waste is covered with a sheet to prevent scattering, it is effective to use an air-permeable sheet (**Figure 2-21**).

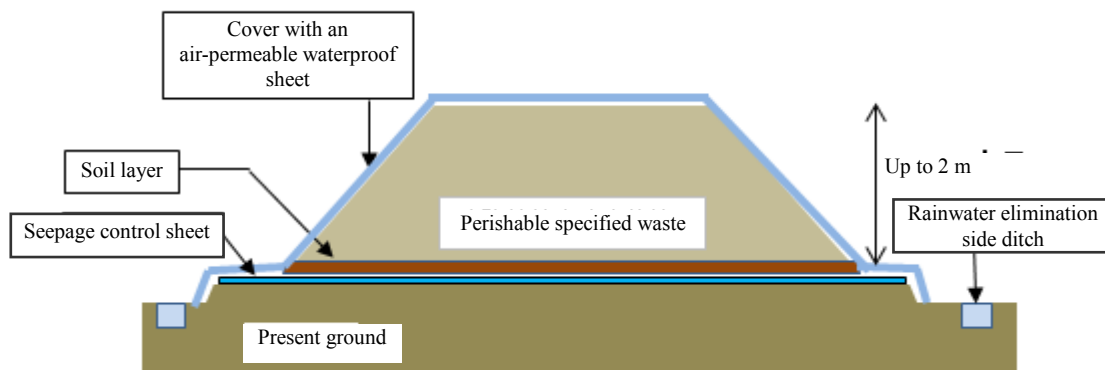


Figure 2-21: Image Figure of Storage of Perishable Specified Waste

- If degassing pipes are installed at the perishable specified waste storage site, please note the following points (**Figure 2-22**):
 - U-shape pipes or an umbrella shall be installed to prevent infiltrating of rainwater.
 - The bore and the number of the pipes to install shall be determined according to the size of the storage site (i.e., 150 mm or more for a larger site).
- It is also effective to place cover soil on the waterproof sheet to protect the sheet.

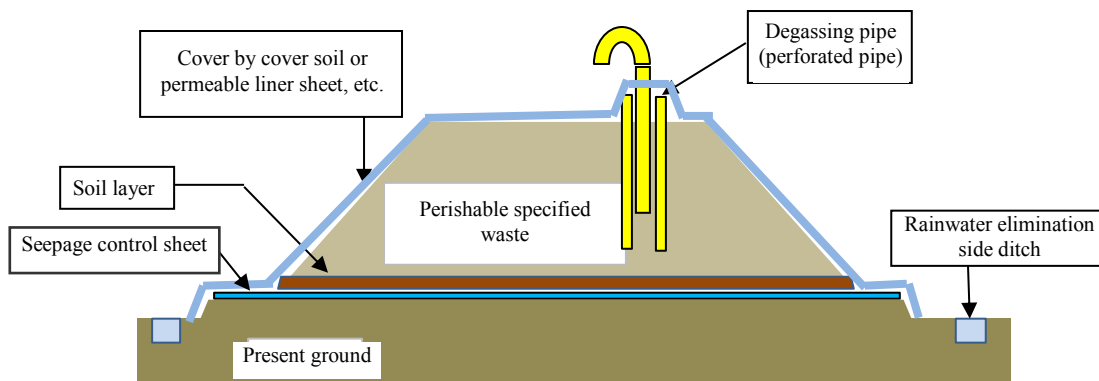


Figure 2-22: Image Figure of Storage of Perishable Specified Waste

- As subsidence tends to occur around where degassing pipes are installed, it is recommended to support the joints of degassing pipes by a dual structure of a sheath pipe and a main pipe (Figure 2-23).

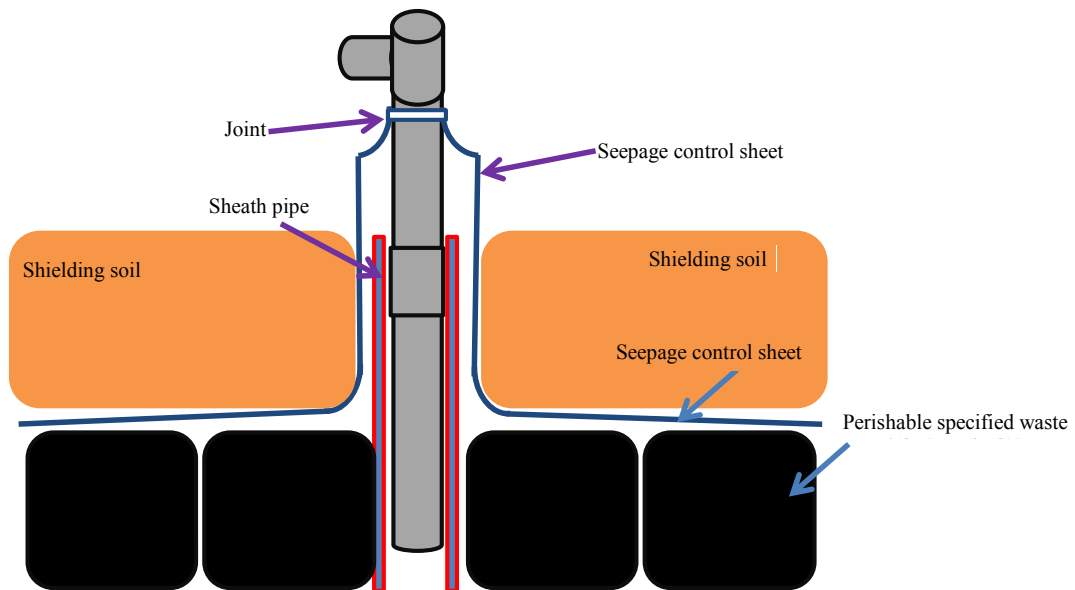


Figure 2-23: Prevention of infiltration of rainwater into the degassing pipe joint (Example of construction)

- If sinkage or deformation of the pile of perishable specified waste or increased leachate is found, it is required to check whether the joint part of the degassing pipe and the sheet has a gap or damage. As a result, if there is a risk of infiltration of rainwater, it needs repairing quickly (Figure 2-24).

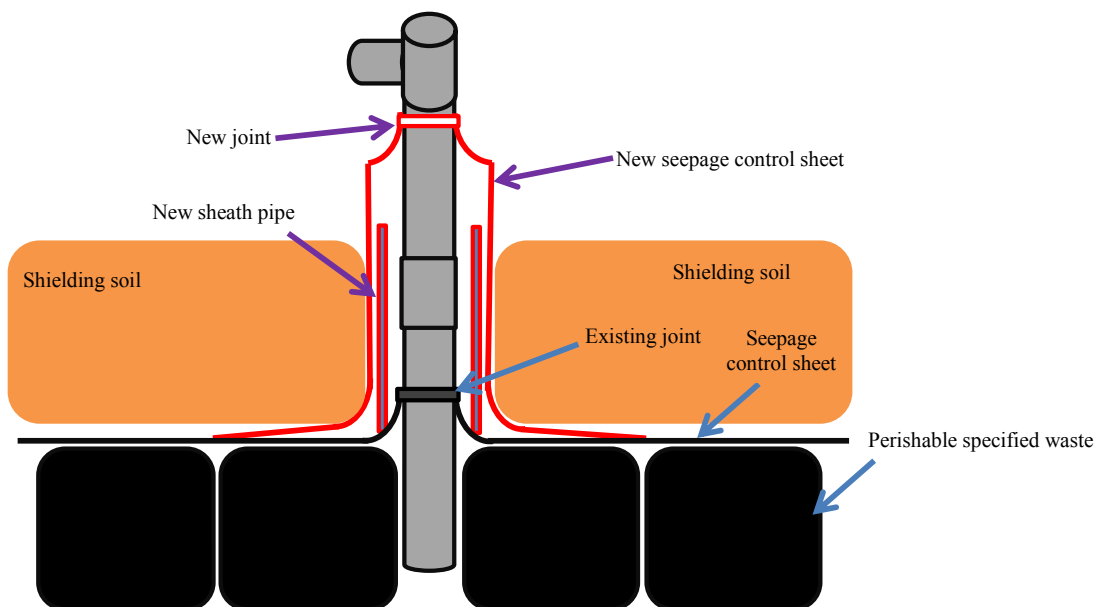


Figure 2-24: Prevention of infiltration of rainwater into the degassing pipe joint (Example of repair)

(Storage of rice straws and grass by using wrapping films)

- If rolled bundles of rice straws and grass are wrapped with a film, air is blocked by the film and there are few risks of generation of flammable gas unless the film is damaged. Therefore, it is not required to install gas pipes.
- If the waste is stored for a long period of time, it is required to visit the storage site regularly and check damage to the film, generation of inflammable gas and surface temperature of the film. As a result, if damage to the film is found, it is required to repair part of the film or rewrap the waste (see “Storage methods for perishable designated waste [Current storage methods for wrapped rice straws and grass]” Administrative circular, June 1, 2012)

(Fire Prevention Measures)

- Please note the following points to prevent heat generation and ignition by fermentation of perishable specified waste.
 - Avoid mixing dangerous materials including fuels (gas cylinders, lighters, kerosene cans) and waste that throws off sparks (electric products, batteries and cells).
 - Prevent temperature increase by heat accumulation by keeping the piling height of the perishable specified waste up to approximately 2m. Do not carry out excessive compaction as methane and hydrogen sulfide may be generated under anaerobic state.
 - Periodic visual inspection (approximately once in every 10 days*) shall be conducted for generation of white smoke or steam from specified waste or sinkage/deformation of such waste. If generation of white smoke or steam or sinkage/deformation is found, there is a high possibility that heat is accumulated due to fermentation at the site. Therefore, it is required to measure the temperature and the concentration of carbon monoxide inside the waste where applicable to check the risk of fire caused by heat generation. Required management shall be conducted based on the result. When the temperature is measured, it is recommended to measure the temperature at 1 m deep from the surface layer or at the lowest part with a thermocouple thermometer. When the concentration of carbon monoxide is measured, it is recommended to measure at 1 m deep from the surface layer or at the lowest part with a CO measuring instrument using an electrochemical sensor.

It is also recommended to measure flammable gas (methane and hydrogen sulfide) instead of the temperature of the inside of the waste and CO.

* At the storage site covered by a seepage control sheet that is hard for gas generated by perishable specified waste is hard to go through, there have been some cases where the temperature rapidly increased when there was incoming air. Therefore, it is important to make a check once every 10 days.

- If perishable specified waste is stored indoors, ventilate the place regularly to prevent the increase of the temperature and gas permeation inside the building.
- It is recommended to install facilities required for fire fighting (sand for fire-extinguishing, fire-extinguishers, fire control water tank) in advance according to the size of the storage site and the conditions of the storage in the event of fire.

If perishable specified waste is stored in buildings such as a warehouse and a tent, it is required to check requirements for the facilities under the Fire Service Act and maintain the facilities.

- If there is a gap at the edge of cover sheets, heat generation is accelerated by incoming air and the risk of fire is increased. Therefore, it is required to check the edge of the sheets is completely closed. If a gap is found, the sheet needs repairing (i.e., reseal).

< Reference >

Measure the temperature and concentration of carbon monoxide at 1 m deep from the surface layer or at the lowest part. If the temperature is over 75–80°C, it is expected that heat is accumulated due to chemical reaction and oxidative heating and as a result, underground fire may occur.

If the concentration of carbon monoxide exceeds 100 ppmv, similar conditions are assumed. If such conditions were observed, it is desirable to notify the fire department as a precautionary measure. If the temperature was below 60°C, only micro organism fermentation is assumed and it is considered that the possibility of generation of fire is low.

(Source: Prevention of Fire of Flammable Waste at the Temporary Storage Site (2nd Edition Supplement), Network Responding to Earthquake Disaster (Field of Waste and Human Waste, etc.), National Institute for Environmental Studies, December 22, 2011)

(Securing safety)

- If it is perishable specified waste such as plants, it is recommended to place non-inflammable materials whose volume is less likely to be reduced at the center of the pile of waste and place perishable specified waste on the slope to ensure that when perishable specified waste sinks due to its volume reduction, it can still maintain the shape of the mound to prevent falling of the waste and pooling of rainwater. In this case, to prevent mixing perishable specified waste and other non-inflammable waste, it is recommended to use containers with different colors for each type of waste as a clear identification (**Figure 2-25**).

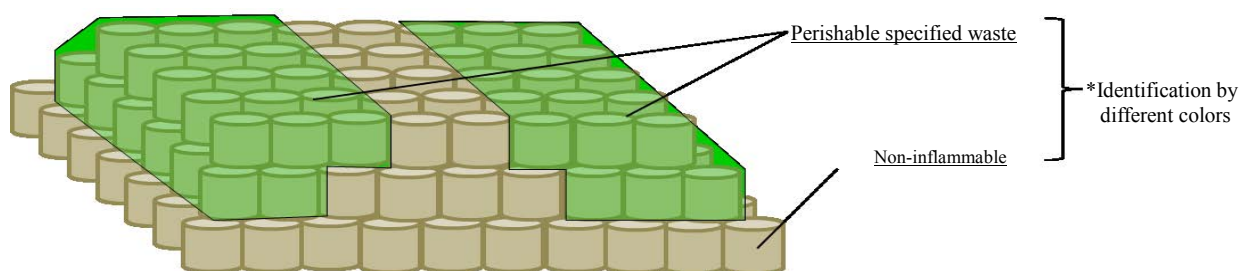


Figure 2-25: Positioning of perishable specified waste/non-inflammable waste (Example)

- It is recommended to store perishable specified waste evenly in flexible containers after reducing its volume to some extent to minimize sinkage and deformation of the waste during the storage period.
- The volume can be reduced by using a chipper or compressor. If there is a risk of scattering of perishable specified waste when the volume reduction is carried out, it is required to cover around the waste with a sheet to prevent scattering (**Figure 2-26**). Also, it is required to take preventive measures against heat generation and fire as perishable specified waste with reduced volume may generate heat according to the storage conditions.
- It is effective to pile up the waste alternately and fill the gap as required to secure the safety of the mound of the waste.



Figure 2-26: Volume reduction with a chipper (Example)

(Source: JAEA Report of decontamination work in evacuation areas in relation to Fukushima-1 plant accident)

- At the occurrence of sinkage or deformation perishable specified waste, it is required to re-shape the mound by piling up the waste again to prevent scattering outflow of the waste due to falling of the waste and pooling rainwater.

2.1.10 Prevention of Radiation Hazard

Ordinance, Article 24, paragraph (1), item (i)

The provisions of Article 15, item (ii) through item (x) shall govern.

Ordinance, Article 15, item (x)

In order to prevent radiation hazard, ensure that no one will enter the area surrounding the storage site without good reason by means of setting up a fence or signage, etc., at the boundary, or take necessary measures such as blocking radiation by covering the surface of the specified waste with soil, etc.

[Purpose of Measures]

It is required to take protective measures against radiation exposure such as radiation shielding by preventing unauthorized entries to the storage site or covering the surface of specified waste with sandbags.

[Example of Measures]

(Prevention of entry)

- For enclosure methods using a fence to prevent unauthorized entry, see “2.1.1 Requirements for storage sites.”

(Fence installation place and radiation blocking measures)

- A fence needs to be installed at the storage site to prevent unauthorized entry even during the time when waste is carried into the site. The fence installation place shall be determined as follows:
 - 1) A fence shall be installed to enclose specified waste to be stored with reference to the rough standard for isolation distance (**Table2-4**) (**Figure 2-27**). It is required to measure the air dose rate and check that additional radiation dose is $0.19 \mu\text{Sv/h}^{*1}$ or less (1 mSv/year).

^{*1} When the additional exposure dose of 1 mSv per year is converted into a value per hour by using the following calculation formula by assuming a life pattern including staying outdoors for 8 hours a day and staying indoors (wooden house with a shielding effect (0.4 times) for 16 hours, the calculated value is $0.19 \mu\text{Sv/h}$. $0.19 \mu\text{Sv/h} \times (8\text{h} + 0.4 \times 16\text{h}) \times 365 \text{ days} = 1 \text{ mSv/y}$

- 2) In case of 1), if sufficient isolation distance to reduce radiation cannot be secured, take measures for protection from radiation on the sides and the top of specified waste to ensure the additional radiation dose is at the place where the fence is installed 0.19 $\mu\text{Sv/h}$ or less (1mSv/year) (**Figure 2-28**). However, if the amount of radiation is relatively higher in the surrounding areas, control the amount of radiation to be equivalent to the air dose rate in the surrounding areas. Also, it is required to comply with this guideline to reduce the additional radiation dose as much as possible.
- Mounding and sandbags are used to shield radiation, see the isolation distance in **Table 2-4** to install a fence.

(Layout Method of Waste)

- If waste of different levels of concentration is stored, it is effective to place the waste with higher concentration inside and that with lower concentration outside.

Table 2-4: Relation between shielding measures and position of site boundary according to the radioactive concentration of waste and the type of facilities
(Additional radiation dose: 1mSv/y or less)*¹

Average radiation concentration (Cs:Bq/Kg)	Size of the mound of waste (length × width × height)	Shielding measure	Position of the border of the site where the additional dose is 1mSv/year or less (keep a distance from residential area)						
			0 m	1 m	2 m	4 m	6 m	8 m	10 m
-3,000 (Reference) - Surface dose rate of the container is approx. 0.7μSv/h or less *2	2 m x 2 m x 1 m	None		●					
	5 m x 5 m x 2 m	None				●			
		Sequential shielding of sides		●					
	10 m x 10 m x 1 m	Sequential shielding of sides		●					
	20 m x 20 m x 2 m	Sequential shielding of sides		●					
	50 m x 50 m x 2 m	Sequential shielding of sides			●				
3,000-8,000 (Reference) - Surface dose rate of the container is approx. 1.8-0.7μSv/h *2	2 m x 2 m x 1 m	None			●				
		Sequential shielding of sides		●					
	5 m x 5 m x 2 m	None					●		
		Sequential shielding of sides			●				
	10 m x 10 m x 1 m	Sequential shielding of sides				●			
	20 m x 20 m x 2 m	Sequential shielding of sides				●			
8,000-30,000 - Surface dose rate of the container is approx. 1.8 - 7.0μSv/h *2	2 m x 2 m x 1 m	Sequential shielding of sides				●			
		Completion of cover soil of 30cm thick		●					
		None							●
	5 m x 5 m x 2 m	Sequential shielding of sides				●			
		Completion of cover soil of 30cm thick		●					
		None							●
	10 m x 10 m x 1 m	Sequential shielding of sides					●		
		Completion of cover soil of 30cm thick		●					
		None							●
	20 m x 20 m x 2 m	Sequential shielding of sides					●		
		If the area without cover soil is under 10m × 10m					●		
		Completion of cover soil of 30cm thick		●					
	50 m x 50 m x 2 m	Sequential shielding of sides						●	
		If the area without cover soil is under 20m × 20m						●	
		Completion of cover soil of 30cm thick		●					
30,000-100,000 - Surface dose rate of the container is approx. 7.0 - 23μSv/h *2	2 m x 2 m x 1 m	Sequential shielding of sides				●			
		Completion of cover soil of 50cm thick	●						
	5 m x 5 m x 2 m	Sequential shielding of sides						●	
		Completion of cover soil of 50cm thick	●						
100,000-250,000 - Surface dose rate of the container is approx. 23 - 47μSv/h *2	2 m x 2 m x 1 m	Sequential shielding of sides					●		
		Completion of cover soil of 50cm thick		●					
	5 m x 5 m x 2 m	Sequential shielding of sides							●
		Completion of cover soil of 50cm thick		●					
250,000-500,000 - Surface dose rate of the container is approx. 47 - 115μSv/h *2	2 m x 2 m x 1 m	Sequential shielding of sides						●	
		Completion of cover soil of 50cm thick		●					
	5 m x 5 m x 2 m	Sequential shielding of sides							●
		Completion of cover soil of 50cm thick		●					
500,000-1 million - Surface dose rate of the container is approx. 115 - 230μSv/h *2	2 m x 2 m x 1 m	Sequential shielding of sides							●
		Completion of cover soil of 50cm thick		●					

*1: **Table 2-4** referred to the Skyshine & direct line assessment result in case of shield of sides and upper part by cover soil (density 1.5 g/cm^3)(30 cm thick) and without shield, etc., For example, where removed soil of 30,000 Bq/kg is piled in the size of $20 \text{ m} \times 20 \text{ m} \times 2 \text{ m}$ (on the ground), the isolation distance required for the additional external exposure dose of 1 mSv/y is 8m if the sides are shielded. If the sides are shielded and the area without cover soil is less than $10 \text{ m} \times 10 \text{ m}$, the distance is 6m. The distance is 1m with cover soil 30 cm thick and it is 0m with cover soil 40 cm thick. Suppose radionuclide contained in the removed soil is only ^{134}Cs and ^{137}Cs and the radiation ratio is 1:1(As the speed of attenuation is different between cesium-134 and cesium-137, the radiation ratio may change as time passes. However, as the speed of attenuation of cesium-134, which is more radioactive, is faster, the radiation ratio can change on the safer side). Suppose there are 4 kinds of concentration of radioactive cesium in the removed soil-3000 Bq/kg, 8000 Bq/kg, 30,000 Bq/kg and 100,000 Bq/kg on average and the type of the facility is one on the ground including piled mounds. Also suppose there are 5 different sizes of the facility (length \times width \times height) – $2 \text{ m} \times 2 \text{ m} \times 1 \text{ m}$, $5 \text{ m} \times 5 \text{ m} \times 2 \text{ m}$, $20 \text{ m} \times 20 \text{ m} \times 2 \text{ m}$, $50 \text{ m} \times 50 \text{ m} \times 2 \text{ m}$ (10 m), $200 \text{ m} \times 200 \text{ m} \times 2 \text{ m}$ (10 m). (Cooperation: Japan Atomic Energy Agency (JAEA), Safety Research Center, Waste Safety Research Group).

If the removed soil is covered, which significantly contains radioactive materials other than ^{134}Cs and ^{137}Cs , such as the soil contaminated near Fukushima Daiichi Nuclear Power Station, it is necessary to conduct individual safety assessment as appropriate and to secure necessary shield or isolation distance.

*2: If a container of $\phi 100 \text{ cm} \times 100 \text{ cm}$ high is filled with removed soil containing radiocesium whose average concentration is 3000 Bq/kg, 8000 Bq/kg, 30,000 Bq/kg and 100,000 Bq/kg (soil density: 2.0 g/cm^3 , shielding by the container is not taken into account), the air dose rate at the place that is 1cm away from the surface of the cylinder sides of 50 cm high will be 0.7, 1.8, 6.9 and $23 \text{ } \mu\text{Sv/h}$ respectively (Cooperation: Japan Atomic Energy Agency).

*This assessment is based on soil, but if the density is the same, the translation coefficient of radiation –the air dose rate is more or less the same.

Since the density of incineration ash and sludge is lower than the soil density of 2.0 g/cm^3 , it could be the assessment result from the safer side.

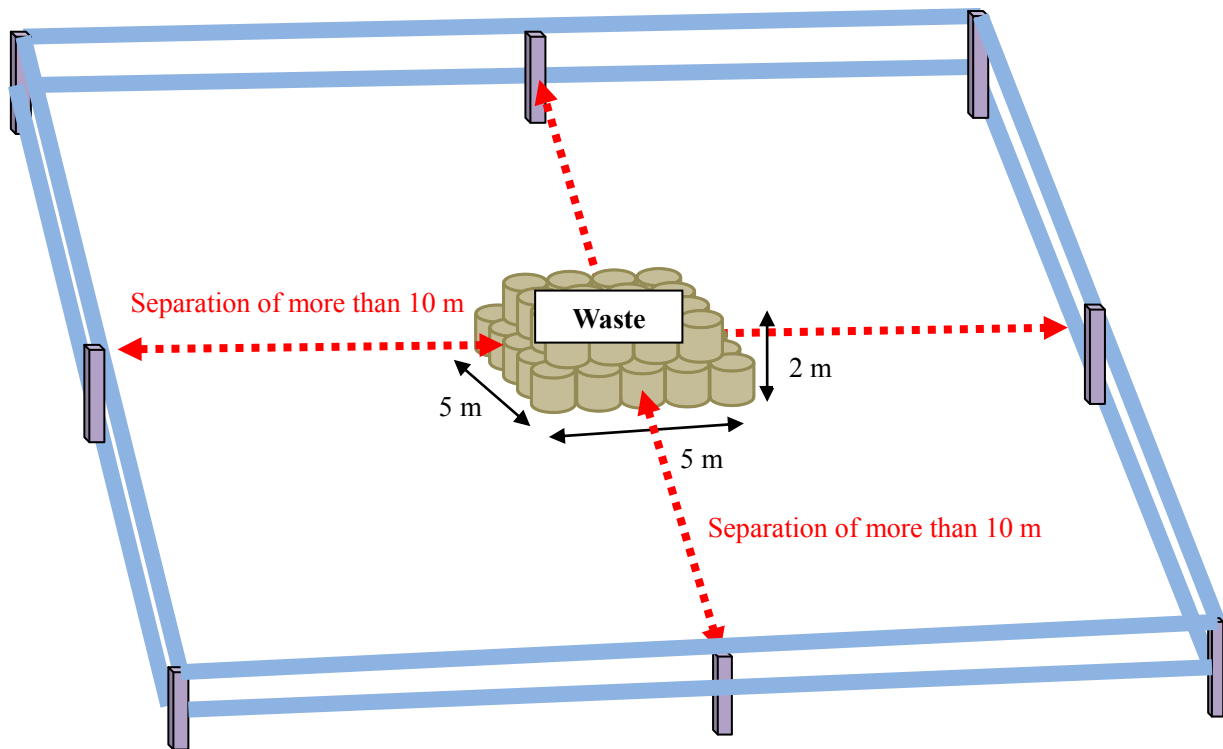


Figure 2-27: Isolation Measure by Sandbags and Position of Premises Boundary
No shield to the Waste of 20,000 Bq/kg (length, width, height: 5 m × 5 m × 2 m) (Example)

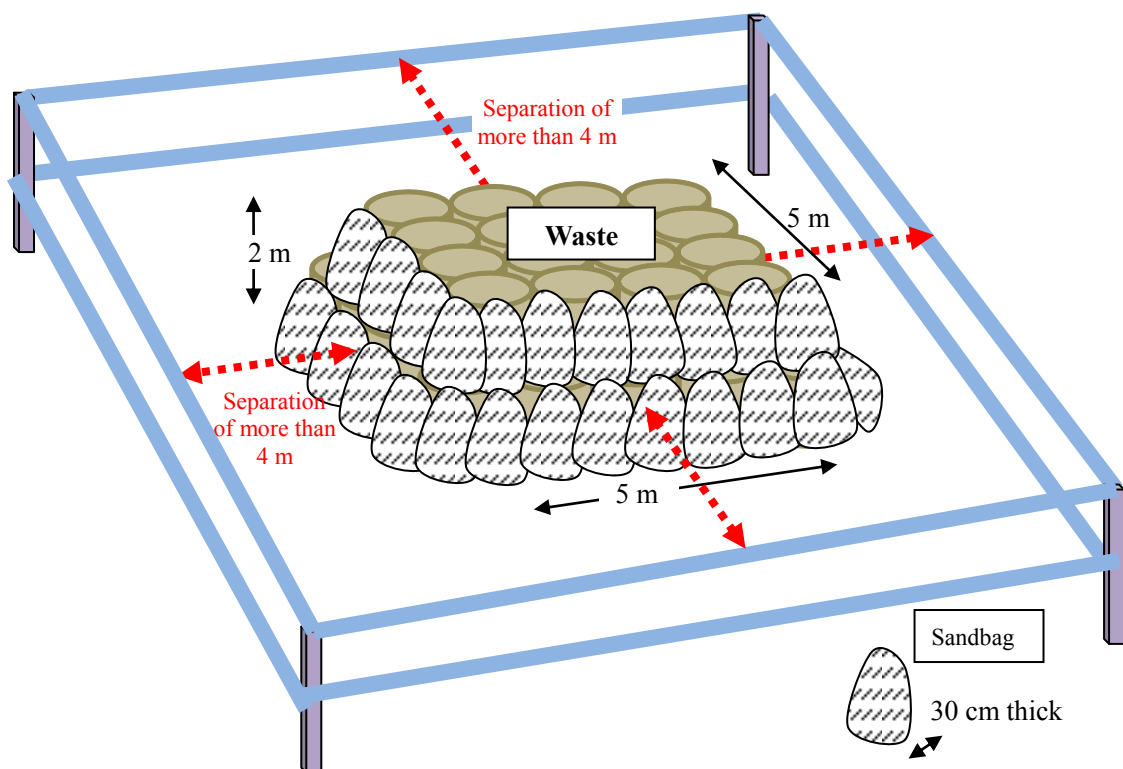


Figure 2-28: Waste of 20,000 Bq/kg (length, width, height: 5 m × 5 m × 2 m) is Shielded by Sandbags (30cm)

2.1.11 Measurement and Recording of Concentration of Radioactive Materials Discharged by the Accident in Groundwater

Ordinance, Article 24, paragraph (1), item (iii)

Water examination of the groundwater shall be conducted as follows, taken from a location suitable for evaluating the presence or absence of the influence of the sewage water generated from the storage of specified waste on the water quality of the groundwater in the area surrounding the storage site; provided, however, that this shall not apply to cases provided by the exceptional clause under the preceding item, (a).

- (a) Prior to the commencement of storage, measurement shall be conducted for radioactive materials discharged by the accident using the method prescribed by the Minister of the Environment, which shall be recorded; and
- (b) After the commencement of storage, measurement shall be conducted for radioactive materials discharged by the accident at least once every month using the method prescribed by the Minister of the Environment as under (a), which shall be recorded.

* Ministerial Notification No. 5 of the Ministry of the Environment on January 27, 2012

A germanium semiconductor detector is used to take measures.

[Purpose of Measures]

- It is required to measure the concentration of radiocesium in the groundwater at least once a month to check whether leachate from the storage site affects the quality of the groundwater in the surrounding area and keep records.
- However, if waste in the countermeasure area generated by decontamination of soil related to the land in the specific area for decontamination or decontamination zone is stored on such land where soil decontamination is carried out, measurement is not required.

[Example of Measures]

(Measurement of the groundwater in the surrounding area)

Measurement of the groundwater in the surrounding area shall be taken in accordance with the methods of described in Chapter 6 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”

(Measures to be taken when an abnormal value is observed in measurement results)

- If an abnormal value (significantly higher value compared to the measurement results after the start of the storage) is found in the measurement results, it is required to investigate the cause. If the cause is related to the storage site, it is required to restore the storage conditions or take an additional measure such as prevention of outflow of wastewater.
- It is recommended to continue the measurement of the groundwater in the surrounding area for a certain period of time after the end of the storage. If an abnormal value (significantly higher value compared to the measurement results after the start of the storage) is found in the measurement results after the end of the storage, it is required to investigate into the cause. If the cause is related to the disused storage site, it is required to take measures such as decontamination.

2.1.12 Measurement and Recording of Amount of Radiation

Ordinance, Article 24, paragraph (1), item (iv)

At the boundary of storage site, etc., the amount of radiation shall be measured at least once every 7 days using the method prescribed by the Minister of the Environment under Article 15, item (xi), which shall be recorded; provided, however, that in cases as provided by the exceptional clause under item (ii), (a), the amount of radiation shall be measured prior to the commencement of storage of specified waste as well as after the commencement without delay, which shall be recorded.

* Ministerial Notification No. 110 of the Ministry of the Environment on December 28, 2011

Measurements shall be taken with a gamma-ray measurement device at a place that is 50 cm to 1 m high above the ground surface.

[Purpose of Measures]

- It is required to measure the air dose rate at least once every 7 days at the border of the storage site for specified waste and keep records to check whether adequate measures for protection from radiation are taken for those who are not involved.
- However, if waste in the countermeasure area generated by decontamination of soil related to the land in the specific area for decontamination or decontamination zone is stored on such land where soil decontamination is carried out, it is required to measure the amount of radiation and keep records without delay before and after the start of the storage of such waste.

[Example of Measures]

It is effective to measure the air dose rate at the disused storage site after the end of the storage (after removal of specified waste) as well as during the storage period to check whether there is any significant difference in the air dose rate compared to that before the start of the storage.

(Measurement of air dose rates)

- Measurement of the air dose rates shall be taken in accordance with the method described in the Chapter 2 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”

(Management of measurement results)

- Take a background measurement at the storage site before waste is carried into the site. If the air dose rate cannot be measured before waste is carried into the site, because, for example, the storage has already started, measure the air dose rate at a place that is far from the stored waste.
- Check whether the additional dose does not exceed 0.19 $\mu\text{Sv/h}$ (1 mSv/year) at a place where the fence is installed based on this measurement. However, if the amount of radiation is relatively higher in the surrounding areas, control the air dose rate around the fence to be equivalent to the air dose rate in the surrounding areas. Also, it is required to comply with this guideline to reduce the additional radiation dose as much as possible.
- When the storage is continued after waste is carried into the site, check whether the air dose rate is “more or less” the same as that of the background.

(Measures to be taken when an abnormal value is observed in measurement results)

- If any change is made to the storage conditions of specified waste due to heavy rain or storm, it is required to measure the air dose rate at the site border.
- If an abnormal value (significantly higher value compared to the measurement results after the start of the

storage) is found in the measurement results after heavy rain or storm, it is required to investigate the cause. If the cause is related to the storage site, it is required to restore the storage conditions or add shielding materials.

- If an abnormal value (significantly higher value compared to the measurement results after the start of the storage) is found in the measurement results after the end of the storage, it is required to investigate the cause. If the cause is related to the disused storage site, it is required to take a measure such as decontamination.

(Record)

- For an example of the form of record, see “Air dose rate measurement records during the storage period” in the Chapter 2 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”

2.1.13 Retention of Records on Storage

Ordinance, Article 24, paragraph (1), item (v)

Record of the following matters shall be prepared and retained until the storage site is abolished; provided, however, that in cases provided by the exceptional clause under item (ii), (a), record of measurement shall be prepared pursuant to the provision of the exceptional clause under the preceding item, which shall be retained until the storage of specified waste is terminated.

- (a) The kind of specified waste stored (if such specified waste includes any asbestos-containing specified waste, etc., such fact shall be included) and its quantity;
- (b) The dates on which storage was commenced and completed per specified waste stored, as well as the names and locations of the place from which it was received and the place to which it was brought after storage;
- (c) Pertaining to the specified waste delivered, the names of the person who delivered such specified waste and the person who received the delivery of such specified waste, and in cases where transportation pertaining to such delivery was carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle; and
- (d) Measurement, inspection, examination and any other measures taken upon maintenance and management of such storage site (including water examination pursuant to the provision under item (iii) and measurement pursuant to the provision under the preceding item).

[Purpose of Measures]

- It is required to prepare records of information on storage and delivery of specified waste and retain the records until the use of storage site is discontinued to manage the location of specified waste to be stored.
- However, if waste in the countermeasure area generated by decontamination of soil related to the land in the specific area for decontamination or decontamination zone is stored on such land where soil decontamination is carried out, it is required to retain measurement records of the amount of radiation taken before and after the start of the storage of specified waste until the end of the storage of such waste.

[Example of Measures]

- An example of a form for the storage records is as follows.
- For the record of the storage of specified waste, use the form of industrial waste management form (manifest). The form with the following information can also be used: the starting date of storage, the ending date of storage and license plate number or vehicle number.

Records on Storage (form example)

Name of storage site								
Address of storage site								
Storage site manager								
Input at the time of carry-in	Input at the time of carry-out							
Kind of stored specified waste ^{Note 1)}	Quantity (unit)	Date of storage start	Name and address of place accepting the specified waste	Name of person in charge of delivering the specified waste	Name of person in charge of receiving delivery of the specified waste	Vehicle identification number or vehicle number of transportation vehicle used for the delivery	Date of storage end	Name and address of the place where specified waste is delivered after storage
Measurements, inspection, tests and other measures taken for maintenance and management of the storage site	Date of implementation of measures		Contents of measures					Measurement record ^{Note2)}

Note 1) If the waste includes asbestos-containing specified waste, specified waste asbestos, etc. and specified soot and dust, the information on those shall be entered. If waste is given lot numbers to manage, such numbers shall also be entered.

Note 2) Attach the measurement results to this form and enter the serial number of the measurement results.

Records on Storage (form example) [example of description]

Name of storage site	Temporary storage site XXXX							
Address of storage site	X-X, XX-cho, XX-shi							
Storage site manager	(Dept./name)							
Input at the time of carry-in	Input at the time of carry-out							
Kind of stored specified waste ^{Note 1)}	Quantity (unit)	Date of storage start	Name and address of place accepting the specified waste	Name of person in charge of delivering the specified waste	Name of person in charge of receiving delivery of the specified waste	Vehicle identification number or vehicle number of transportation vehicle used for the delivery	Date of storage end	Name and address of the place where specified waste is delivered after storage
Debris (H24-1-1)	Flexible container: XX bags	DD/MM/2012	●●cho●●shi ●●administrative district debris collection site ●●cho●●shi	(Name)	(Name)	Fukushima●● ●●●●	DD/MM/2012	●●●●Clean center ●●cho●●shi
Debris (H24-1-2)	Flexible container: XX bags	DD/MM/2012	●●cho●●shi ●● administrative district debris collection site ●●cho●●shi	(Name)	(Name)	Fukushima ●● ●●●●	DD/MM/2012	●●●● Clean center ●●cho●●shi
House cleaning waste (H24-2)	Flexible container: XX bags	DD/MM/2012	●●cho●●shi	(Name)	(Name)	Fukushima ●● ●●●●	DD/MM/2012	●●●● Clean center ●●cho●●shi
Measurements, inspection, tests and other measures taken for maintenance and management of the storage site	Date of implementation of measures	Contents of measures						Measurement record ^{Note2)}
	DD/MM/2012	Visual check of the condition of containers and others (no problem)						—
	DD/MM/2012	Measurement of air dose rates at site border						See 24, 1)

Note 1) If the waste includes asbestos-containing specified waste, specified waste asbestos, etc. and specified soot and dust, the information on those shall be entered. If waste is given lot numbers to manage, such numbers shall also be entered.

Note 2) Attach the measurement results to this form and enter the serial number of the measurement results.

<Example of Storage of Specified Waste>

Storage of specified waste of over 8,000 Bq/kg at a temporary storage site

<p>- Protective mat such as seepage control sheet</p> <p>- Enclosure by iron fence</p> <p>- When shielding is required, arrange sandbags or flexible containers filled with uncontaminated soil outside.</p> <p>Locked</p> <p>- Make the level higher than the periphery by embankment, transport pallets, etc.</p>	
[1] Fence and Notice board	<ul style="list-style-type: none"> ▪ Enclose the periphery by an iron fence and manage entry and exit under lock and key. ▪ Specify the type of specified waste on the notice board
[2] Prevention of dispersion and outflow	<ul style="list-style-type: none"> ▪ To be stored in flexible containers
[3] Prevention of pollution of groundwater, etc.	<ul style="list-style-type: none"> ▪ Set a soil layer by embankment or liner sheet.
[4] Prevention of infiltration of rainwater, etc.	<ul style="list-style-type: none"> ▪ Cover the container with flexible seepage control sheet, etc. (if storage continues for a certain period, concurrently use nonwovens) ▪ It is recommended to store waste at a higher place than the surrounding area by embankment or install 'pallets' for cargo transportation to prevent infiltration of water outflow from the surrounding area. ▪ Raising the center of seepage control sheet, etc., to make rainwater difficult to collect.
[5] Prevention of emission of foul odors	<ul style="list-style-type: none"> ▪ Handle by containing in flexible containers and sheet cover.
[6] Prevention of emergence of sanitary harmful insects	<ul style="list-style-type: none"> ▪ If stagnant rainwater, etc., emerged around the site, remove early.
[7] Prevention of mixing	<ul style="list-style-type: none"> ▪ Do not carry in the materials other than subject of storage)
[8] Prevention of mixing of Asbestos-containing specified waste, etc.	<ul style="list-style-type: none"> ▪ The same as above
[9] Prevention of generation of fire	<ul style="list-style-type: none"> ▪ No special measure shall be taken.
[10] Protection of people other than the related persons from radiation	<ul style="list-style-type: none"> ▪ Amount of radiation around the site before and after storage shall be measured and the dose of premises boundary shall be the same amount of radiation around the site. If the distance from the waste to the premises boundary cannot be secured, shielding shall be made by placing sandbags and flexible containers in which sand is packed by the waste.
Other	<ul style="list-style-type: none"> ▪ Confirm the storage status regularly and if any abnormality was observed, respond quickly.

Figure 2-29: Storage of Specified Waste (Example)

2.2 Standards on Storage of Standard Conformable Specified Waste

Ordinance, Article 24, paragraph (2), item (i)

The provisions of Article 15, item (iii) and item (v) through item (ix), and the preceding paragraph, item (ii) through item (v) shall govern.

From Article 15 of Ordinance

- (iii) It is required to take measures, for example, covering the base of the storage site with a seepage control sheet to prevent contamination of public water area and groundwater caused by wastewater generated by the storage of the standard conformable specified waste.
- (v) It is required to take a necessary measure to ensure foul odor is not emitted from the storage site.
- (vi) Take measures to prevent infestation of rats and emergence of mosquitoes, flies and other pests at the storage site.
- (vii) Take necessary measures, for example, installing partitions to prevent the standard conformable specified waste from being mixed with other waste at the storage site.
- (viii) If the standard conformable specified waste stipulated in item (i) (b) (2) a, b and d is stored, take a necessary measure, for example, installing partitions to prevent the standard conformable specified waste from being mixed with other type of standard conformable specified waste.
- (ix) If perishable standard conformable specified waste is stored, comply with the following provisions.
 - (a) Take necessary measures, for example, installing a degassing system to remove gas generated by perishable standard conformable specified waste
 - (b) Take necessary measures to prevent fire and install fire extinguishing facilities including fire extinguishers.

Ordinance, Article 24, paragraph (1)

- (ii) Storage shall be carried out at a place that meets the requirements specified under Article 15, item (i), (a) and where a notice board satisfying the following requirements is installed at a clearly viewable location.
- (a) 60 cm or greater both vertically and horizontally; provided, however, that this shall not apply to cases where waste (limited to that falling under the category of waste in the countermeasure area and that pertaining to the designation pursuant to the Act, Article 17, paragraph (1)) generated from measures for decontamination of the soil, etc., applicable to the land, etc., within the specific area for decontamination or decontamination zone is stored on the land on which measures for decontamination of the soil, etc., has been implemented.
- (b) Following matters shall be displayed:
 - 1. That it is a storage site of standard conformable specified waste;
 - 2. The kind of standard conformable specified waste stored (if such specified waste includes any of the standard conformable specified waste listed from Article 23, paragraph (1), item (v), (a) through (c) or any standard conformable specified waste which has putrefied or poses a risk to become putrefied (hereinafter referred to as “Asbestos-Containing Specified Waste, etc.”), such fact shall be included);
 - 3. Contact information in case of emergency; and
 - 4. In cases where standard conformable specified waste is stored outdoors without using a container, the maximum of the heights prescribed under Article 15, item (ii), (b), that shall be governed by the provision of the preceding item.
- (iii) It is required to inspect the quality of groundwater sampled at the place where you can check whether the quality of groundwater around the storage site is affected by wastewater generated by the storage of the standard conformable specified waste. However, this does not apply to the case described in the provision of (a) of the preceding item.

- (a) Take measurements of radioactive materials discharged by the accident before the start of the storage by using the method stipulated by the Minister for Environment and keep records.
- (b) Take a measurement of radioactive materials discharged by the accident after the start of the storage at least once every 7 days using the method in (a) stipulated by the Minister for Environment and keep records.
- (iv) Take a measurement of the amount of radiation at the border of the storage site at least once every 7 days using the method stipulated by the Minister for Environment in Article 15, item (xi) and keep records. However, if it is stipulated in the provision of item (ii) (a), take a measurement of the amount of radiation without delay before and after the start of the storage of the standard conformable specified waste and keep records.
- (v) It is required to keep records of the following items and retain them until the use of such storage site is discontinued. However, if it is stipulated in the provision of item (ii) (a), record of measurement shall be prepared pursuant to the provision of the exceptional clause under the preceding item, take a measurement of the amount of radiation without delay before and after the start of the storage of the standard conformable specified waste and keep records.
- (a) The types of the standard conformable specified waste to be stored (if such specified waste contains asbestos-containing specified waste, its information shall be included) and the volume.
- (b) The starting date and ending date of the storage for each standard conformable specified waste to be stored, and the name and address of the place where the waste is received and the place where the waste is delivered after the end of the storage.
- (c) For the standard conformable specified waste received, the name of the responsible person who delivered the standard conformable specified waste and the name of the responsible person who received such standard conformable specified waste. If a vehicle is used to deliver such waste, the license plate number or the vehicle number.
- (d) Measurements, inspection, tests and other measures taken to maintain and manage the storage site (including inspection of water quality stipulated in item (iii) and measurements stipulated in the preceding item).

Ordinance, Article 24, paragraph (2), item (ii)

- (ii) The following measures shall be taken to ensure the standard conformable specified waste will not scatter or flow out of the storage site.
- (a) In cases where the standard conformable specified waste is stored outdoors without using a container, the height of such standard conformable specified waste piled up shall not exceed such height prescribed under Article 15, item (ii) (b).
- (b) Other necessary measures

Ordinance, Article 15, item (i) (a)

Storage shall be carried out in a place that satisfies the following requirement.

- (a) An enclosure shall be set up surrounding the place (if it is of a structure where the standard conformable specified waste to be stored is loaded directly against such enclosure, then it shall be restricted to an enclosure which is safe enough from the point of view of structural strength)

[Purpose of Measures]

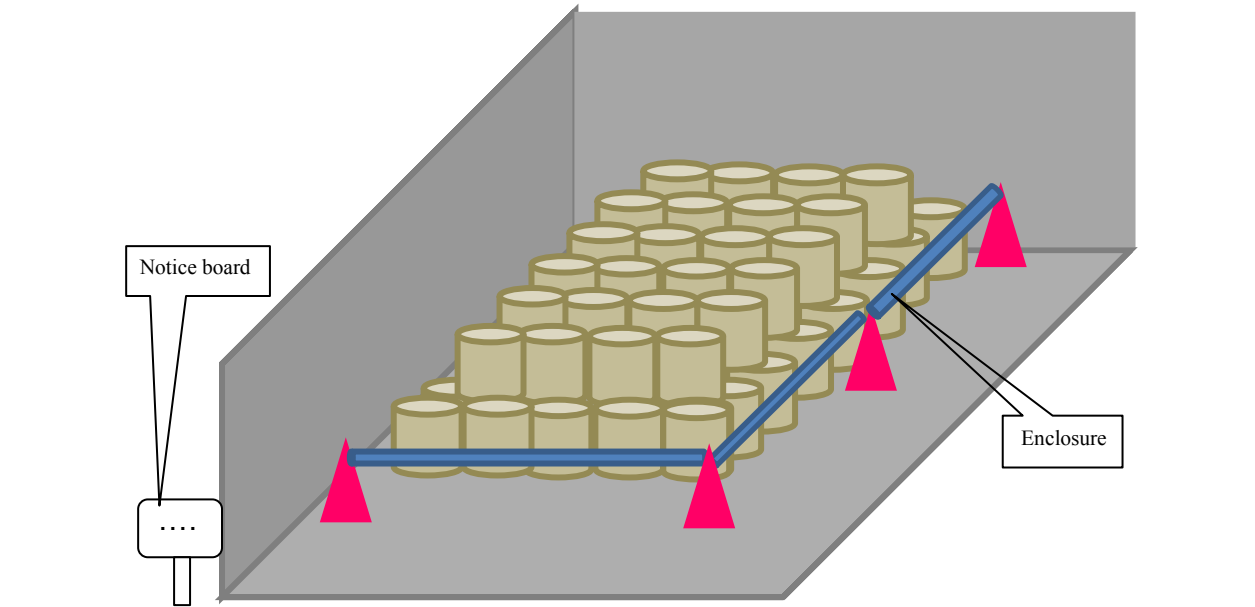
As the same storage standards are set for the standard conformable specified waste as the storage standards for specified waste (excluding the standard conformable specified waste), it is required to store the standard conformable specified waste in accordance with such standards. “Designated waste” and “specified waste” are described as “standard conformable specified waste” in the provisions of the Ordinance for each item.

[Example of Measures]

See 2.1.1 for requirements for the storage site for the standard conformable specified waste, 2.1.2 for scattering and outflow of the standard conformable specified waste, 2.1.3 for prevention of contamination of public water area and groundwater, 2.1.5 for prevention of emission of foul odor, 2.1.6 for prevention of emergence of pests, 2.1.7 for prevention of mixing of specified waste with other materials, 2.1.8 for prevention of mixing of the standard conformable specified waste containing asbestos, 2.1.9 for storage methods of perishable standard conformable specified waste, 2.1.11 for measurement and record of the concentration of radioactive materials discharged by the accident in the groundwater, and 2.1.12 for measurement and recording of amount of radiation, and 2.1.13 for retention of records on storage.

<Example of Storage of Standard Conformable Specified Waste>

In case of storage of waste before treatment (plants, etc.) under 8,000 Bq/kg in intermediate treatment facility building



<p>[1] Fence and Notice board</p>	<ul style="list-style-type: none"> Surround the circumference with color cones to clearly indicate the storage site. On the notice board, it shall be specified as “Standard Conformable Specified Waste.”
<p>[2] Prevention of dispersion and outflow</p>	<ul style="list-style-type: none"> To be stored in flexible containers
<p>[3] Prevention of pollution of groundwater, etc.</p>	<ul style="list-style-type: none"> Set the waste on a painted concrete floor.
<p>[4] Prevention of infiltration of rainwater, etc.</p>	<ul style="list-style-type: none"> To be stored at a place where infiltration of rainwater is prevented, such as inside a building with a roof
<p>[5] Prevention of emission of foul odors</p>	<ul style="list-style-type: none"> Handle by containing in flexible containers.
<p>[6] Prevention of emergence of sanitary harmful insects</p>	<ul style="list-style-type: none"> Avoid contact with water.
<p>[7] Prevention of mixing</p>	<ul style="list-style-type: none"> Do not carry in the materials other than subject of storage
<p>[8] Prevention of mixing of asbestos-containing specified waste, etc.</p>	<ul style="list-style-type: none"> The same as above
<p>[9] Prevention of generation of fire</p>	<ul style="list-style-type: none"> Piling shall be up to two tiers, and the area of piling shall be up to 5 m × 20 m.
<p>[10] Protection of people other than the related persons from radiation</p>	<ul style="list-style-type: none"> (Unnecessary because waste conforms to standards)
<p>Other</p>	<ul style="list-style-type: none"> Confirm the storage status regularly and if any abnormality was observed, respond quickly.

Figure 2-30: Storage of Standard Conformable Specified Waste (Example)

Act, Article 20

A person or entity undertaking the collection and transfer waste in the countermeasure area and designated waste (hereinafter referred to as “Specified Waste”) shall collect and transfer such specified waste in accordance with the standards for collection and transportation of specified waste under Ordinance, Article 23.

[Purpose of Measures]

The cases to which the standards are applied are the “cases where the national government and its entrustee, etc., transport in transportation vehicles, etc., specified waste to the treatment facilities (interim treatment facilities, interim storage facilities, final landfill sites, and storage facilities, etc.)”

It is provided that if the Minister of the Environment recognizes as particularly necessary to ensure proper treatment of specified waste where the standards for collection and transportation of specified waste under the Act, Article 20 are not conformed, the Minister of the Environment may give an order to the person who conducted the collection and transportation to take necessary measures, including the change of method of collection and transportation of the specified waste and the measures for proper treatment of the specified waste within a certain period to the extent necessary (Act, Article 51, paragraph (2)).

In this regard, transportation standards to follow in the case of transportation of designated waste (in such a case where a storage site of designated waste is changed after a notification is made pursuant to the provision of Article 15, item (xiii) of the Ordinance) are also included in the transportation standards based on Article 20 of the Act; however, there are standards unique to designated waste (carrying of designation document, etc.). Therefore, for transportation of designated waste, refer to “Guidelines for Designated Waste” published separately.

3.1 Standards for Collection and Transportation of Specified Waste (excluding any Standard Conformable Specified Waste)

In collecting and transporting specified waste (excluding any standard conformable specified waste), the standards set forth below shall be complied with.

3.1.1 Prevention of Health Damage and Damage related to the Living Environment

Ordinance, Article 23, paragraph (1), item (i)

- (a) It shall be ensured that no harm pertaining to human health or the living environment will be caused by the specified waste;

[Purpose of Measures]

In collecting and transporting specified waste, it shall be ensured that no harm pertaining to human health or the living environment will be caused by radioactive cesium contained in the specified waste.

[Example of Measures]

Specifically, making the following responses, etc. is considered.

- In carrying out specified waste, washing, etc., of tires and bodies of cars, etc., and of boots, etc., of workers shall be conducted to prevent scattering and outflow of specified waste from the storage site.
- Avoid as practical as possible transportation during rush hours and commuting times to schools and kindergartens to reduce impact on local residents, for example, by avoiding housing areas, shopping streets, school zones, and narrow roads.
- When transporting waste other than specified waste after transportation of specified waste, make efforts to prevent pollution by washing transportation vehicles and transportation containers, etc., as required.
- Wastewater generated by washing, etc., shall properly be treated.

3.1.2 Measures Necessary to Prevent Specified Waste from Scattering, Outflowing, or Leaking

Ordinance, Article 23, paragraph (1), item (i), (b)

Necessary measures shall be taken such as putting the specified waste in a container, etc., to prevent the specified waste (including any sewage water from the specified waste) from scattering, flowing, or leaking out of the transportation vehicle;

[Purpose of Measures]

In order to prevent expansion of contamination with radioactive cesium during collection and transportation, necessary measures shall be taken to prevent the specified waste (including any sewage water from the specified waste) from scattering, flowing, leaking, etc., out of the transportation vehicle.

[Example of Measures]

Specifically, the measures shown in **Table 3-1** are considered, considering kinds of specified waste.

Table 3-1: Examples of Measures requiring Transportation in Containers, etc.

	Examples of Measures with Structure of Transportation Vehicles and Transportation Container
Response by Transportation Container	<ul style="list-style-type: none"> ▪ Drum cans; ▪ Flexible containers (running-type); ▪ Flexible containers (cross-type with inner bags or inner coating type); ▪ Over pack, etc.

Response depending on the structure of transportation vehicles	<ul style="list-style-type: none"> ▪ Box car; ▪ Sludge absorption-discharge vehicle; ▪ Delivery car; ▪ Wing car, etc.
--	---

(Response depending on the Structure of Transportation Vehicles)

When transporting the specified waste, it is important to select proper vehicles depending on the properties of specified waste and loading conditions (packing mode, etc.) to prevent scattering, outflow and leakage of specified waste.

Hereinafter examples of transportation vehicles are shown.

(Sealed Type Vehicles)

- Box Car

A water tight specification box car is suitable for transportation of sludge (**Figure 3-1**).



Figure 3-1: Water Tight Dump Car (Example)

- Sludge absorption-discharge vehicle

A sludge absorption-discharge vehicle is suitable for transportation of flowable sludge and liquid materials (**Figure 3-2**).



Figure 3-2: Sludge Absorption-Discharge Vehicle (Example)

- Delivery Truck

An example of a vehicle with an airtight structure is a delivery truck (**Figure 3-3**).



Figure 3-3: Delivery Truck (Example)

- Wing Body Truck

A wing body truck is an example of a vehicle that has the method of flip-up of cargo room of a delivery truck from the side to the ceiling uniformly to make loading and unloading easier (**Figure 3-4**). As it is easy to load in rain, and the side part of the loading platform is open, loading and unloading work such as palette cargo handling by forklifts is easier.



Figure 3-4: Wing Body Truck (Example)

(Open Type Vehicles)

- Container Truck with Attaching and Detaching Device

A container truck with attaching and detaching device is an example of a vehicle that allows to mechanically load and unload a container containing wastes as-is (**Figure 3-5**).

It is necessary to take such measures as covering the top of the container with a sheet to prevent infiltration of rainwater during transportation.



Figure 3-5: Container Truck with Attaching and Detaching Device (Example)

- Soil Dump Truck

Soil dump trucks have been commonly used for collecting and transporting solid waste in a direct loading manner (**Figure 3-6**). In transportation of specified waste, it is necessary to take such measures as covering the loading platform with a sheet to prevent transportation containers from falling or dropping during transportation and to prevent infiltration of rainwater.



Figure 3-6: Soil Dump Truck (Example)

- Flat Body Truck

Flat body trucks are commonly used for transporting the waste contained in containers (**Figure 3-7**).

In transportation of specified waste, it is necessary to take such measures as covering the loading platform with a sheet to prevent transportation containers from falling or dropping during transportation and to prevent infiltration of rainwater.

There are also flat body trucks equipped with lifters and truck cranes for loading and unloading waste.



Figure 3-7: Flat Body Truck (with Lifter) (Example)

(Response by Transportation Container)

As transportation containers are expected to prevent scattering, outflow, and leakage of specified waste, it is important to select proper containers depending on the kind of specified waste and loading conditions (packing mode, etc.) when transporting the specified waste.

Hereinafter examples of transportation containers are shown.

- Drum Can

Drum cans are widely used for storage and as a transportation container of liquid waste and powder waste, etc. (**Figure 3-8**). Other than metal, there are plastic or compound cans of both metal and plastic.

In case of an open type, it is recommended to use the type with a cap to prevent scattering of specified waste to the outside and prevent mixing of foreign substances.



Figure 3-8: Drum Can (Open Type) (Example)

- Flexible Container

An example of a container used for storage and transportation of powder waste is a flexible container. For types of flexible containers, refer to the **Table 2-1** above and for examples of flexible containers, refer to **Figure 2-6** and **Figure 2-7** above. Attention shall be paid if large wastes or sharp materials are contained

because sharp specified waste would cause sticking, tears, etc.

- Over Pack

An over pack has considerable strength from shocks caused by falling, etc., enabling reduction of scattering risk by shocks from accidents, etc. (**Figure 3-9**). It has a structure that allows for safer transportation in case of specified waste having relatively high radiation concentration.



Figure 3-9: Over Pack (Example)

3.1.3 Prevention of Infiltration of Rainwater

Ordinance, Article 23, paragraph (1), item (i) (c)

Necessary measures shall be taken such as covering the surface of the specified waste with a seepage control sheet so that no rainwater will infiltrate into the specified waste

[Purpose of Measures]

Because radioactive cesium might outflow, etc., when rainwater infiltrates into specified waste during collection and transportation, it is necessary to take such measures as covering with a seepage control sheet, etc., on top of the specified waste to prevent infiltration of rainwater.

[Example of Measures]

- For a seepage control sheet with a high waterproof effect, it is effective to use a truck sheet made of polyester or polypropylene.
- An example of transportation by the combination of flexible containers and a seepage control sheet is shown in **Figure 3-10**.

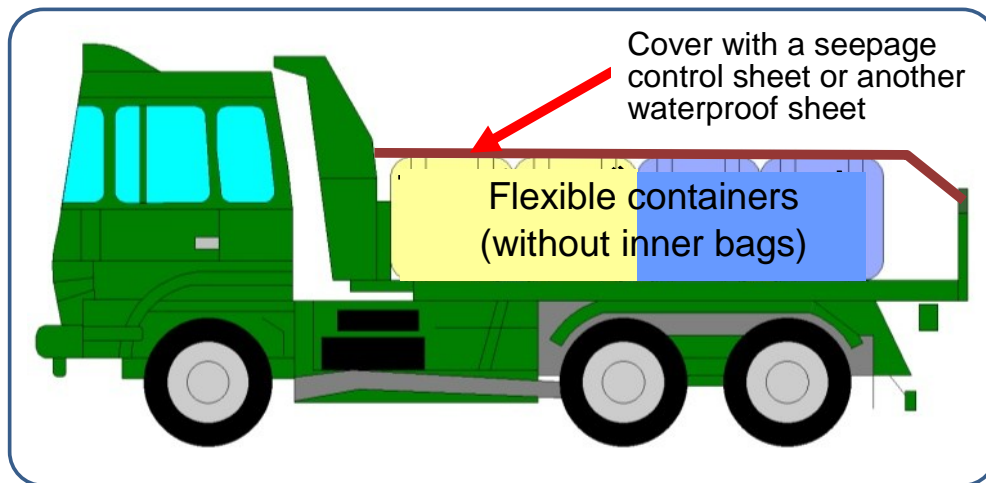


Figure 3-10: Transportation by combination of transportation containers and seepage control sheet (Example)

3.1.4 Prevention of Impairment of Conservation of the Living Environment by Foul Odors, Noises or Vibrations

Ordinance, Article 23, paragraph (1), item (i) (d)

Necessary measures shall be taken so that the conservation of the living environment will not be impaired by any foul odors, noise or vibration accompanying the collection or transportation.

[Purpose of Measures]

It is necessary to take measures so that the conservation of the living environment will not be impaired by any foul odors, noise, or vibration during the collection or transportation.

[Example of Measures]

Specifically, taking the following measures set forth below can be considered.

- In loading and unloading specified waste, use machines with low noise and low vibration.
- If storing specified waste emitting foul odors in transportation containers, storing work shall be conducted in the facilities having an isolated structure from the outside by buildings, etc.
- Legal speed shall be complied with, and overloading shall be avoided.
- In transportation, rigidly enforce idling stop and refrain from sudden acceleration, deceleration, or engine racing.
- Avoid as practical as possible transportation during midnight hours.

3.1.5 Separation from other Materials

Ordinance, Article 23, paragraph (1), item (i) (e)

The specified waste shall be separated from other materials to prevent any danger of it being mixed with other materials.

[Purpose of Measures]

To prevent secondary pollution of materials other than specified waste and increase in specified waste amounts due to mixing of specified waste with other materials, it is necessary to collect and transport specified waste separately from other materials.

[Example of Measures]

- It is effective to load specified waste exclusively in terms of prevention of secondary pollution, etc., by mixed loading of specified waste and other waste.
- In transportation by ships and cargo trains, in addition to mixed loading with other materials, bulk transportation of multiple kinds of specified waste is expected. Therefore, it is important to transport the specified waste, surely separating from other materials by individually putting in transportation containers. It can also be considered to transport, separating by kind of specified waste.
- An example of separate transportation is shown in **Figure 3-11**.

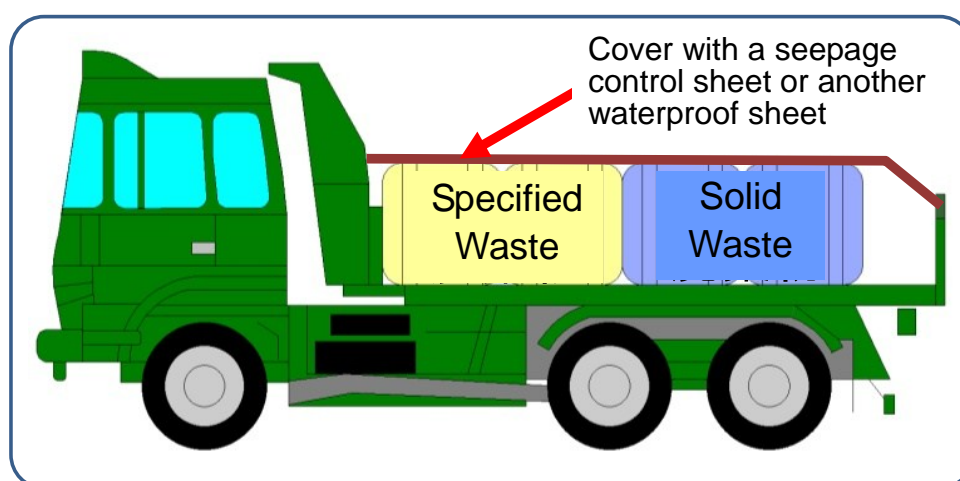


Figure 3-11: Transportation, separating by containers (Flexible Containers) (Example)

3.1.6 Conservation of the Living Environment at the Time of Establishment of Facilities

Ordinance, Article 23, paragraph (1), item (ii)

In cases where any facility for collection or transportation of specified waste is established, necessary measures shall be taken to prevent any danger of impairing the conservation of the living environment.

[Purpose of Measures]

In cases where any facility for collection or transportation of specified waste is established, it is necessary to take measures to prevent the facility from impairing the conservation of the living

environment of the surrounding area.

[Example of Measures]

- Here, facilities for collection or transportation of specified waste assume garages and parking lots of transportation vehicles and storage facilities of transportation containers.
- In establishing and operating the facility, it is necessary to take measures to control the emission of foul odors, noise making, or the occurrence of vibration.

3.1.7 Prevention of Scattering, Outflow and Foul Odors from Transportation Vehicles and Transportation Containers

Ordinance, Article 23, paragraph (1), item (iii)

The transportation vehicle and the containers used for transportation shall be those which pose no risk of scattering or flowing out of the specified waste and of leakage of foul odors.

[Purpose of Measures]

To prevent environmental pollution and impairing of the conservation of the living environment by radioactive cesium due to the scattering or outflow of specified waste at the time of collection and transportation, it is necessary to use transportation vehicles or transportation containers having the structure that prevents the specified waste from scattering, outflowing, or emitting foul odors.

[Example of Measures]

(Prevention of Scattering of Specified Waste)

- If specified waste is transported, it is necessary to prevent exposure of specified waste by transporting in flexible containers (with inner bags, etc.) and covering with a sheet, etc. In transportation of specified waste containing a large amount of fine fractions, such as incineration ash and soot and dust, special attention shall be paid.
- Attention shall be paid to the following points in loading and unloading the waste.
 - Visual inspection shall be conducted to check if cracks or chaps emerged in transportation containers in connection with storage of specified waste.
 - If incineration ash and soot and dust are stored in transportation containers, work shall be done in the building and proper water spraying, etc., shall be performed so that specified waste shall not scatter.
 - When storing specified waste in such a transportation container as a flexible container, work shall be done carefully so as not to damage the transportation container.
 - Loading and unloading shall be carried out by paying attention so as not to drop transportation containers such as flexible containers so that they will not be damaged.
- As a container used at a storage site for specified waste is usually stored for a certain period, its strength can decline depending on its storage period and, when moving specified waste, such a

container might be damaged, resulting in the scattering of specified waste. Therefore, when lifting or moving such a container during transportation, attention shall be paid to prevent the scattering of the specified waste by checking the strength of the container (for instance, it shall be checked that the container is not damaged before using while it shall be assured that the container will not be damaged by lifting it gradually).

(Prevention of Outflow of Specified Waste)

- In case of mud or liquid specified waste, they shall be transported by a water tight specification box car or a sludge absorption-discharge vehicle, or after storing in airtight containers.
- Even in case of solid waste, water content contained in specified waste might flow out in connection with vibrations during transportation. Therefore, a water tight specification box car or airtight containers shall be used.
- Depending on the properties of specified waste, it is necessary to select transportation vehicles and transportation containers having such functions as anti-corrosion, waterproof, fireproof, heatproof and penetrability resistance, etc.
- When handling liquid specified waste, it is necessary that the floor has a structure that is difficult to permeate, etc., so that outflowed specified waste can be collected.

(Prevention of Foul Odors from Specified Waste)

- Specifically, in case of specified waste that might emit foul odors, it is necessary to store it in airtight containers.

3.1.8 Indication and Keeping Documents for Transportation Vehicles

Ordinance, Article 23, paragraph (1), item (iv)

Any collection or transportation of specified waste using a transportation vehicle shall be carried out as follows.

- (a) The following matters shall be displayed on the outside of the body of the transportation vehicle
 1. That it is a transportation vehicle used for collection or transportation of specified waste
 2. The name of the person who carries out collection or transportation
- (b) The matters listed under (a), 1. and 2., shall be displayed in characters in an easily identifiable color, and the matters listed under (a), 1., shall be displayed using characters of the size 140 points or larger prescribed under the Japanese Industrial Standard Z8305, and the matters listed under (a), 2., shall be using characters of the size 90 points or larger prescribed under the Japanese Industrial Standard Z8305.
- (c) The transportation vehicle shall be furnished with the documents prescribed under the following 1. , through 3. , according to the categorization of the person as under such 1., through 3.:

1. National government, prefectures or municipalities and persons who carry out collection or transportation of specified waste upon entrustment by these administrative bodies: document certifying to that effect and documents describing the matters set forth below (“documents with required matters” in 2. and 3.)
 - a The name and address of the person or entity carrying out collection or transportation, and in case of a judicial person, the name of its representative;
 - b The kind of the specified waste to be collected or transported (if such specified waste includes asbestos-containing specified waste, specified waste asbestos, etc., and specified soot and dust, such facts shall be included) and the quantity thereof;
 - c The date on which collection or transportation was commenced;
 - d The names, locations, and contact information of the place where the specified waste to be collected or transported was loaded and the place of destination of transportation;
 - e Matters to be noted when handling the specified waste; and
 - f Matters concerning emergency measures in case of an accident.
2. A person or entity that carries out collection or transportation of the specified waste upon entrustment of persons or entities entrusted by national government regarding collection or transportation of specified waste (hereinafter “primary entrustee” in 2.): document certifying to that effect, document certifying that the person or entity is described in the contract on entrustment agreement between the national government and the primary entrustee as the person or entity that intends to be entrusted collection or transportation of the specified waste by the primary entrustee, and documents with required matters
3. A person or entity that stores designated waste in accordance with the provisions of the Act, Article 17, paragraph (2) (including its application mutatis mutandis is under Article 18, paragraph (5) of the Act) and that carries out transportation of the designated waste to change a storage site of such designated waste: document certifying that specified waste to be collected or transported is designated waste, document certifying that a notification was made pursuant to the provision of Article 15, item (xiii) of the Ordinance, and documents with required matters

(Indication)

[Purpose of Measures]

A transportation vehicle used for collection and transportation shall be indicated on the outside of its body that the vehicle is for collection and transportation of specified waste.

[Example of Measures]

An example of indication is shown in **Figure 3-12**.

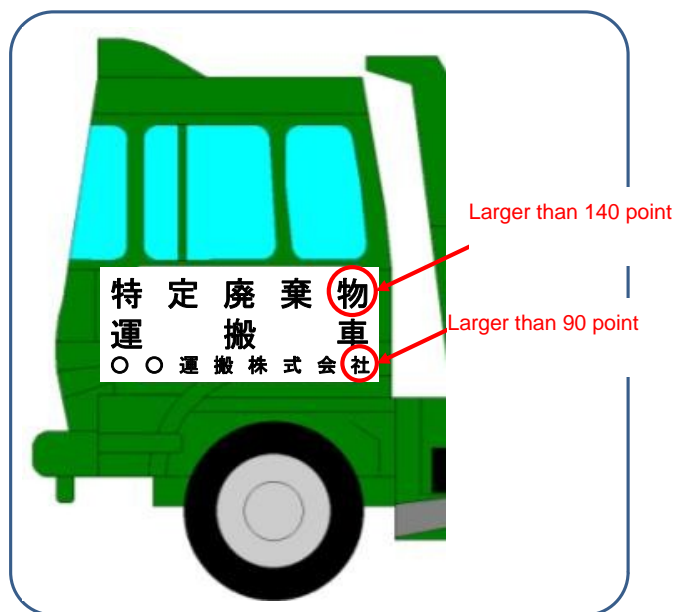


Figure 3-12: Indication (Example)

(Keeping Documents)

[Purpose of Measures]

A transportation vehicle shall be furnished with the applicable documents to state that the person or entity carrying out collection or transportation is entrusted regarding collection or transportation of specified waste.

[Example of Measures]

(Documents to be Furnished)

- When collection or transportation is carried out by the national government, prefectures, or municipalities or upon entrustment by these administrative bodies
 - Copy of certificate of entrustment acceptance, etc.
- When collection or transportation of the specified waste is carried out upon entrustment of primary trustee
 - Certificate stating the entrustment of primary trustee, its copy, etc.
 - Entrustment agreement between the national government and the primary trustee, its copy, etc.,
(the person or entity is described in the contract on entrustment agreement between the national government and the primary trustee as the person or entity that intends to be entrusted with collection or transportation of the specified waste by the primary trustee)

(Documents with required matters)

- For a to d regarding documents with required matters, it is acceptable to respond using the form of industrial waste management form (manifest). If the concentration of radioactive substances in the specified waste is measured, it is appropriate to describe the concentration of the radioactive substances in the remarks column.
- For e, it is possible to refer to the waste data sheet under WDS Guidelines as a document describing the

matters of note in handling specified waste.

- For f, it is necessary to prepare the emergency communication system in advance so that the accident shall promptly be communicated to the related persons and the measures shall be taken to minimize the damage and impact. It is also required to draw up the manual of response to emergency describing the measures necessary to prevent damage and to cause transportation workers, etc. to carry the manual with them.
- An example of the emergency communication system is shown in **Figure 3-13** and an example of a manual for responding to an emergency is shown in **Table 3-2**.

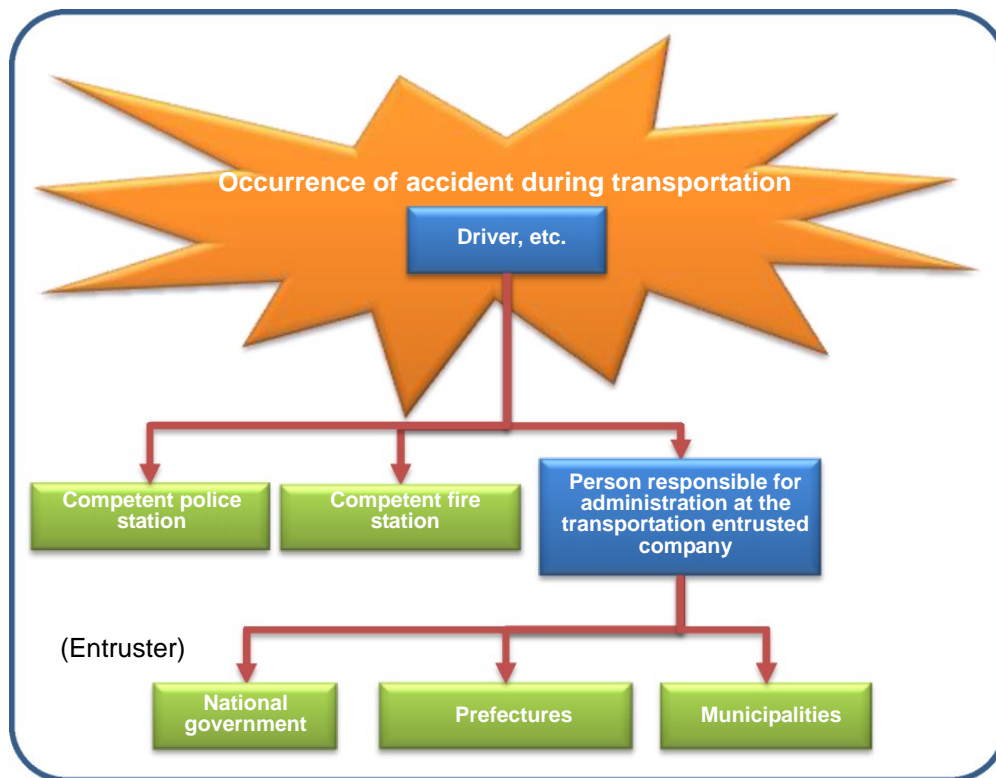


Figure 3-13: Emergency Communication System (Example)

**Table 3-2: Manual of Response to Emergency Measures
(In Case of Land Transportation by Car) (Example)**

Emergency Measures		<ul style="list-style-type: none"> · Stop engine. · Make emergency report/communication and follow the instructions. · In case of leakage, if it is not dangerous, confirm the safety and prevent outflow by absorption materials, etc. · Measure the radiation concentration of leaked specified waste. · If there is the possibility of passers-by approaching, such measures as extending a rope shall be taken so that they will not be approach the specified waste. · When it is difficult for transportation workers to handle the situation by themselves, they shall call for reinforcements.
Emergency Report		Police Station (110) <ul style="list-style-type: none"> · When: time · Where: address or road · What: specified waste XXX · What: scattered / flew out · Any injured person; Yes/No · My name is: XXX of YYYY Transportation Corporation
Emergency Communication		Contact: YYYY Transportation Corporation Person in charge: XXXX Address: XXXXX Tel: **-****-****
Protection of Workers		<ul style="list-style-type: none"> · Dust prevention mask · Protective garment, protective gloves · Protective glasses
Leakage	Solid:	<ul style="list-style-type: none"> · Spilt specified waste shall be collected so as not to scatter. · Collect in containers, etc., using scoop, etc.
	Mud:	<ul style="list-style-type: none"> · Stop leakage if not dangerous · Collect by absorption, etc., after intercepting and the residue shall be removed by absorption material and relocated from the leakage place. · Prevent flowing into the water discharge ditch, sewage outlet, basement or closed place
Emergency measures at the time of exposure and contact	Eyes:	<ul style="list-style-type: none"> · Immediately wash with plenty of flowing water for more than 15 minutes · Wash eye balls and eyelids by flushing water to every corner by opening eyelids with fingers (remove contact lenses). Seek medical treatment from an eye doctor.

		· Never use eye-drops or topical cream without instructions from a doctor.
	Skin:	· Immediately wash with plenty of water using a sufficient amount of soap.
	Inhalation:	· Move from the inhaled place to a place with fresh air and promptly seek medical treatment from a doctor.
Ex post facto measures		· After finishing emergency measures, the person responsible for administration shall report the situation to the Ministry of the Environment, Regional Environmental Office.

3.1.9 Prevention of Radiation Hazard

Ordinance, Article 23, paragraph (1), item (iv) (d)

Necessary measures shall be taken such as blocking radiation, etc., so that the maximum value of 1-cm dose equivalent rate at a point 1 meter away from the front, rear and both side surfaces (if the vehicle is of an open type, vertical surfaces having contact with the external outline) of the transportation vehicle loaded with specified waste shall be 100 micro Sievert per hour or less

[Purpose of Measures]

From the viewpoint of the prevention of radiation hazard to public during collection or transportation, it is necessary to take such measures as blocking radiation, etc., so that the air dose rates around the transportation vehicle loaded with the specified waste does not exceed the standards provided for in the Ordinance.

[Example of Measures]

- In order for the maximum value of air dose rate at a point 1 meter away from the surfaces of the vehicle not to exceed 100 $\mu\text{Sv/h}$, it is necessary to take such measures such as adjustment of kind or quantity of loaded specified waste, change loading position, use containers having shield effect, installation of shield materials, etc. Specifically, the following shield methods are conceivable.
 - In loading, lay out specified waste with higher radioactive concentration around the center of platform and specified waste of lower radioactive concentration at contour.
 - Shield the surroundings by sandbags, lead plate, iron plate, and concrete wall, etc.
 - Lay out specified waste only in the center of loading platform to secure distance from the surface of body.
 - Shield by containers with inner liner having shield effect.
- The air dose rates shall be measured in accordance with the method set forth in Chapter 2 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”.
- The intensity of radiation differs depending on concentrations and quantities of radioactive materials. As shown in **Table 3-3**, even when specified waste with the radioactive cesium level of 100,000 Bq/kg is loaded into a comparatively large transportation vehicle (Case 3), the maximum air dose rate at a

distance of 1 m from the transportation vehicle is considered to be much lower than 100 $\mu\text{Sv/h}$. Within a general maximum load range, when transporting specified waste with a radioactive cesium level of 100,000 Bq/kg or less, measurement of the air dose rate of the transportation vehicle shall not be carried out in this case since it is obvious that the level does not exceed the standards.

**Table 3-3: Trial Calculation of Air Dose Rates
at a Distance of 1 Meter from Vehicle Surface (Example)**

[Preconditions]

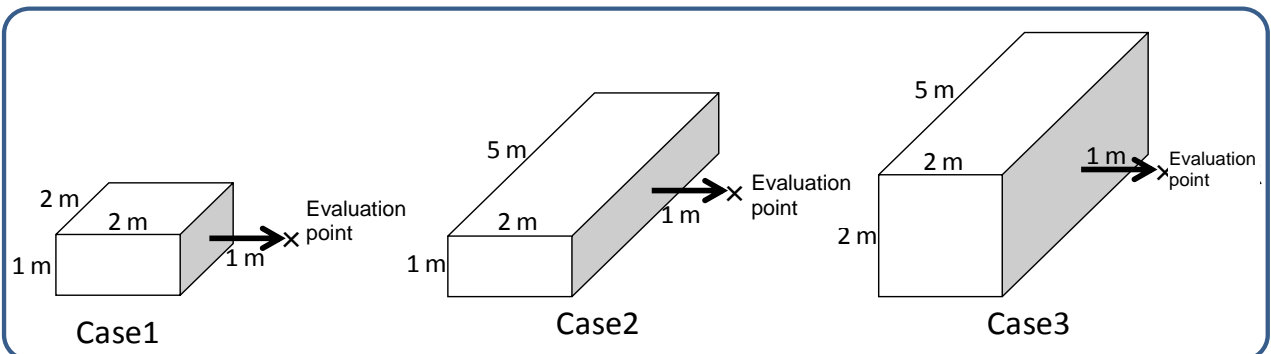
- Load incineration ash (specific weight: 1.6 g/cm^3 , radioactivity ratio of Cs-134 to Cs-137 = 1 to 1) into flexible containers
- Size of flexible container: $1 \text{ m} \times 1 \text{ m} \times 1 \text{ m}$
- A shielding effect by the flexible container shall not be taken into account.
- Evaluation point is at a distance of 1 m from the center of the loading side surface.

[Parameter]

Case 1: loading of 4 flexible containers

Case 2: loading of 10 flexible containers

Case 3: loading of 20 flexible containers



[Trial calculation results]

		Average radioactive concentration (Bq/kg)				Air dose rates at a distance of 1 meter from vehicle surface prescribed in Article 23, paragraph (1), item (iv) of the Ordinance
		8,000	100,000	300,000	500,000	
Air dose rate ($\mu\text{Sv/h}$)	Case 1	0.9	11.5	34.5	57.5	100
	Case 2	1.3	16.3	48.9	81.5	
	Case 3	2.2	27.4	82.2	137.0	

3. 1. 10 Carrying Equipment and Devices, etc., Necessary for Response to Accidents

Ordinance, Article 23, paragraph (1), item (iv) (e)

Instruments, etc., for taking measures prescribed under Ordinance, Article 23, paragraph (1), item (i), (c) 1. f, shall be carried.

[Purpose of Measures]

It is necessary to carry instruments, etc., for taking emergent measures at the time of accidents during collection or transportation.

[Example of Measures]

(Equipment, etc., to be Carried)

Specifically, it is advisable to carry the following equipment, etc., depending on the properties of transported specified waste.

- Collection equipment (scoop, etc.)
 - It is advisable to carry scoop, etc., to collect specified waste that has scattered, flowed out or leaked. When transporting specified waste containing much water, it is also advisable to carry waste cloth, etc., as well as scoop.
- Protective Equipment
 - Protective equipment shall be carried to prevent health damage to workers such as the driver in collection work.
 - An appropriate mask (such as a dust prevention mask) shall be carried, depending on the properties of transported specified waste.
 - A protective garment such as a sealed garment for protection from suspended solid dust (Type 5) and a sealed garment for protection from liquid (Type 3) shall be carried depending on the properties of specified waste to be transported.
 - Protective gloves and protective glasses shall be carried depending on the properties of specified waste to be transported so that specified waste shall not adhere to the hands of a worker or enter the eyes through collection work. A combined dust prevention mask that combines a dust prevention mask and protective glasses is also available.
 - Examples of protective equipment are shown in **Figure 3-14**.

 <p>Examples of dust prevention mask</p>	 <p>Example of protective garment</p>
 <p>Example of protective glasses</p>	 <p>Example of combined dust prevention mask</p>

Figure 3-14: Protective Equipment (Example)

- Rope/Sign
 - For the purpose of prohibition of entry of people in the surrounding area of specified waste, which was scattered or flowed out, ropes and signs shall be carried.
- Fire Extinguisher
 - For the purpose of extinguishing fire at an early stage in case of fire from specified waste or transportation vehicles, a fire extinguisher shall be carried.
- Lighting Equipment
 - As it is expected to be dark in the surrounding area, in collection of scattered or flowed out specified waste, lighting equipment, including a flashlight, etc., shall be carried.
- Mobile Phone
 - For the purpose of communicating with related persons promptly in case of an accident, a mobile phone shall be carried.

(Response in Case of Accidents)

If specified waste scattered, outflowed, permeated into the ground, emitted foul odors during collection and transportation of specified waste, it is necessary to immediately park the transportation vehicle in a safe place and immediately take emergency measures and warn people in the surrounding area and promptly communicate to the related persons.

In this regard, some examples of specific response in case of accidents are as follows.

- Rescue of human life
- Fire extinction and prevention of spread of fire, etc., in case of fire
- Confirmation of the status of waste (damage to containers and existence of leakage, etc.)
- Prohibition of entry of people other than the related persons by roping, putting up of signs, etc.
- Collection of leaked specified waste
- Checking air dose rate of the surrounding area (after the emergency measures)*, etc.

* When checking air dose rate after taking emergency measures, and when the driver needs to measure him/herself, it is advisable to prepare a dosimeter.

(Prevention of Accidents, etc.)

In transportation, it is necessary to provide education for prevention of accidents, etc., and education for response in case of accidents, etc., so that the impact on the living environment or health damage to workers, etc., shall not occur as a result of an accident, etc., during loading and unloading work and transportation of waste.

- Standards for collection and transportation
- Compliance with other laws (prohibition of overload)
- Carrying emergency communication system chart and manual for response in case of emergency
- Compliance with transportation routes following the plan
- Impact of cesium on people
- Use of appropriate protective equipment, etc.
- Impact of swing and vibrations during transportation on transported objects (such as dispersion, spillover, or leakage)

3.1.11 Collection and Transportation of Asbestos-Containing Specified Waste, Specified Waste Asbestos, etc., and Specified Soot and Dust upon Separation

Ordinance, Article 23, paragraph (1), item (v)

In cases where any of the following specified waste is collected or transported, such specified waste shall be collected or transported, separating it so that the same will not be mixed with specified waste other than such specified waste

- Asbestos-Containing Specified Waste
- Specified Waste Asbestos, etc.
- Specified Soot and Dust

[Purpose of Measures]

- Under the Waste Management Act, for the waste containing asbestos (asbestos-containing waste, waste asbestos, etc.) and soot and dust containing hazardous materials, including dioxins, etc., the respective standards for treatment are established as the waste which might impair human health and the living environment. In particular, waste asbestos, etc., and soot and dust are designated as specially-controlled

waste, to which the stricter standards for treatment than ordinary waste is applied.

- As described above, for the materials requiring treatment under the special treatment standards, if these fall under the specified waste, it is necessary to collect or transport such specified waste separately from other specified waste so that transfer to the subsequent interim treatment will be easier.

[Example of Measures]

An example of separation by transportation containers is shown in **Figure 3-15**.

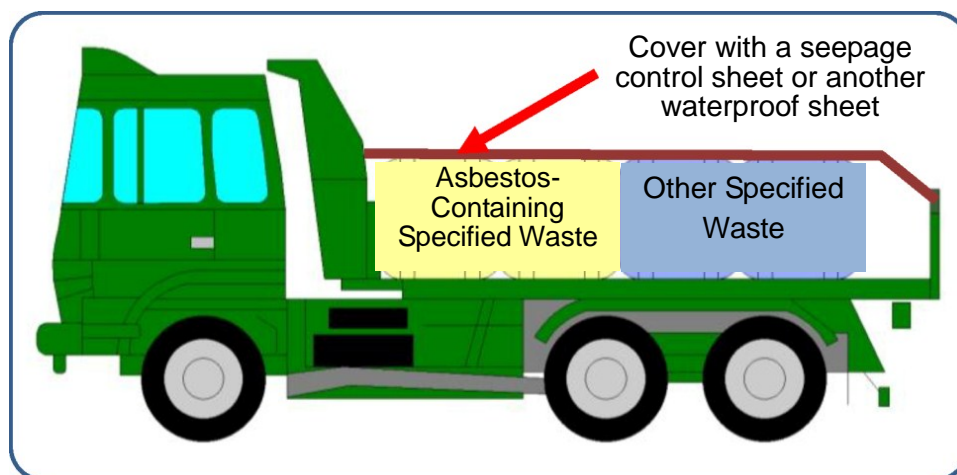


Figure 3-15: Transportation Separating by Containers (Flexible Containers) (Example)

3.1.12 Matter of Note for Collection and Transportation of Asbestos-Containing Specified Waste and Specified Waste Asbestos, etc.

Ordinance, Article 23, paragraph (1), item (vi)

In cases where asbestos-containing specified waste and specified waste asbestos, etc., are collected or transported, collection or transportation shall be carried out by a method with which such specified waste will not be shredded.

[Purpose of Measures]

Because asbestos fibers might scatter due to contact and load during collection and transportation of asbestos-containing specified waste and specified waste asbestos, etc., it is necessary to select a collection or transportation method with which such asbestos-containing specified waste will not be shredded.

[Example of Measures]

(Asbestos-Containing Specified Waste)

- Loading or unloading shall be done in the original form so that asbestos-containing specified waste would not be fractured.
- Such measures as a sheet cover and bag packing shall be taken as the measure for prevention of scattering.

- In collection or transportation of asbestos-containing specified waste, they shall not be put into packer trucks and press packer trucks.

(Specified Waste Asbestos, etc.)

- A person that collects and transports waste asbestos, etc., shall handle carefully at each process of loading, transportation and unloading so as not to scatter waste asbestos, etc.
- Loading and unloading of plastic bags, etc., shall generally be carried out manually. If a machine is used, use pallets and the machine shall not directly touch the plastic bags, etc.
- If plastic bags, etc., were damaged, take scattering prevention measures by moisturizing through prompt water spraying and newly package the waste by such waterproof materials as double plastic bags, etc.

3.1.13 Preparation and Retention of Records

Ordinance, Article 23, paragraph (1), item (vii)

Record of the following matters shall be prepared and retained for five years from the date on which collection or transportation is completed.

- (a) The kind of specified waste collected or transported (if such specified waste includes any of the specified waste stipulated under item (v), (a) through (c), such fact shall be included) and its quantity. (Ordinance, Article 23, paragraph (1), item (vii), (a))
- (b) The date on which collection or transportation was commenced and completed per specified waste, the name of the person in charge of transportation, the names and locations of the place where it was loaded and the place of destination of transportation, and, in cases where collection or transportation of specified waste is carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle.

[Purpose of Measures]

To manage the collection or transportation status of specified waste, it is necessary to prepare and retain records about collection and transportation.

[Example of Measures]

- Examples of forms for recording collection or transportation of specified waste are shown in the next page.
- Records about collection or transportation of specified waste may be made to correspond by using the form of industrial waste management form (manifest) in which the date of start and completion of transportation, the vehicle identification number or vehicle number are described.

[Example of Descriptive Form]

Records on Collection/Transportation

Kind of collected or transported specified waste ^{Note)}	Quantity (unit)	Date of collection or transportation start	Date of collection or transportation end	Name of person in charge of collection or transportation	Name and address of loading place	Name and address of destination of transportation	Vehicle identification number or vehicle number of transportation vehicle

Note) If asbestos-containing specified waste, specified waste asbestos, etc., and specified soot and dust are included, that fact shall be entered. In addition, lot number shall be described on waste, and the lot number shall be entered.

[Example of Description in Recoding Form]

Records on Collection/Transportation

Kind of collected or transported specified waste ^{Note)}	Quantity (unit)	Date of collection or transportation start	Date of collection or transportation end	Name of person in charge of collection or transportation	Name and address of loading place	Name and address of destination of transportation	Vehicle identification number or vehicle number of transportation vehicle
Debris (H24-1-1)	Flexible container: XX bags	DD/MM/2012	DD/MM/2012	(Name)	XX temporary storage site XX, XX-cho, XX-shi	XX Clean Center XX, XX-cho, XX-shi	Fukushima XXXXXX ●●●●
Debris (H24-1-2)	Flexible container: XX bags	DD/MM/2012	DD/MM/2012	(Name)	XX temporary storage site XX, XX-cho, XX-shi	XX Clean Center XX, XX-cho, XX-shi	Fukushima XXXXXX ●●●●
House cleaning waste (H24-2)	Flexible container: XX bags	DD/MM/2012	DD/MM/2012	(Name)	XX temporary storage site XX, XX-cho, XX-shi	XX Clean Center XX, XX-cho, XX-shi	Fukushima XXXXXX ●●●●

Note) If asbestos-containing specified waste, specified waste asbestos, etc., and specified soot and dust are included, that fact shall be entered. In addition, lot number shall be described on waste, and the lot number shall be entered.

3.2 Standards on Collection/Transportation of Standard Conformable Specified Waste

Ordinance, Article 23, paragraph (2)

- (i) The provisions of the preceding paragraph, item (i) (excluding (b) and (c)), (ii), (iii) and (iv) (excluding (c), 1, f., (d) and (e)), and item (v) through item (vii) shall govern.
- (ii) It shall be ensured that no standard conformable specified waste (including any sewage water from the standard conformable specified waste) will scatter, flow out, or leak out.

From the Ordinance, Article 23, paragraph (1):

- (i) Any collection or transportation shall be carried out as follows.
 - (a) It shall be ensured that no harm pertaining to human health or the living environment will be caused by the standard conformable specified waste;
 - (b) Necessary measures shall be taken so that the conservation of the living environment will not be impaired by any foul odors, noise or vibration accompanying the collection or transportation; and
 - (e) The standard conformable specified waste shall be separated from other materials to prevent any danger of it being mixed with other materials.
- (ii) In cases where any facility for collection or transportation of standard conformable specified waste is established, necessary measures shall be taken to prevent any danger of impairing the conservation of the living environment.
- (iii) The transportation vehicle and the containers used for transportation shall be those which pose no risk of scattering or flowing out of the standard conformable specified waste and of leakage of foul odors.
- (iv) Any collection or transportation of standard conformable specified waste using a transportation vehicle shall be carried out as follows.
 - (a) The following matters shall be displayed on the outside of the body of the transportation vehicle:
 - 1. That it is a transportation vehicle used for collection or transportation of standard conformable specified waste; and
 - 2. The name of the person who carries out collection or transportation.
 - (b) The matters listed under (a), 1. and 2. above, shall be displayed in characters in an easily identifiable color, and the matters listed under (a), 1., shall be displayed using characters of the size 140 points or larger prescribed under the Japanese Industrial Standard Z8305, and the matters listed under (a), 2., shall be using characters of the size 90 points or larger prescribed under the Japanese Industrial Standard Z8305.
 - (c) The transportation vehicle shall be furnished with the documents prescribed under the following 1., through 3., according to the categorization of the person as under such 1., through 3.:
 - 1. National government, prefectures or municipalities and persons who carry out collection

or transportation of standard conformable specified waste upon entrustment by these administrative bodies: document certifying to that effect and documents describing the matters set forth below (“documents with required matters” in 2. and 3.).

- a The name and address of the person or entity carrying out collection or transportation, and in case of a judicial person, the name of its representative;
 - b The kind of the standard conformable specified waste to be collected or transported (if such standard conformable specified waste includes standard conformable specified waste prescribed under the next item, (a) through (c), such fact shall be included) and the quantity thereof;
 - c The date on which collection or transportation was commenced;
 - d The names, locations and contact information of the place where the standard conformable specified waste to be collected or transported was loaded and the place of destination of transportation; and
 - e Matters to be noted when handling the standard conformable specified waste
2. A person or entity that carries out collection or transportation of the standard conformable specified waste upon entrustment of persons or entities entrusted by national government regarding collection or transportation of standard conformable specified waste (“primary entrustee” hereinafter in 2.): document certifying to that effect, document certifying that the person or entity is described in the contract on entrustment agreement between the national government and the primary entrustee as the person or entity that intends to be entrusted collection or transportation of the specified waste by the primary entrustee, and documents with required matters
3. A person or entity that stores standard conformable specified waste in accordance with the provisions of the Act, Article 17, paragraph 2 (including its application mutatis mutandis is under Article 18, paragraph 5 of the Act) and that carries out transportation of the standard conformable specified waste to change a storage site of such standard conformable specified waste: document certifying that standard conformable specified waste to be collected or transported is designated waste, document certifying that a notification was made pursuant to the provision of Article 15, item (xiii) of the Ordinance, and documents with required matters
- (v) In cases where any of the following standards conformable specified waste is collected or transported, such standard conformable specified waste shall be collected or transported, separating it so that the same will not be mixed with standard conformable specified waste other than such standard conformable specified waste.
- (a) Standard conformable specified waste containing asbestos, designated by the Minister of the Environment (except for standard conformable specified waste asbestos, etc. prescribed in (b)) (hereinafter “asbestos-containing standard conformable specified waste”)
 - (b) Waste asbestos (only limited to standard conformable specified waste) and asbestos-containing standard conformable specified waste or to which asbestos is attached, designated by the Minister of the Environment as these might disperse (hereinafter

“standard conformable specified waste asbestos, etc.”)

- (c) Soot and dust (only limited to standard conformable specified waste. Hereinafter "specified soot and dust")
- (vi) In cases where asbestos-containing standard conformable specified waste and standard conformable specified waste asbestos, etc., are collected or transported, collection or transportation shall be carried out by a method with which such standard conformable specified waste will not be shredded.
- (vii) Record of the following matters shall be prepared and retained for five years from the date on which collection or transportation is completed.
 - (a) The kind of the standard conformable specified waste collected or transported (if such standard conformable specified waste includes any of the standard conformable specified waste under item (v), (a) through (c), such fact shall be included) and its quantity;
 - (b) The date on which collection or transportation was commenced and completed per collected or transported standard conformable specified waste, the name of the person in charge of collection or transportation, the names and locations of the place where it was loaded and the place of destination of transportation, and, in cases where collection or transportation of standard conformable specified waste is carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle.

[Purpose of Measures]

The same collection/transportation standards as those for specified waste (except for standard conformable specified waste) are applied to standard conformable specified waste, and they shall be complied with. The provisions of the items of the Ordinance are given with the replacement of the term “specified waste” with the term “standard conformable specified waste.”

[Example of Measures]

Refer to 3.1.1 for the prevention of health damage and damage related to the living environment, 3.1.4 for the prevention of impairment of conservation of the living environment by foul odors, noises, or vibrations, 3.1.5 for the separation from other materials, 3.1.6 for the conservation of the living environment at the time of establishment of facilities, 3.1.7 for the prevention of scattering, outflow, and foul odors from transportation vehicles and transportation containers, 3.1.8 for the indication and keeping documents for transportation vehicles, 3.1.11 for the collection and transportation of asbestos-containing specified waste, specified waste asbestos, etc., and specified soot and dust upon separation, 3.1.12 for the matter of note for collection and transportation of asbestos-containing specified waste and specified waste asbestos, etc., and 3.1.13 for the preparation and retention of records.

4.1 Intermediate Treatment Standards for Specified Waste (Except for Standard Conformable Specified Waste)

[Outline of institution] Act, Article 20

- A person or entity who collects, transports, stores, or disposes of specified waste (waste in the countermeasure area or designated waste) shall follow the standards on treatment of specified waste.

The intermediate treatment standards to be applied include 9 items mainly as shown in **Table 4-1**, and application and non-application of these treatment standards based on concentrations of radioactive cesium and description items in the guidelines are shown.

Table 4-1: Outline of Intermediate Treatment Standards

	Contents of intermediate treatment standards	Over 8,000 Bq/kg	Under 8,000 Bq/kg	Description item
1	Measures for prevention of scattering and outflow of specified waste	Applied	Applied	4.1.2
2	Prevention of foul odors, noise, and vibration accompanying intermediate treatment	Applied	Applied	4.1.2
3	Prevention of impairment in conserving the living environment relating to facility for intermediate treatment	Applied	Applied	4.1.2
4	Structure of incineration facility (inclusion of exhaust gas treatment equipment, etc.)	Applied	Applied	4.1.3
5	Incineration method (prevention of scattering of incineration ash, etc.)	Applied	Applied	4.1.3
6	Prevention of scattering of dust generated accompanying shredding (indoor installation of facilities, etc.)	Applied	Not applied (secured by 3)	4.1.4
7	Management of concentrations of radioactive cesium in exhaust gas and drainage water accompanying intermediate treatment	Applied	Applied	4.1.5
8	Measurement and recording of amount of radiation in intermediate treatment facility	Applied	Applied	4.1.6
9	Recording and retention of information concerning intermediate treatment (kinds and quantities, etc., of waste)	Applied	Applied	4.1.7

4.1.1 Cases the Standards Shall Apply

(Standards for Treatment of Specified Waste)

Ordinance, Article 25

The standard for disposal (excluding any landfill disposal and ocean dumping (referring to disposals carried out in accordance with the standards concerning the place and method of ocean dumping prescribed pursuant to the Act relating to the Prevention of Marine Pollution and Marine Disaster (Act No. 136 of 1970)); the same shall apply hereinafter in this Article) of specified waste (excluding any

Standard Conformable Specified Waste; the same shall apply hereinafter in this paragraph) shall be as follows:

[Purpose of Measures]

When carrying out disposal (intermediate treatment) excluding landfill disposal and ocean dumping, the standards provided in of the Ordinance, Article 25 shall be complied with.

In the standards, methods for incineration and shredding are defined.

4.1.2 Disposal of Specified Waste (Intermediate Treatment)

Ordinance, Article 25, paragraph (1)

- (i) Disposal of specified waste shall be carried out as follows:
 - (a) It shall be ensured that the specified waste will not scatter or flow out.
 - (b) Necessary measures shall be taken so that the conservation of the living environment will not be impaired by any foul odors, noise or vibration accompanying the disposal.
- (ii) In cases where any facility for disposal of specified waste is established, necessary measures shall be taken to prevent any danger of impairing the conservation of the living environment.

[Purpose of Measures]

In intermediate treatment of specified waste, it is necessary to prevent scattering and outflow of waste for conserving the local living environment and protecting human health from the view point of prevention of spreading of contamination with radioactive cesium.

[Example of Measures]

- For the purpose of preventing impairment of conservation of the living environment by noise and vibration, adoption of low-noise equipment and taking vibration-proofing measures are effective.
- In order to prevent specified waste from scattering or outflow, it is effective to install facilities for intermediate treatment inside a building or provide covering over outdoor facilities.

4.1.3 Incineration of Specified Waste

Ordinance, Article 25, paragraph (1)

- (iii) In cases where specified waste is incinerated, it shall be carried out as follows:
 - (a) Incineration shall be carried out using incineration equipment of the following structure:
 1. That no part inside the incineration equipment except for the air intake and the tip of a smoke stack is exposed to the outside air, and the specified waste can be incinerated at a condition where the temperature of the gas generated inside the combustion

chamber (hereinafter referred to as “Combustion Gas”) is 800 degrees Celsius or higher;

2. That an amount of air sufficient for combustion is ventilated;
3. If specified waste is put into the combustion chamber while specified waste is burning inside the combustion chamber, that allows such specified waste to be fed by a fixed quantity into the combustion chamber, being insulated from the outside air;
4. That a device to measure the temperature of Combustion Gas inside the combustion chamber is installed;
5. That an auxiliary combustion equipment necessary to maintain the temperature of Combustion Gas is mounted; provided, however, that this shall not apply to incineration equipment that incinerates only such specified waste with a property capable of maintaining the temperature of Combustion Gas without heating; and
6. That exhaust gas treatment equipment is installed that has a sophisticated function to eliminate radioactive materials discharged by the accident inside Combustion Gas, such as a bag-filter type of dust collection equipment, etc.

(b) Incineration shall be carried out by the following method:

1. No Combustion Gas shall be exhausted except from the tip of a smoke stack;
2. No flame or black smoke of a pollution degree of more than 25% as per D8004 of the Japanese Industrial Standard shall be exhausted from the tip of a smoke stack;
3. No incinerated ash or unburned matter shall be scattered from the a smoke stack; and
4. Concentration of dioxins (referring to dioxins prescribed under the Act on Special Measures concerning Dioxins (Act No. 105 of 1999), Article 2, paragraph (1); the same shall apply hereinafter) in the exhaust gas emitted from the a smoke stack shall be the concentration listed in the lower section of appended table 1 or below according to the disposal capacity of the combustion chamber listed in the upper column of the same appended table.

(c) The concentration of dioxins in the exhaust gas emitted from the a smoke stack shall be measured and recorded at least once every year, and the amount of soot and smoke per the Air Pollution Control Act (Act No. 97 of 1968), Article 6, paragraph (2), and the concentration of soot and smoke per the same paragraph (limited to that pertaining to sulfur oxide, soot and dust, hydrogen chloride and nitrogen oxide) shall be measured and recorded at least once every 6 months by the methods prescribed by the Minister of the Environment*.

Appended Table 1

	New	Existing
Processing capacity of 4 tons or more per hour	0.1 ng/m ³	1 ng/m ³
Processing capacity of 2 tons or more and less than 4 tons per hour	1 ng/m ³	5 ng/m ³
Processing capacity of less than 2 tons per hour	5 ng/m ³	10 ng/m ³

*Ministerial Notification No. 132 of the Ministry of the Environment on September 3, 2012

- Concentrations of dioxins: methods provided in the calculation methods for concentration of dioxins (Ministerial Notification No. 7 of the Ministry of Health and Welfare)
- Amount of soot and smoke of sulfur oxide: methods provided in JIS K 0103
- Concentration of soot and smoke of soot and dust: methods provided in JIS Z 8808
- Concentration of soot and smoke of hydrogen chloride: methods provided in JIS K 0107
- Concentration of soot and smoke of nitrogen oxide: methods provided in JIS K 0104

[Purpose of Measures]

From the view point of controlling environmental contamination with radioactive cesium as well as controlling dioxins, it is necessary to treat specified waste with appropriate equipment and methods in incinerating the specified waste. Further, the concentration of dioxins in the exhaust gas needs to be measured and recorded.

[Example of Measures]

(Structure Requirements)

- Incineration facilities shall have a structure either equaling or surpassing the structure prescribed in Article 4 (technical standards for domestic waste disposal facilities) and Article 12 and Article 12-2 (technical standards for industrial waste disposal facilities) of the Ordinance for Enforcement of the Waste Management Act.

(Exhaust Gas Facilities)

- As exhaust gas treatment equipment with advanced functions, the following treatment equipment is effective for removing soot and dust: bag filter (**Figure 4-1**) that is capable of sufficiently removing soot and dust in/to which radiocesium aggregates/adheres, and electric dust collector (**Figure 4-2**) attached with equipment to improve the dust removal efficiency (activated carbon injection equipment, activated carbon based adsorption tower, lime injection equipment or wet gas cleaning equipment).

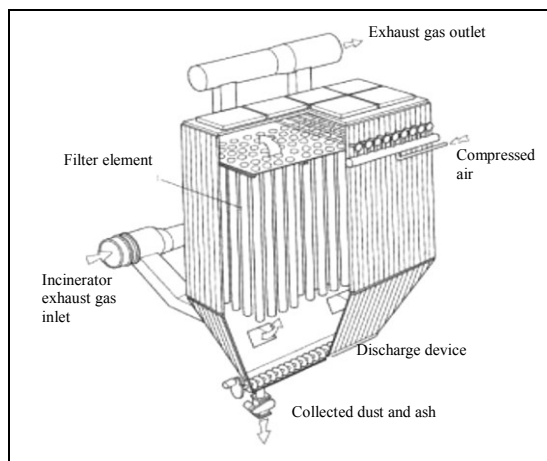


Figure 4-1: Bag Filter (Example)

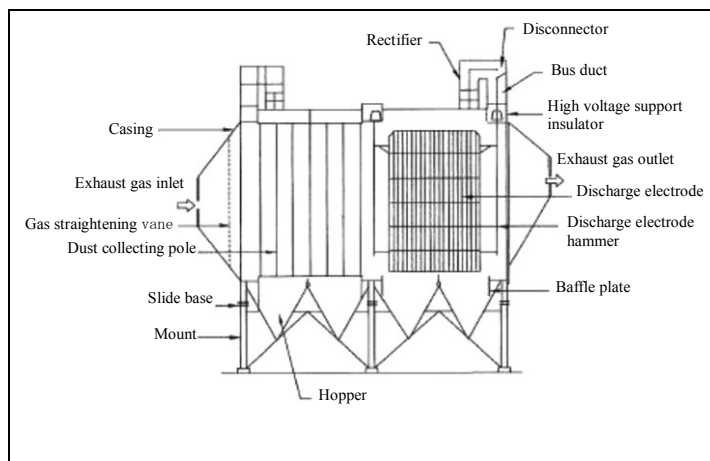


Figure 4-2: Electric Dust Collector (Example)

Source: Plan and design point of waste disposal facility improvement (Japan Waste Management Association)

(Reference) Removal of Radioactive Cesium by Bag Filter

- Radioactive cesium transferred to exhaust gas is cooled down to control the generation of dioxins, is condensed mainly as solid cesium chloride in the vicinity of the bag filter lower than around 200 °C, and is aggregated with other substances to be soot and dust. Therefore, removing soot and dust can mean the removal of cesium. While the average particle diameter of soot and dust is tens of μm , bag filters can trap particles of $1/10 \mu\text{m}$. This means bag filters can remove almost all radioactive cesium.
- Although filters could break, deposited soot and dust on the surface are brushed off bag filters sequentially by a back-flow called "pulse-jet", to prevent the rise of pressure loss or the drop of filters caused by deposited soot and dust, thus preventing the filters from breaking. A little decline of filters' effectiveness is assumed when brushing deposited soot and dust off, but the effect is only minor since the filters are pre-coated to maintain filter function. In addition, sediment on bag filters is brushed off one filter at a time, not every filter at once. In that way, there is no interference with filter function as a whole.

(Extracted from "Proper treatment of wastes contaminated by radioactive substances (Technical report)" by National Institute for Environmental Studies (NIES))

(Treatment of Soot and Dust)

- At a specified waste incineration facility, it is desirable that soot and dust are also disposed of in the same manner as at a waste disposal facility, in accordance with a method determined by the Minister of the Environment pursuant to the provision of item (i) of Ministerial Notification No. 194 of MHLW of 1992.
- In particular, it is presumed that higher concentrations of radioactive cesium than those of burnt residue (bottom ash) aggregate and adhere to soot and dust. Therefore, it is necessary to shield or keep a sufficient distance from the point of view of radiation protection when storing soot and dust, and also it is effective that that soot and dust are stored in equipment or containers, with high

sealability such as an ash pit or a storage hopper inside a building.

- Washing treatment of soot and dust may cause radioactive cesium enriched in discharged water from washing. In that case, it is necessary to remove radioactive cesium from such discharged water by reverse osmosis membrane (RO) or adsorbent such as zeolite.

(Measurement of Radioactivity Concentration in Burnt Residue, etc.)

- Radioactive cesium may be enriched in burnt residue (bottom ash) and soot and dust (fly ash) generated by incineration, slag from ash melting furnace and fly ash from ash melting furnace generated by melting and sludge, etc., generated from water treatment, so that for smooth storage and subsequent treatment of these, it is effective to measure the concentrations in these and manage the measurement results by such means as preparing and retaining records of the measurement results. The concentrations in these shall be measured in accordance with the method set forth in Chapter 7 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”.

(Storage of Burnt Residue, etc.)

- Burnt residue (bottom ash) and soot and dust (fly ash) generated by incineration, and slag from ash melting furnace and fly ash from ash melting furnace generated by melting and sludge, etc., generated from water treatment shall be properly stored within a site until they are transported. When the concentrations of radioactive cesium are high, for ensuring the safety of workers, regulations, etc., relating to the Ordinance on Prevention of Ionizing Radiation Hazards shall be complied with as daily management.

[Other Matters of Note]

(Incineration of Specified Waste with Relatively High Concentration)

- In the case of incineration of specified waste with 100,000 Bq/kg or higher of radioactive cesium, it is important to give a close consideration of some issues beforehand including the prevention of scattering and outflow of specified waste and burnt residue during the treatment process, ensuring proper treatment of exhaust gas, and the prevention of radiation hazard to workers, and to establish necessary systems for operation management, operation, and maintenance, etc.

4.1.4 Shredding of Specified Waste

Ordinance, Article 25, paragraph (1)

- (iv) In cases where specified waste is shredded, necessary measures shall be taken such as shredding it with equipment installed inside a building, etc., to prevent dust particles generated by shredding from scattering into the surroundings.

[Purpose of Measures]

When shredding specified waste, it is necessary to take measures to prevent dust particles from

scattering to avoid environmental contamination with radioactive cesium adhered to dust particles generated by shredding.

[Example of Measures]

- Measures necessary for preventing scattering of dust are as follows.
 - Install the shredding equipment inside a building (**Figures 4-3, 4-5**)
 - Adopt a sealed structure for the shredding equipment (**Figure 4-4**)
 - If necessary, provide equipment for preventing scattering such as a watering system at a place where dust is generated of an opening portion. However, watering should be minimized so as not to produce a large amount of drainage water containing radioactive materials.



Figure 4-3: Indoor Installation of Shredder (Example)



Figure 4-4: Sealed Structure (Example)

Note) When handling specified waste with 10,000 Bq/kg or higher of the concentration of radioactive cesium, it is necessary to take measures in accordance with the Ordinance on Prevention of Ionizing Radiation Hazards.



Figure 4-5: Indoor Installation of Shredder (Example)

- When shredding equipment is installed inside a building, it is necessary to take measures to prevent dust, etc., from scattering inside the building by using a filter, etc.
- As for residue from the shredding equipment too (except for objects generated by intermediate treatment) (such as fine particle generated through the shredding of construction waste except

recycled crashed stone), it is important to confirm situations of contamination of the residue with radioactive cesium.

4.1.5 Measurement and Concentration Monitoring of Exhaust Gas or Drainage Water Resulting from Treatment of Specified Waste

Ordinance, Article 25, paragraph (1)

- (v) In cases where exhaust gas generated along with disposal is emitted, comply with the following.
 - (a) Through monitoring of the concentration of radioactive materials discharged by the accident in the exhaust gas at the outlet of such exhaust gas, it shall be ensured that the sum of the ratios of a three-month average concentration of each radioactive materials discharged by the accident listed in the 1st column of appended table 2 in the atmosphere surrounding the workplace against the concentration value listed in the 2nd column for such radioactive materials discharged by the accident will not exceed one.
 - (b) The concentration of radioactive materials discharged by the accident in such exhaust gas shall be measured and recorded at least once every month by the method prescribed by the Minister of the Environment.
- (vi) In cases where wastewater generated along with disposal is discharged, comply with the following.
 - (a) Through monitoring of the concentration of radioactive materials discharged by the accident in such final effluent at the drain outlet of such final effluent, it shall be ensured that the sum of the ratios of a three-month average concentration of each radioactive materials discharged by the accident listed in the 1st column of appended table 2 in the water of the public water area surrounding the workplace against the concentration value listed in the 3rd column for such radioactive materials discharged by the accident will not exceed one.
 - (b) The concentration of radioactive materials discharged by the accident in such final effluent shall be measured and recorded at least once every month by the method prescribed by the Minister of the Environment.

Appended Table 2

First column	Second column	Third column
Kind of radioactive material discharged by the accident	Limit of concentration in the atmosphere around the workplace	Limit of concentration in water in public water area around the workplace and final disposal facility.
Cesium-134	20 Bq/m ³	60 Bq/L
Cesium-137	30 Bq/m ³	90 Bq/L

* 1. Ministerial Notification No. 111 of the Ministry of the Environment on December 28, 2011

Samples shall be obtained in accordance with a method prescribed under the Japanese Industrial

Standard Z8808, and shall be measured with a germanium semiconductor detector.

* 2. Ministerial Notification No. 112 of the Ministry of the Environment on December 28, 2011

A germanium semiconductor detector shall be used for measurement.

[Purpose of Measures]

(Measurement of Concentrations of Radioactive Cesium in Exhaust Gas and Drainage Water)

- As for treatment facilities for specified waste, it is necessary to confirm that disposal does not affect the surrounding living environment and human health by measuring the concentration of radioactive cesium in exhaust gas and drainage water at least once every month.
- It is necessary to monitor the concentration of radioactive cesium in the air or the water of the public water area surrounding the workplace so that the value (the sum of the ratios of concentration limits of cesium 134 and cesium 137) obtained using the formula below regarding its three-month average concentration will not exceed one.

Concentration of Radioactive Cesium in the Air

$$\frac{\text{Concentration of } ^{134}\text{Cs (Bq/m}^3\text{)}}{20 \text{ (Bq/m}^3\text{)}} + \frac{\text{Concentration of } ^{137}\text{Cs (Bq/m}^3\text{)}}{30 \text{ (Bq/m}^3\text{)}} \leq 1$$

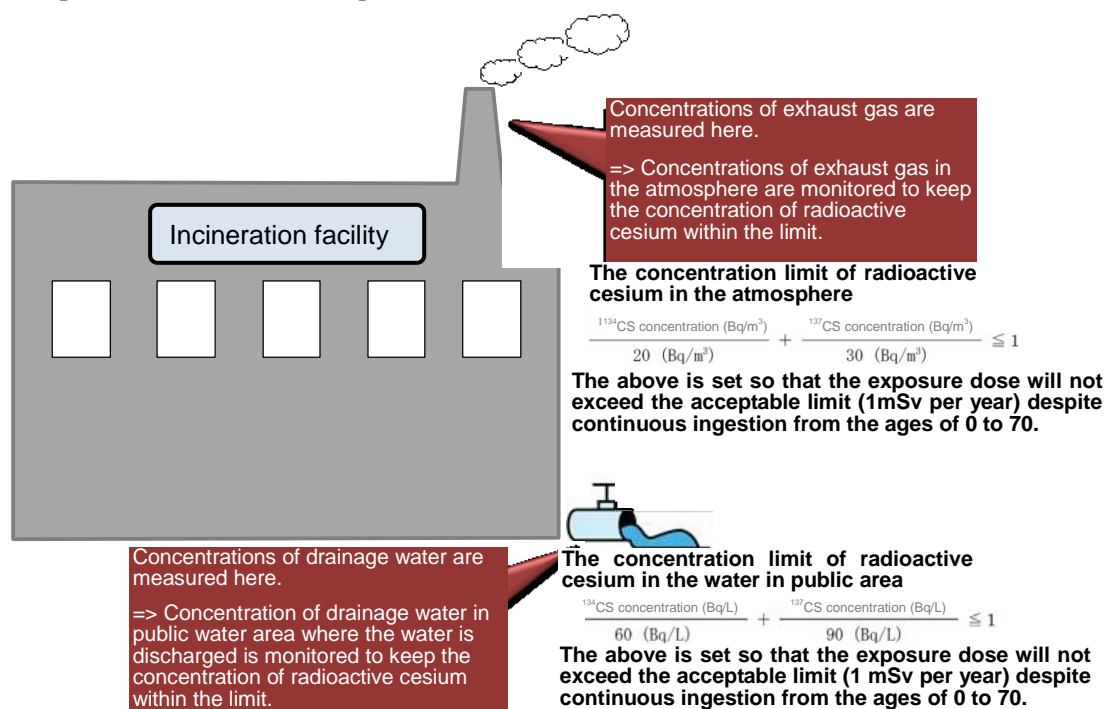
Concentration of Radioactive Cesium in the Water of the Public Water Area

$$\frac{\text{Concentration of } ^{134}\text{Cs (Bq/L)}}{60 \text{ (Bq/m}^3\text{)}} + \frac{\text{Concentration of } ^{137}\text{Cs (Bq/L)}}{90 \text{ (Bq/m}^3\text{)}} \leq 1$$

- Concentrations of radioactive cesium in the atmosphere around the workplace shall be monitored by measuring the concentrations at a smokestack or dust collector outlet of the facility. The measurement of radioactivity concentrations and the management of its results shall be carried out in accordance with the method set forth in Chapter 3 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”.
- Concentrations of radioactive cesium in a public water area around the workplace shall be monitored by measuring the concentrations at a drain outlet of said facility. The measurement of radioactivity concentrations and the management of its results shall be carried out in accordance with the method set forth in Chapter 5 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”.

(Reference)

- The limit of concentration of radioactive cesium in the atmosphere and in water in public water area is set so that the exposure dose will not exceed 1 mSv per year, which is the acceptable limit for the general public, even if they continually ingest radioactive cesium from the age of 0 to the age of 70.
- While the operation and maintenance standards for interim treatment facilities under the Special Measures Law ask for keeping the concentrations of radioactive cesium in the atmosphere and in the water in public water area within the limit, in practice, exhaust gas and drainage water are monitored and measured at a drain outlet of facilities to ensure that the concentration in the atmosphere and in the water in public water area remain within the limit.



[Other Matters of Note]

As for specified waste disposal facilities too, exhaust gas and drainage water shall be managed in accordance with effluent standards, obligations to measure, etc., determined in environmental laws such as the Air Pollution Control Act, the Water Quality Pollution Control Act, and the Act on Special Measures against Dioxins.

4.1.6 Monitoring of Influence on the Periphery

Ordinance, Article 25, paragraph (1)

- (vii) At the site boundary of the workplace, the amount of radiation shall be measured at least once every 7 days by the method prescribed by the Minister of the Environment under Article 15, item (xi), which shall be recorded.

*Ministerial Notification No. 110 of the Ministry of the Environment on December 28, 2011

The amount of radiation shall be measured at a height between 50 cm and 1 m from the ground surface using a gamma-ray measurement instrument.

[Purpose of Measures]

To confirm that measures for radiation protection for persons other than waste disposer, etc., have been properly taken, it is necessary to measure the air dose rate at a boundary of the site of the workplace of intermediate treatment, and record the measurement results. The air dose rates shall be measured and the measurement results shall be managed both in accordance with the method set forth in Chapter 2 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration”.

[Example of Measures]

- Background measurement shall be carried out at the boundary of the site before starting acceptance of waste. If waste has already been accepted and an intermediate treatment facility such as an incineration facility is in operation, background measurement shall be carried out at a point sufficiently distant from the facility.
- By carrying out these measurements, make sure that the additional dose around a boundary of the site does not exceed $0.19 \mu\text{Sv/h}^{*1}$ (1 mSv per year). However, in the surrounding area where the amount of radiation is relatively high, the air dose rate around a boundary of the site shall be managed at the same level as surrounding area. Further, this guideline shall be complied with to reduce the additional dose as low as possible.

4.1.7 Preparation and Retention of Records

Ordinance, Article 25, paragraph (1)

(viii) Record of the following matters shall be prepared and retained until the facility used for such disposal is abolished:

- (a) The kind of specified waste disposed (if such specified waste includes any specified waste specified under Article 23, paragraph (1), item (v), (a) through (c), such fact shall be included) and its quantity;
- (b) The dates on which disposal was carried out per specified waste disposed, as well as the names and locations of the place from which it was received and the place to which it was brought after disposal;
- (c) Pertaining to the specified waste delivered, the names of the person who delivered such specified waste and the person who received the delivery of such specified waste, and in cases where transportation pertaining to such delivery was carried out using a transportation vehicle, the vehicle identification number or vehicle number of such

^{*1} When the additional exposure dose of 1 mSv per year is converted into a value per hour by using the following calculation formula by assuming a life pattern including staying outdoors for 8 hours a day and staying indoors (wooden house with a shielding effect (0.4 times) for 16 hours, the calculated value is $0.19 \mu\text{Sv/h}$. $0.19 \mu\text{Sv/h} \times (8\text{h} + 0.4 \times 16\text{h}) \times 365 \text{ days} = 1 \text{ mSv/y}$

- transportation vehicle; and
- (d) Measurement, inspection, examination and any other measures taken upon operation and maintenance of the facility used for such disposal (including the measurement pursuant to the provisions of item (iii), (c), item (v), (b), item (vi), (b) and the preceding item).

[Purpose of Measures]

Preparation and retention of records are important for ensuring the transparency of the entire process and the management of such process in waste disposal, and it is necessary to retain records until the facility is closed.

[Example of Measures]

- The records shall be stored in an office on the site, or if there is no office on the site, the records shall be stored in the nearest office.
- Information included in the records shall be kinds and quantities of specified waste for which intermediate treatment was carried out, date of intermediate treatment, the location of accepting place, and destinations to which waste was transported after intermediate treatment, etc., and it is advisable to manage records regarding destinations to which waste was transported after intermediate treatment by the transportation vehicle that transported the waste. Concerning kinds of specified waste, “specified waste falling under Article 23, paragraph (1), item (v), (a) through (c)” means asbestos-containing specified waste, specified waste asbestos, etc., and specified soot and dust.
- In an incineration facility, records of concentrations of radioactive cesium in the atmosphere and concentrations of radioactive cesium in water in a public water area measured in accordance with **4.1.5**, and air dose rate at a boundary of the site of the workplace measured in accordance with **4.1.6**, shall be prepared and retained until the facility is abolished.
- In addition, as the operation management of incineration facilities, it is important to record items such as the temperature of combustion gas, the temperature of combustion gas flowing into a dust collector, the concentration of carbon monoxide in exhaust gas, and the date of removal of soot and dust.
- The form examples for records accompanying intermediate treatment of specified waste are shown below. However, concerning the form examples for records on the measurement of radioactivity concentration in exhaust gas and drainage water accompanying intermediate treatment of specified waste, and the measurement of the radiation amount at a boundary of the site of the workplace of intermediate treatment, refer to Chapters 3, 5 and 2 in “Part V: Guidelines for Method of Measurement of Radioactive Concentration” respectively.

[Form Example 1] Records on Delivery and Disposal of Specified Waste (Ordinance, Article 25, paragraph (1), items (viii), (a), (b) and (c) concern)

Records of delivered Specified Waste (Ordinance, Article 25, paragraph (1), item (viii) (c))

Delivery			Vehicle number	Accepting place (discharge destination)		Kind of Specified Waste*	Quantity (t)	Person in charge of acceptance
Date	Affiliation, etc.	Person in charge		Name	Address			

* When asbestos-containing specified waste and specified waste asbestos, etc., are included, enter that fact clearly.

Records of Specified Waste disposed of (Ordinance, Article 25, paragraph (1), item (viii) (a) and (b))

Date of disposal	Disposal method	Kind of Specified Waste*	Quantity (t)	Accepting place (discharge destination)		Carrying-out destination after disposal			
				Name	Address	Date of carrying-out	Vehicle number	Name	Address

* When asbestos-containing specified waste and specified waste asbestos, etc., are included, enter that fact clearly.

[Example of description]

Records of delivered Specified Waste (Ordinance, Article 25, paragraph (1), item (viii) (c))

Delivery			Vehicle number	Accepting place (discharge destination)		Kind of Specified Waste*	Quantity (t)	Person in charge of acceptance
Date	Affiliation, etc.	Person in charge		Name	Address			
24/01/2012	XXX	XXXX	XX88 Ha 12-34	XXX	X-X, XX-cho, XX-shi, XX Pref.	Rice straw	1. 4	XXXX
24/01/2012	XXX	XXXX	XX88 Ha 12-34	XXX	X-X, XX-cho, XX-shi, XX Pref.	Sludge	1. 8	XXXX

* When asbestos-containing specified waste and specified waste asbestos, etc., are included, enter that fact clearly.

Records of Specified Waste disposed of (Ordinance, Article 25, paragraph (1), item (viii) (a) and (b))

Date of disposal	Disposal method	Kind of Specified Waste*	Quantity (t)	Accepting place (discharge destination)		Carrying-out destination after disposal			
				Name	Address	Date of carrying-out	Vehicle number	Name	Address
26/01/2012	Incineration	Rice straw	1. 4	XXX	X-X, XX-cho, XX-shi, XX Pref.	30/01/2012	XX88 Ha 56-78	XXX	X-X, XX-cho, XX-shi, XX

		<i>Sludge</i>	<i>I. 8</i>	<i>XXX</i>	<i>X-X, XX-cho,</i> <i>XX-shi, XX</i> <i>Pref.</i>				<i>Pref.</i>
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* When asbestos-containing specified waste and specified waste asbestos, etc., are included, enter that fact clearly.

[Form Example 2] Records on Removal of Soot and Dust

(Ordinance for Enforcement of the Waste Management Act, Article 12-7-5, paragraph (1), item (i) concerns)

- The Ordinance for Enforcement of the Waste Management Act stipulates that the date of removal of soot and dust that accumulated in cooling equipment and exhaust gas treatment equipment shall be kept by the final day of the month following the month that includes the day on which the removal was carried out.

Removal of soot and dust that accumulated in cooling equipment and
exhaust gas treatment equipment (form example)

Date of removal of soot and dust
DD/MM/YY
DD/MM/YY

[Example of description]

Removal of soot and dust that accumulated in cooling equipment and
exhaust gas treatment equipment

Date of removal of soot and dust
20/12/2011
16/02/2012

[Form Example 3] Records of Exhaust Gas measurement regarding Dioxins and Soot and Dust

(Ordinance, Article 25, paragraph (1), item (viii), (d) concerns)

(Ordinance for Enforcement of the Waste Management Act, Article 12-7-5, paragraph (1), item (i) concerns)

- The Ordinance for Enforcement of the Waste Management Act stipulates that the results of the following measurement items concerning exhaust gas discharged from the smokestack shall be kept, together with sampling position and the date on which the results were obtained, by the final day of the month following the month that includes the day on which the results were obtained.
 - Concentrations of dioxins (once or more per year)
 - Quantities or concentrations of soot and dust (sulfur oxide, soot and dust, hydrogen chloride, and nitrogen oxide) (once or more per six months)

- These records shall be kept until the facility is decommissioned in accordance with the Ordinance, Article 25, paragraph (1), item (viii).

Records of exhaust gas measurement (form example)

Sampling position*	Exhaust gas sampling date	Date on which the results were obtained	Measurement results				
			Dioxins ng-TEQ/ Nm ³	Sulfur oxide Nm ³ /h	Soot and dust g/Nm ³	Hydrogen chloride mg/Nm ³	Nitrogen oxide ppm
Smokestack intermediate portion	DD/MM/YY	DD/MM/YY					
	DD/MM/YY	DD/MM/YY					

*The sampling location is shown in the flow diagram of the incineration facility.

[Example of description]

Records of exhaust gas measurement

Sampling position*	Exhaust gas sampling date	Date on which the results were obtained	Measurement results				
			Dioxins ng-TEQ/ Nm ³	Sulfur oxide Nm ³ /h	Soot and dust g/Nm ³	Hydrogen chloride mg/Nm ³	Nitrogen oxide ppm
Smokestack intermediate portion	11/07/2011	04/08/2011	0.021	0.0015	0.0035	0.92	26
	10/01/2012	31/01/2012	—	0.0049	0.002	6.4	14

*The sampling location is shown in the flow diagram of the incineration facility.

In addition to the above, the Ordinance for Enforcement of the Waste Management Act (Article 12-7-5, paragraph (1), item (i)) stipulates that the results of the following measurement items shall be kept, together with the measurement positions and the dates on which the results were obtained, by the final day of the month following the month that includes the day on which the results were obtained.

- Continuously measured temperature of combustion gas inside combustion chamber
- Temperature of combustion gas flowing into dust collector (in the case where the temperature of the combustion gas can be quickly cooled to about 200°C or less inside the dust collector, continuously measured temperature of the combustion gas cooled inside the dust collector)
- Continuously measured concentration of carbon monoxide in exhaust gas discharged from smokestack

4.2 Standards on Disposal of Standard Conformable Specified Waste

Ordinance, Article 25, paragraph (2)

The standard for disposal of standard conformable specified waste shall be governed by the provisions under the preceding paragraph (except for item (iv)).

[Purpose of Measures]

In intermediate treatment of standard conformable specified waste whose concentration of radioactive cesium is not more than 8,000 Bq/kg, all of the standards on intermediate treatment to be applied to specified waste apply except for the standards (4. 1. 4) that apply to shredding (refer to **Table 4-1** described above).

Chapter 5 Standards on Landfill Disposal

5.1 Outline of Landfill Disposal of Specified Waste

In the event of conducting the landfill disposal of specified wastes, the landfill disposal standards prescribed by the Ordinance shall apply.

The outline of the landfill disposal standards prescribed by the Ordinance can be summarized as shown in Table 5-1.

Table 5-1: Outline of Landfill Disposal Standards Based on the Ordinance

	Landfill Standards pursuant to the Act on Special Measures [Article 26]					
	[Paragraph (1)] Those over 100,000Bq/kg	[Paragraph (2)] Those that fall between 8,000 and 100,000 Bq/kg			[Paragraph (3)] Standard conformable specified wastes	[Paragraph (4)] Those that are standard conformable specified wastes and pose no risk of causing contamination to the public water area and groundwater
		[Item (iii)] A place isolated from the public water area and groundwater	[Item (ii)] A place other than the place isolated from the public water area and groundwater	[Item (ii) (e)] (Those that have a low elution volume)		
Indication, etc.	Indicating the place as the place of the treatment of specified wastes and enclosing its surrounding Preventing any scattering or outflow of specified wastes Preventing any impairment of conservation of the living environment caused by foul odors, noises or vibrations					
Structure, etc.	Outer intercept equipment satisfying the requirements specified by the Minister of the Environment is installed and the landfill site is isolated from the public water area and groundwater.	(Isolated type equivalent)	(Controlled type equivalent)	(Controlled type equivalent)	(Controlled type equivalent)	(Stabilized type equivalent)
Disposal position	Landfill the waste in a designated place and in a way that will not cause any scattering.					
Pretreatment of landfilling wastes	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).	Pretreat in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.).

	solidifying, etc.).	solidifying, etc.).	with cement or other bonding agents.	etc.).	etc.).	
Lower layer of soil	-	-	Underneath the waste layer, lay a soil layer with thickness of approximately more than 50 cm. In addition, lay an impermeable soil layer.	Underneath the waste layer, lay a soil layer with thickness of approximately more than 50 cm.		-
Surface and sides of landfill wastes	-	-	Lay impermeable soil layers.	-	-	-
Stratified landfill	-	-	-	- The thickness of a layer is not more than approximately 3 m. - Lay an impermeable soil layer on the surface of each layer.	- The thickness of a layer is not more than approximately 3 m. - Cover the surface of each layer with approximately 50 cm thick soil.	-
Landfilling of specified soot and dust	-	-	-	-	Apply prevention measures for infiltration of rainwater	-
Storage of landfill wastes	-	-	Store in containers that are not easily damaged.	-	-	-
At the completion of daily landfill work	Prevent radiation hazard by installing a shielding structure, etc.	Prevent radiation hazard by covering the surface with soil, etc.	Prevent radiation hazard by covering the surface with soil. In addition, prevent infiltration of rainwater by covering the surface with a shielding sheet, etc. for a period until the impermeable soil layer is laid on the surface.	Prevent radiation hazard by covering the surface with soil, etc. Prevent infiltration of rainwater by covering the surface with a shielding sheet, etc. for a period until the impermeable soil layer is laid on the surface.	-	-
Measures taken at the completion of landfilling	Close the opening part with a cover that is effective for preventing radioactive hazard and apply any other measures specified by the Minister of the Environment.	Close the opening part with a cover that is equipped with the requirements specified by the Minister of the Environment and apply any other measures specified by the Minister of the	Close the opening part with a cover of soil, etc., which is approximately more than 50 cm thick, apply any other measures specified by the Minister of the Environment, provide a slope that allows effective drainage of	Close the opening part with a cover of soil, etc., which is approximately more than 50 cm thick, apply any other measures specified by the Minister of the Environment, provide a slope that allows effective drainage of rainwater, etc.	Close the opening part with a cover of soil, etc., which is approximately more than 50cm thick.	

		Environment.	rainwater, etc.		
Groundwater	Implementation of water quality inspection				Implementation of water quality inspection (groundwater inspection items, radioactivity materials discharged by accident only)
Leachate/final effluent/infiltrated water	-	-	Apply measures to prevent contamination due to leachate. Maintain final effluent and conduct its water quality inspection.	Apply measures to prevent contamination due to leachate. Maintain final effluent and conduct its water quality inspection.	Water quality inspection of infiltrated water
Air dose rates	Measurement at premises boundary				
Recording	Landfill location drawing, the kind and amount of landfill wastes, date of landfill, the names of the persons who delivered and received the waste, vehicle identification number or vehicle number of the transportation vehicle used, measurements and any other records taken for maintenance and management of such waste				
Retention of records	Retaining the records until the abolishment of the site.				

5.2 Landfill Disposal Standards for Specified Waste Exceeding 100,000 Bq/kg

Ordinance, Article 26, paragraph (1)

The standards for landfill disposal of specified waste (limited to those recognized as having the radioactive concentration of cesium-134 that is a radioactive material discharged by the accident and the radioactive concentration of cesium-137 that is a radioactive material discharged by the accident exceeding 100,000 Becquerel per kilogram in total as a result of a survey of radioactive concentration of radioactive materials discharged by the accident by the method prescribed under Article 20; hereinafter the same shall apply in this paragraph) shall be as follows:

(i) to (x) (omitted)

[Purpose of Measures]

This provision prescribes the standards for landfill disposal of specified waste that has a radioactive cesium concentration exceeding 100,000 Bq/kg and the outline of such standards is as follows:

- Outer intercept equipment^{*1} satisfying the requirements specified by the Minister of the Environment shall be installed and landfill disposal shall be conducted at a place that is isolated from the public water area and groundwater;
- Pretreatment shall be conducted in advance in accordance with the type of specified wastes (shredding, incineration, solidifying, etc.);
- At the completion of daily landfill work, radiation hazard shall be prevented by installing a shielding structure, etc.;
- Water quality inspection of the groundwater shall be implemented;
- The amount of radiation at the premises boundary shall be measured and recorded;
- At the completion of landfill disposal, the opening part shall be closed with a cover that is effective in preventing radioactive hazard and take any other measures^{*2} specified by the Minister of the

Environment; and

- Records related to landfill disposal shall be prepared and retained until the abolishment of the site.

- *1 Requirements for the Outer Intercept Structure pertaining to the Landfill Disposal Sites for Specified Waste (Ministerial Notification No. 15 of the Ministry of the Environment on February 28, 2013)
- *2 Measures in the Case of Completing Landfill Disposal of Specified Waste (Ministerial Notification No. 16 of the Ministry of the Environment on February 28, 2013)

5.3 Landfill Disposal Standards for Specified Wastes Exceeding 8,000 Bq/kg and not more than 100,000 Bq/kg

Ordinance, Article 26, paragraph (2)

The standards for landfill disposal of specified wastes (except for the specified waste prescribed in part of the Ordinance other than the respective items of the preceding paragraph and standard conformable specified wastes; hereinafter the same shall apply in this paragraph) shall be as follows:

[Purpose of Measures]

This provision prescribes the standards for landfill disposal of specified wastes that have the radioactive cesium concentration exceeding 8,000 Bq/kg and not more than 100,000 Bq/kg, and for the final landfill site where such wastes are landfill disposed, the final landfill site that has structures equivalent to those of the controlled type final landfill site (including roofed sites) or isolated type final landfill site is assumed.

5.3.1 Measures Taken at the Time of Landfill Disposal, Measurement of the Amount of Radiation, etc.

Ordinance, Article 26, paragraph (2), item (i)

The provisions of the preceding paragraph, item (i) (except for (d)), (iv) and (viii) through (x) shall govern.

[Purpose of Measures]

This provision prescribes general matters necessary for the appropriate maintenance and management of the landfilled specified wastes that are applicable to both controlled and isolated types of final landfill sites and many of such prescribed matters, from the viewpoint of proper treatment of waste, are same as those for the waste treatment pursuant to the Waste Management Act.

The details are as listed below from (1) to (5):

(1) Measures Taken at the Time of Landfill Disposal

1. Measures for the Conservation of the Living Environment

Ordinance, Article 26, paragraph (1), item (i)

(a) It shall be ensured that specified wastes will not scatter or flow out; and

- | |
|---|
| (b) Necessary measures shall be taken so that the conservation of the living environment will not be impaired by any foul odors, noises, or vibration accompanying the landfill disposal. |
|---|

[Purpose of Measures]

At final disposal of waste, from the viewpoint of preventing of spreading of contamination due to radioactive cesium, it is necessary to prevent any scattering or outflow of waste for conserving the local living environment and protecting human health.

[Example of Measures]

As the measures to prevent impairment of conservation of the living environment, it is effective to prevent scattering or outflow of waste and emission of foul odors through the use of daily soil cover, etc. and implement anti-noise and vibration measures through the use of low-noise equipment, etc.

2. Indication

Ordinance, Article 26, paragraph (1), item (i) (c)
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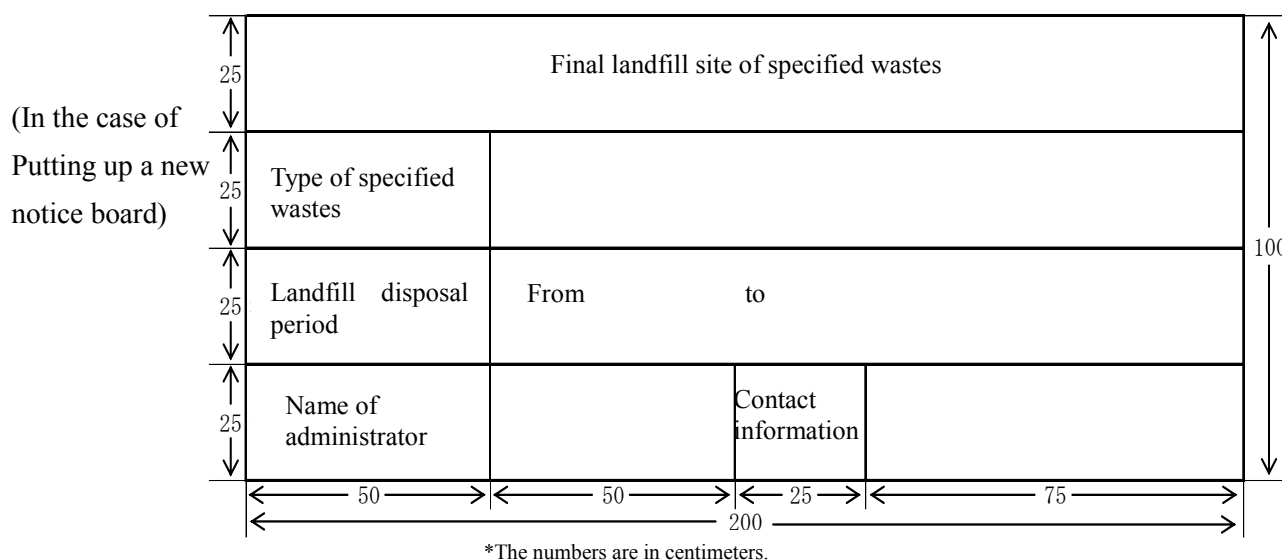
The disposal shall be conducted at a place where an enclosure surrounding the place is installed as well as an indication that it is a treatment site of specified wastes is displayed.

[Purpose of Measures]

At the landfill site of the landfill disposal of specified wastes, it is necessary to indicate that it is the final landfill site of specified wastes.

[Example of Measures]

- Concerning a notice that is put up anew in a place where only specified wastes are to be landfill disposed, it is appropriate to prepare it in accordance with Form 1 and Form 2 prescribed under Article 1 and Article 2 of the Ministerial Ordinance Determining Engineering Standards Pertaining to Final landfill site for Municipal Solid Wastes and Final landfill site for Industrial Wastes (hereinafter referred to as the “Standards Ordinance”) (**Figure 5-1**).
- It may also be allowed to add a note that the site is “the final landfill site of specified wastes” to the existing notice board displaying that the site is the final landfill site of municipal solid wastes or the final landfill site of industrial wastes (**Figure 5-1**).



(In the case of using the existing notice board)

Final landfill site of municipal solid wastes Final landfill site of specified wastes		Final landfill site of industrial wastes Final landfill site of specified wastes			
Type of municipal solid wastes		Type of industrial wastes			
Landfill disposal period	From to	Landfill disposal period	From to		
Name of administrator		Contact information			

Figure 5-1: Examples of Indications for Landfill Site

3. Prohibition of Waste Scattering

Ordinance, Article 26, paragraph (1), item (i) (e)

The disposal shall be made at a certain place within the final landfill site and in a way that specified wastes will not be scattered.

[Purpose of Measures]

In the case of landfill disposing of specified wastes, from the viewpoint of the management of radioactive cesium at the final landfill site, it is necessary to landfill specified wastes at a certain place within the final landfill site and in a way that specified wastes will not be scattered.

[Example of Measures]

- When landfilling specified wastes, it is necessary to designate a certain location for landfilling. In addition, it is effective to distinguish specified wastes from other wastes for an easier management of the landfill position and have specified wastes aggregated before they are landfilled.
- For that purpose, a section of the final landfill site may be used as a landfill lot for specified wastes that may be partitioned by having its boundary from other wastes covered by soil. In this case, the soil used for partitioning shall have a fine-grained fraction content of 5–15%, etc., which is the same as the soil used for the lower layer of soil.

- For an easier identification of the landfill position even after wastes have been landfilled, the boundary of the landfill lot may be covered by a sheet, etc. (**Figure 5-2**).

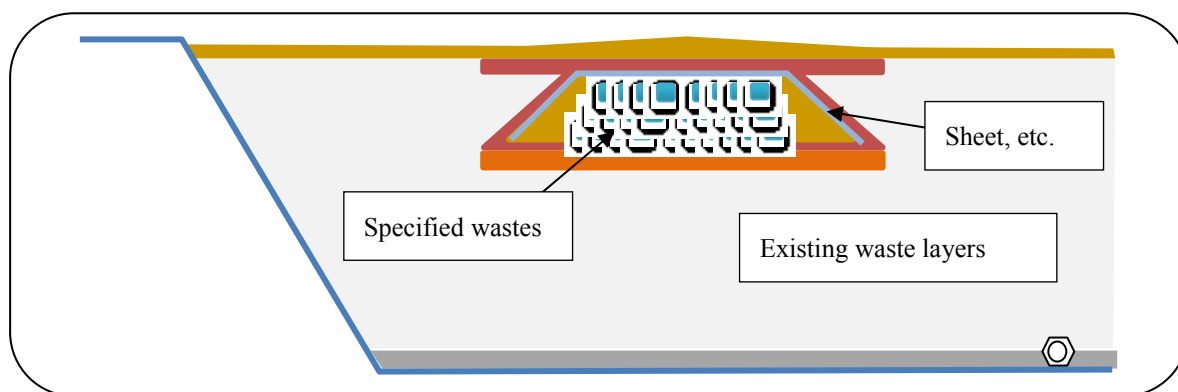


Figure 5-2: Image Figure of the Landfill Position of Specified Wastes (In the Case of Landfilling at a Designated Lot in the Final Landfill Site)

(2) Measurement of Amount of Radiation

Ordinance, Article 26, paragraph (1), item (iv)

At the boundary of the premises of the final landfill site, the amount of radiation shall be measured at least once every 7 days (once every month if the final landfill site is completed with its landfill disposal of specified wastes) using the method prescribed by the Minister of the Environment under Article 15, item (xi)*, which shall be recorded.

*Ministerial Notification No. 110 of the Ministry of the Environment on December 28, 2011

The measurement shall be made from 50 cm up to 1 m in height above the ground surface using a measurement instrument for measuring gamma -rays.

[Purpose of Measures]

To confirm whether the measures for protecting persons other than waste disposal operators, etc. from radiation have been properly taken, it is necessary to measure the air dose rate at the boundary of the premises of a final landfill site at least once every 7 days (once every month if the final landfill site is completed with its landfill disposal of specified wastes) and record such measurements. The measurement of air dose rates and management of the measurement results shall be carried out in accordance with the method prescribed in Chapter 2 of “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”

[Example of Measures]

- Background measurement shall be carried out at the boundary of the premises of the site before starting the acceptance of wastes. If the wastes have already been accepted and the landfill disposal is in operation, background measurement shall be carried out at a point sufficiently distant from the facility.

- By carrying out such background measurement, it shall be made sure that the additional dose measured in the surrounding areas of the site boundary does not exceed 0.19 $\mu\text{Sv/h}$ (1 mSv per year); provided, however, that with regard to areas where the amount of radiation in their surrounding areas is relatively high, the air dose rate near the site boundary shall be managed at the same level as that of such surrounding areas. Moreover, in order to reduce the additional air dose as much as possible, the Guidelines shall be complied with.

(3) Prevention of Emergence of Harmful Insects

Ordinance, Article 26, paragraph (1), item (viii)

It shall be ensured that neither any rodents will live nor any mosquitoes or flies or any other harmful insects will break out at the landfill site.

[Purpose of Measures]

From the viewpoint of conservation of the living environment of the landfill site, it is necessary to ensure that neither any rodents will live nor any mosquitoes, flies, or any other insects will break out.

[Example of Measures]

- In order to understand the situation of any emergence of rodents or insects harmful to sanitation, a visible inspection shall be conducted periodically in the surrounding areas of the landfill site and depending on the situation, it is effective to use pesticides or rodenticides.

(4) Conservation of the Living Environment Pertaining to Establishment of Facilities

Ordinance, Article 26, paragraph (1), item (ix)

In cases where any facility for landfill disposal of specified wastes is to be established, necessary measures shall be taken to prevent any danger of impairing the conservation of the living environment.

[Purpose of Measures]

In cases where any facility pertaining to landfill disposal of specified wastes is to be established, it is necessary to take measures to prevent such facility from causing any hindrances to the conservation of the living environment in the surrounding areas of the landfill site.

[Example of Measures]

- Facilities pertaining to the landfill disposal of specified wastes include leachate treatment facilities, management buildings, storage facilities of heavy equipment, etc. and parking lots.
- When establishing and operating such facilities, it is necessary to take measures necessary for controlling the generation of foul odors, noises, vibration, etc.

(5) Landfill Disposal of Waste Acid and Waste Alkali

Ordinance, Article 26, paragraph (1), item (x)

Waste acid and waste alkali shall not be landfill disposed of.

[Purpose of Measures]

Same as the landfill disposal standards under the Waste Management Act, the landfill disposal of waste acid and waste alkali that are liquid substances is prohibited.

5.3.2 Landfilling at the Controlled Type Final Landfill Site

Ordinance, Article 26, paragraph (2), item (ii)

Conducting any landfill disposal of specified wastes at a place other than a place which is isolated from the public water area and groundwater shall be in accordance with the following:

[Purpose of Measures]

This provision specifies the landfill disposal conducted at a place other than the place which is isolated from the public water area and groundwater (the landfill site that has structures equivalent to those of the isolated type of final landfill sites) and it is specifically intended for the landfill disposal conducted at a landfill site that has structures equivalent to those of the controlled type of final landfill sites (including the existing final landfill sites of municipal solid wastes and controlled type of final landfill sites of industrial wastes).

(1) Laying of the Lower Layer of Soil

Ordinance, Article 26, paragraph (2), item (ii) (a)

The laying shall be made to at a place within the landfill site that is laid with a soil layer of approximately 50cm or greater in thickness (if the soil layer laid is more than two, the thickness shall be the total of those combined).

[Purpose of Measures]

Radioactive cesium is easily absorbed into soil so that in the case of landfilling specified wastes, it is necessary to lay a soil layer of approximately 50 cm or greater at the lower layer of wastes in order to prevent the outflow of radioactive cesium to surrounding areas of the landfill layer.

[Example of Measures]

(In the case of landfilling on top of the existing waste layer)

- In the case of landfilling specified wastes on top of the existing waste layer, it is necessary to lay a soil layer of 50 cm or greater. Moreover, it is effective to conduct the landfilling after sufficiently compacting the existing waste layer or apply the reinforcing method of embankment (geotextile) in advance to restrain unequal settlement (**Figure 5-3**).

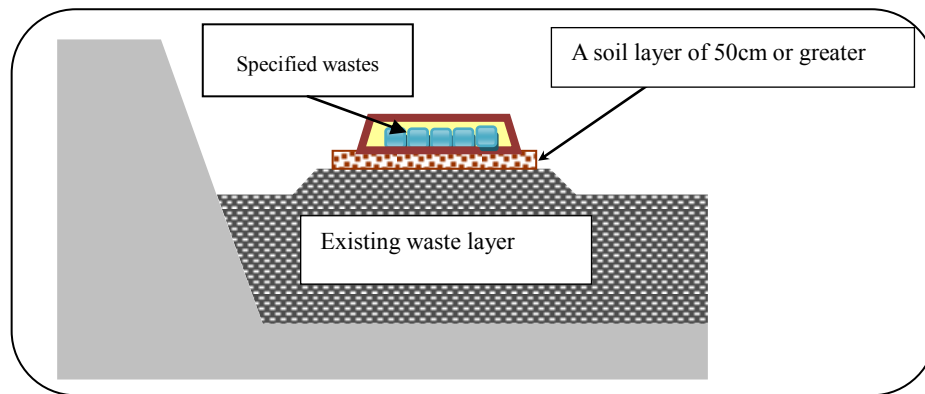


Figure 5-3: In the Case of Landfilling on Top of the Existing Waste Layer

(Soil to be Used)

- The soil layer laid at the lower part of the waste layer when landfilling specified wastes is intended for the prevention of the outflow of radioactive cesium to surrounding areas of the landfill layer. Even if radioactive cesium is hypothetically eluted, it is absorbed into the soil layer. Since the absorption ability of the soil layer can be exhibited by letting leachate to pass through, it is important to select soil that has an appropriate permeability to prevent any stagnant leachate.
- Concerning the soil to be used, the following matters shall be considered:
 - Either of the following shall be used as standards for the selection of soil:
 - a. Various types of soil are available, however, the soil that has fine-grained fraction content of 5–15%^{*1} shall be selected (refer to the Reference Table) as soil having an ability to absorb radioactive cesium and also appropriate permeability; or
 - b. It shall be verified that the soil has an appropriate absorption ability^{*3} by conducting the absorption test of radioactive cesium^{*2}, etc.

^{*1} Using only the sand or gravel that has less than 5% of the fine fractions is not suitable for the soil layer because the permeability coefficient will be too large, which may cause the water containing radioactive cesium eluted from the lower part of the soil layer. On the contrary, clayish soil, etc. that has finer fractions is also not suitable for the soil layer because it does not have an appropriate permeability, which may cause stagnant leachate on the surface of the soil layer.

^{*2} With regard to the absorption test method, refer to “5. Soil Sorption of Radioactive Cesium” of “Proper Treatment of Wastes Contaminated by Radioactive Substances (Summary of our Technical Report)” issued by the National Institute for Environmental Studies.

→The solution containing the radioactive cesium or stable cesium created under certain conditions is mixed into a soil sample container and then exposed to horizontal vibration. After that, based on the amount of radioactive cesium absorbed by the soil sample and the equilibrium concentration of the cesium in the solution at that time, the distribution coefficient of the soil is found. (= means that the larger the value, the higher the capacity of absorbing to radioactive cesium).

*3 Using the soil that has a high distribution coefficient will significantly delay the radioactive cesium from passing through which may result in the natural attenuation of the radioactivity. As a result of conducting the absorption test of the radioactive cesium by using silica sand No.5, decomposed granite soil collected in Ibaragi prefecture, landfill cover soil collected in Saitama prefecture and Bentonite, the distribution coefficient of each soil sample (mL/g) was 4.52, 13.0, 34.4 and 64.1, respectively. Based on the test result, the absorption capacity becomes higher in an order of silica sand No. 5, decomposed granite soil collected in Ibaragi prefecture, landfill cover soil collected in Saitama prefecture and Bentonite (from the report of the National Institute for Environment Studies).

- If there is no proper soil available, it is also conceivable to use an absorption layer that may be made by mixing absorbents such as zeolite with locally collected soils, etc.

(Matters of Note, etc. for Laying of the Soil)

- When laying the soil layer, the following matters shall be considered:
 - When laying the soil, it is effective to level and roller compact the ground according to the shape of the soil layer for homogenizing the lower layer of soil; provided, however, that excessive roller compacting shall be paid attention to avoid reduced permeability of the soil layer.
 - In order to manage the thickness and finished height of the leveling of the soil layer, construction management shall be performed appropriately.
 - When laying the soil layer, it shall be paid attention that the soil layer will not be washed away or softened due to effects of rainfall.

(Reference Table) Definitions of the Unified Soil Classification System of Japan

Simplified Classification	Name of Soil		Definition or Description			
Gravels	Gravels Coarse gravels Medium gravels Fine gravels Sandy gravels		Less than 5% fine particles	The particle size of the majority is 2 mm – 75 mm. The particle size of the majority is 20 mm – 75 mm. The particle size of the majority is 5 mm – 20 mm. The particle size of the majority is 2 mm – 5 mm. Gravels containing a significant amount of sands		
	<div>Silt Clay Organic soil Volcanic ash</div>	<div>Mixture<div>Gravels Coarse gravels Medium gravels Fine gravels Sandy gravels</div></div>	5% or more and less than 15% fine particles	Fine particles are silt. Fine particles are clay. Fine particles are organic soil. Fine particles are volcanic clay.		
Gravelly Soils	<div>Silt Clay Organic soil Volcanic ash</div>	<div>Quality<div>Gravels Coarse gravels Medium gravels Fine gravels Sandy gravels</div></div>	15% or more and less than 50% fine particles	Fine particles are silt. Fine particles are clay. Fine particles are organic soil. Fine particles are volcanic clay.		
Sands	Gravel-mixed sand Sand Coarse sand Fine sand		Less than 5% of fine particles	Sand containing gravels The particle size of the majority is 74 μm–2.0 mm. The particle size of the majority is 0.42–2.0 mm. The particle size of the majority is 74 μm–0.42 mm.		
	<div>Silt Clay Organic soil Volcanic ash</div>	<div>Mixture<div>Sand Coarse sand Fine sand</div></div>	5% or more and less than 15% fine particles	Fine particles are silt. Fine particles are clay. Fine particles are organic soil. Fine particles are volcanic clay.		
Sandy Soils	<div>Silt Clay Organic soil Volcanic ash</div>	<div>Quality<div>Sand Coarse sand Fine sand</div></div>	15% or more and less than 50% fine particles	Fine particles are silt. Fine particles are clay. Fine particles are organic soil. Fine particles are volcanic clay.		
Silts	Sandy silt Silt Clayish silt			Noticeable sand grains	Noticeable dilatancy phenomenon keeping the drying strength low	WL < 50
				Not noticeable sand grains	Midway between silt and silty clay	WL ≥ 50
Clayish Soil	Sandy silt			Noticeable	No dilatancy	WL < 50

	Silty clay Clay	50% or more fine particles	sand grains	phenomenon keeping the drying strength high or around medium	
			Not noticeable sand grains		WL ≥ 50
Organic Soils	Organic silt Organic silty clay Organic sandy clay Organic clay		It contains organic component, is black or dark color and has odor of organic soil.	Inorganic component is silt. Inorganic component is silty clay. Inorganic component is sandy clay.	WL < 50
	Andosol, Kanto loam (black), etc.			Inorganic component is clay.	WL ≥ 50
Volcanic Clays				Inorganic component is volcanic ash clay.	
	Volcanic ash soil Loam soils from various regions including Kanto loam		Volcanic ash clay of W < 80 Volcanic ash clay of WL ≥ 80		
Highly Organic Soils	Peat, etc. Muck, etc.	Fibrous highly organic clay Decomposed highly organic clay			

(2) Solidification of Specified Wastes

Ordinance, Article 26, paragraph (2), item (ii) (b)

In order to reduce the amount of radioactive materials discharged by the accident which can be eluted from rainwater or other water infiltrated into specified wastes for landfilling, the specified wastes shall be solidified in advance based on the method* prescribed by the Minister of the Environment; provided, however, that the specified wastes listed in the following items from 1. to 4. shall be treated with measures prescribed in the said items from 1. to 4. before being solidified by the said method:

1. Sludge: It shall be incinerated at an incineration facility or its water content ratio shall be reduced to less than 85%;
2. Waste oil (except for tar pitch types): It shall be incinerated using an incineration facility;
3. Waste plastics (except for asbestos-containing specified waste): It shall be shredded or cut so that there is no hollow space inside or incinerated using an incineration facility; and
4. Rubber pieces: It shall be shredded or cut, or incinerated using an incineration facility.

*Ministerial Notification No. 14 of the Ministry of the Environment on February 24, 2012

Article 1 The solidification shall be made by using cement or other binding materials.

Article 2, item (i)

In cases where the specified waste that has been solidified by the method prescribed under the preceding Article (hereinafter referred to as the “solidified waste”) satisfies all of the following standards, it shall be the layer of soil mixed with clay that is approximately 30 cm or more in thickness or the layer which has seepage control effect that is equal or higher than that of the said layer:

- (a) The compounded amount of cement is 150 kg or more per cubic meter of the solidified waste:
and
- (b) The uniaxial compressive strength at the time of conducting landfill disposal is 0.98 megapascals or more.

[Purpose of Measures]

- This provision prescribes the method used at the time of solidifying specified wastes before the landfill disposal by using cement, etc. to reduce any elution of radioactive materials that is caused by the landfilled specified wastes being exposed to rainwater, etc. infiltrated into the landfill site.
- When landfilling sludge, waste oil, waste plastics, and rubber pieces, it is also necessary to apply measures specified by the Ordinance in combination before the solidification is conducted.

[Example of Measures]

(Matters of Note Pertaining to Measures before the Solidification)

- Before the solidification is conducted, it is necessary to measure the radioactive concentration of specified wastes to confirm that it is over 8,000 Bq/kg and not more than 100,000 Bq/kg.

(Examples of the Solidification Methods)

- Detailed methods of the solidification may be the methods listed below (solidification using cement or other binding materials). Depending on the amount of cement mixed and uniaxial compressive strength of the solidified waste, the criteria required for the impermeable soil layers that are to be laid on the surface, sides, and bottom of the solidified waste at the time of landfilling are different (refer to 5.3.2 (4) Solidification A and B concerning the Impermeable Soil Layers). Therefore, it is necessary to select the solidification method taking into account the operation method at the time of conducting the landfill disposal.
- As a method of solidifying specified wastes, in addition to the method of solidifying by evenly kneading specified wastes with a binding material such as cement, the method of confining specified wastes by sealing the surroundings by cement can also be considered.

a. Solidification by Kneading

- Knead specified wastes, cement and water evenly using a solidification facility, etc.
- When kneading, the amount of cement mixed shall be 150kg/m³ or more and the uniaxial compressive strength of the solidified waste shall be 0.98 megapascals or more. By doing so, the impermeable soil layer laid at the time of landfilling the waste can be made into the layer of soil mixed with clay that is approximately 30cm or more in thickness or the layer that has the impermeability that is equal or higher than that of the said layer.

b. Solidification by Confinement

- Burnt fly ashes, etc. generated by the existing incineration facilities have been stored in flexible containers, etc. after they are kneaded with cement or chelating materials to confine

dioxins and heavy metals contained in them. Therefore, it is often the case that they are stored within the facilities. Since such ashes have already been solidified inside containers, it will be difficult to solidify them again by adding afresh cement to mix them evenly. Based on that account, a method alternative to solidifying by cement can be considered, which is to place a size larger container outside and the existing container containing the solidified ashes, etc. inside the larger container, similar to an egg shell, and then fill the cement milk into the gap between those containers.

- Place the flexible container containing burnt ashes inside the outer bag that is superior in water-imperviousness and fill a cement-based solidification between the gap to solidify.
- The construction method is shown in **Figure 5-4**.
- When the landfill disposal is to be made with more than three piles or in a way that the upper load is applied excessively, it is necessary to verify in advance if there will be any problems concerning the strength.

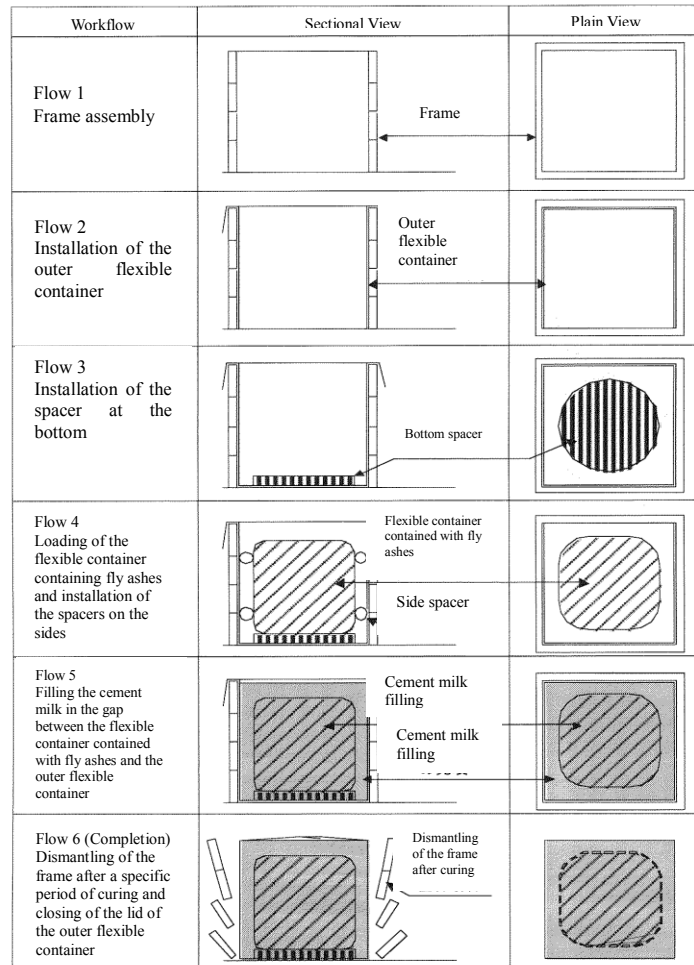


Figure 5-4: A Method of Solidifying a Flexible Container by Cement Confinement

(3) Storing in Containers not Easily Damageable

Ordinance, Article 26, paragraph (2), item (ii) (c)

To prevent scattering of specified wastes in the air that have had the measures prescribed by the provision of (b) applied, the said specified wastes shall be stored in advance in a container that is not easily damageable; provided, however, that specified waste asbestos, etc. shall be stored in a container that is not easily damageable after it is wrapped with waterproof materials.

[Purpose of Measures]

To prevent any scattering of the specified waste solidified based on the provision of 5.3.2 (2) to surrounding areas due to cracks, etc. caused by shocks, etc. at the time of landfilling, it is necessary to store it in a container that is not easily damageable.

[Example of Measures]

Specifically, storing it in a flexible container, drum can, etc. can be considered (**Figure 5-5**).

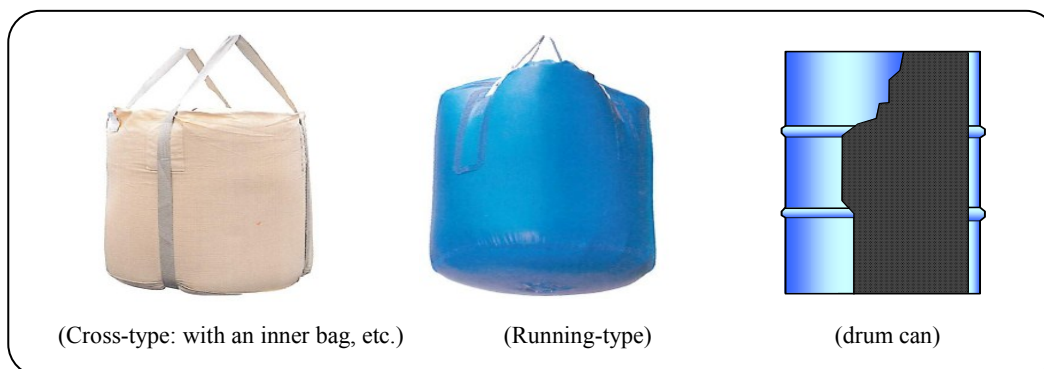


Figure 5-5: Containers Not Easily Damageable (Example)

(4) Impermeable Soil Layer

Ordinance, Article 26, paragraph (2), item (ii) (d)

At the place where specified wastes are to be landfilled, a layer of soil that has seepage control effect (hereinafter referred to as the “impermeable soil layer”) shall be laid in advance, as stipulated by the Minister of the Environment*. Concurrently, after specified wastes are landfilled, the impermeable soil layers shall be laid on the surface and sides of the said specified wastes as stipulated by the Minister of the Environment*.

*Ministerial Notification No. 14 of the Ministry of the Environment on February 24, 2012

Article 2 The impermeable soil layer that is laid on the place where specified wastes are landfilled pursuant to the provision of Article 26, paragraph (2), item (ii) (d) of the Ordinance shall be that the relevant case falls under the requirements set forth in the following items according to the category specified in the respective items:

- (i) In cases where the specified waste solidified by the method prescribed under the preceding Article (hereinafter referred to as the “solidified waste”) satisfies all of the following standards, it shall be a layer of soil mixed with clay that is approximately 30 cm or more in thickness or the layer which has seepage control effect that is equal or higher than that of the said layer:
 - (a) The compounded amount of cement is 150kg or more per cubic meter of the solidified waste: and
 - (b) The uniaxial compressive strength at the time of conducting landfill disposal is 0.98 megapascals or more.
- (ii) In cases other than the cases listed in the preceding item, it shall be the layer of bentonite or other materials that is approximately 30 cm or more in thickness and has the permeability coefficient of less than 10 nanometers per second or a layer that has seepage control effect that is equal to or higher than that of the said layer.

Article 3 The impermeable soil layer that is laid on the surface of specified waste pursuant to the provision of Article 26, paragraph (2), item (ii) (d) of the Ordinance shall be one that falls under any of the following requirements:

- (i) A layer of bentonite or other materials that is approximately 30 cm or more in thickness and has the permeability coefficient of less than 10 nanometers per second;

- (ii) A layer of watertight asphalt concrete that is approximately 30 cm or more and has a permeability coefficient of less than one nanometer per second;
- (iii) A layer which has seepage control effect that is equal to or higher than those of the layers set forth in the preceding two items.

Article 4 The permeable soil layer that is laid on the sides of specified waste pursuant to the provision of Article 26, paragraph (2), item (ii) (d) of the Ordinance shall be that the relevant case falls under the requirements set forth in the following items according to the category specified in the respective items:

- (i) In the case set forth in Article 2, item (i), the layer shall be one that is prescribed under the same item;
- (ii) In cases other than that set forth in the preceding item, the layer shall be one that is prescribed under the following (a) and (b) according to the sides listed in the said (a) and (b);
 - (a) For the sides other than those listed in (b), the layer prescribed under Article 2, item (i);
 - (b) For the sides that may be infiltrated by rainwater or other water, the layer prescribed under Article 2, item (ii).

[Purpose of Measures]

In order to prevent radioactive cesium from being eluted due to the infiltration of rainwater, etc., it is necessary to lay an impermeable soil layer that has seepage control effect on the top, bottom and sides of the landfilling waste at the time of the landfill disposal of the solidified specified waste.

[Example of Measures]

- In cases where the bentonite mixed soil, etc. is to be used as an impermeable soil layer, it is necessary to make the permeability coefficient less than 10^{-6} cm/s by managing the compounding ratio, etc. of bentonite, performing sufficient compaction or the like.
- In cases where the impermeable soil layer is to be laid on top of waste, providing it with gradient to avoid any stagnant water may be conceivable (**Figure 5-6**).
-
- Moreover, until the time when the impermeable soil layer is laid on the surface of the landfilling waste, it is necessary to take measures to prevent any infiltration of rainwater such as covering it with a sheet that has seepage control (seepage control sheet, blue sheet, etc.). If the rainwater couldn't be removed at the time of landfilling due to the shape of the final landfill site and there may be water built up inside the landfilling site, this shall not prevent measures such as making draining spots at the bottom of the impermeable soil layer, on condition that the drain water can be treated appropriately. In this case, it is important to make the draining spots not to be in a direct contact with specified wastes and in a position where the leachate can be removed appropriately (such as the bottom edges of the landfill section where the soil laid on both sides of specified wastes and the impermeable soil layer are in contact).

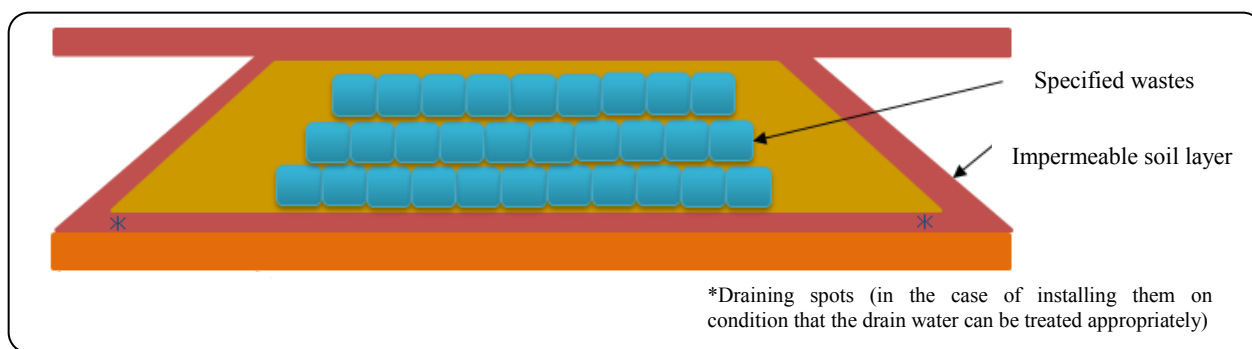


Figure 5-6: Image Figure of the Impermeable Soil Layer and Landfilled Wastes

(Requirements of the Impermeable Soil Layer)

- Pursuant to the Ministerial Notification No. 14 of the Ministry of the Environment (February 24, 2012), the requirements of the impermeable soil layer that is laid on top, bottom and sides of the landfilling wastes are specified as follows depending on the compressive strength of the solidified wastes:

- 1) When the mixture amount of cement is 150kg/m^3 or more and the uniaxial compressive strength of the concrete solidified wastes has 0.98 megapascals or more (solidification A);
 - Lay the soil mixed with clay with low permeability coefficient on top of the lower soil layer (approximately 50 cm or more in thickness) or the clay mixed soil layer (approximately 30 cm or more in thickness) that has seepage control effect equal to or higher than that of the said layer and landfill the solidified specified wastes (**Figure 5-7**).
 - Use the clay mixed soil layer for the sides of the landfilled specified wastes as well.
 - Cover the upper part of the landfilled specified wastes with the impermeable soil layer (the soil layer that is approximately 30 cm or more in thickness that has less than 10^{-6} cm/s of the permeability coefficient or the layer of watertight asphalt concrete, etc. that is approximately 3 cm or more in thickness that has less than 10^{-7} cm/s of the permeability coefficient).
 - The uniaxial compressive strength shall be one that is measured based on the Japanese Industrial Standards A1108 (Method of test for compressive strength of concrete). Normally, the mixture is conducted in a way that cement is mixed in evenly; however, such mixture can be conducted by a different method, etc. if the water seepage capacity can be maintained that is equal to or higher than that of the said mixture method of cement and the uniaxial compressive strength can be satisfied.

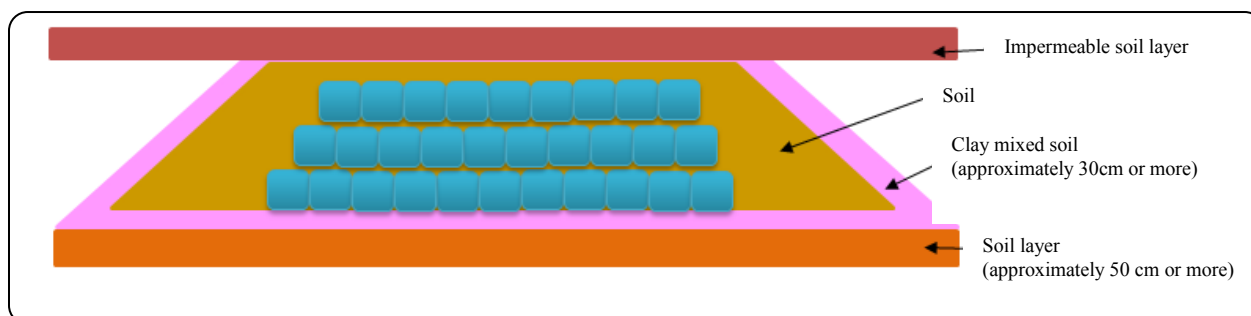


Figure 5-7: Landfiling for the Case of Solidification A (Example)

2) When the solidified wastes are other than the solidification A (solidification B)

- Lay the impermeable soil layer (less than 10^{-6} cm/s of the permeability coefficient and approximately 30 cm or more in thickness) on top of the lower layer of soil (approximately 50 cm or more in thickness) and landfill the solidified wastes above it (**Figure 5-8**).
- For the sides, lay the impermeable soil layer that has less than 10^{-6} cm/s of the permeability coefficient and approximately 30 cm or more in thickness when there is a risk of rainwater or other water infiltrating from the sides and in any other cases, lay the clay mixed soil layer (approximately 30 cm or more in thickness).
- Cover the upper part of the landfilled specified wastes with the impermeable soil layer (the soil layer that is approximately 30 cm or more in thickness that has less than 10^{-6} cm/s of the permeability coefficient or the layer of watertight asphalt concrete, etc. that is approximately 3 cm or more in thickness that has less than 10^{-7} cm/s of the permeability coefficient).

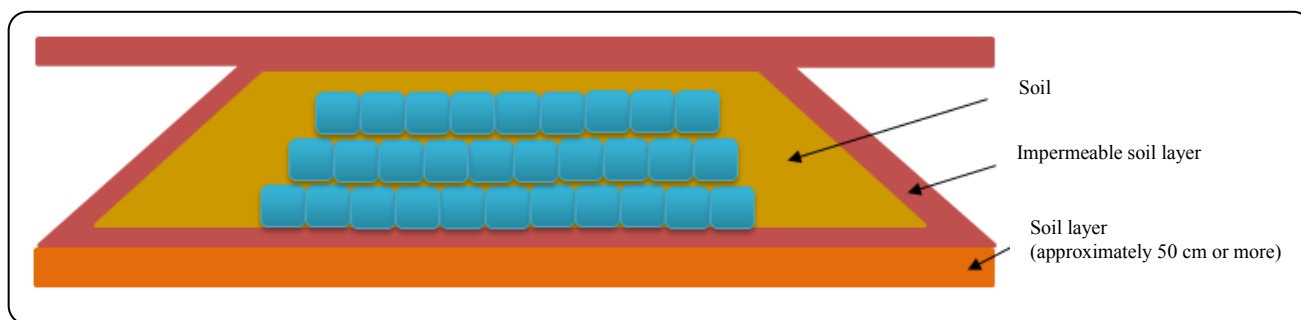


Figure 5-8: Landfilling for the Case of Solidification B (Example)

(5) In the Case of not requiring the Installation of the Impermeable Soil Layer

Ordinance, Article 26, paragraph (2), item (ii)

(d) Provided, however, that this shall not apply in the following cases:

1. In the case of conducting the landfill disposal at a place where necessary measures to prevent infiltration of rainwater have been taken; and
2. In the case of landfilling specified wastes after storing them in a container made of reinforced concrete or other materials that have watertight capability, strength, and durability necessary to prevent infiltration of rainwater into the said specified wastes for a period until the said specified wastes come to fall under the category of the standard conformable specified wastes due to the attenuation of radioactivity.

(Landfill Disposal at the Roofed Final Landfill Site)

[Purpose of Measures]

When conducting the landfill disposal at a place where necessary measures to prevent infiltration of rainwater have been taken, the laying of the impermeable soil layer is not required.

[Example of Measures]

- The case in which the landfill disposal is conducted at a place where necessary measures to prevent infiltration of rainwater have been taken may be the case that the landfill disposal is conducted at the final landfill site that has structures equivalent to that of the controlled type of roofed final landfill site and the final landfill site that has been applied with prevention measures of infiltration of rainwater (**Figure 5-9**).
- At the final landfill site that has a movable roof structure, it is necessary to take measures to prevent infiltration of rainwater from above due to the moved roof after the landfill of the section is completed.

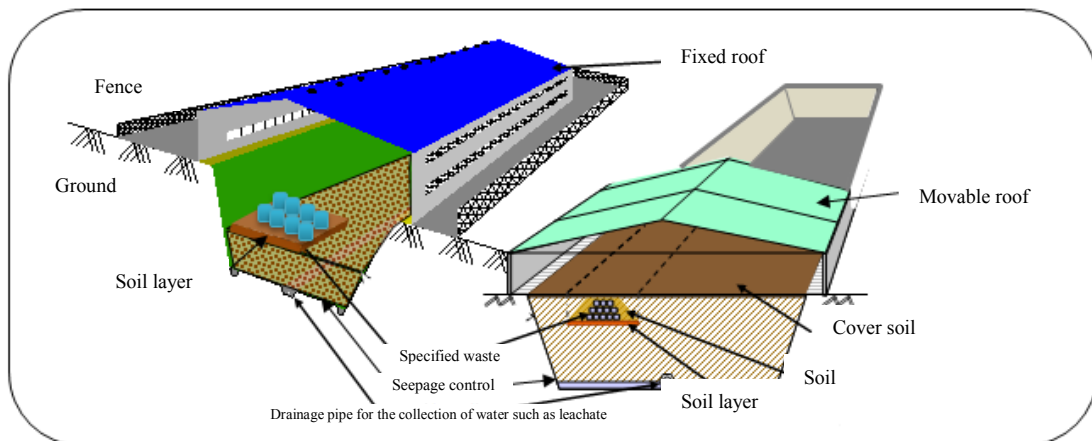


Figure 5-9: Landfill Disposal at the Roofed Final Landfill Site (Example)

(Landfill Disposal after Storing in a Container with a Long-Term Durability)

[Purpose of Measures]

In the case of conducting the landfill disposal after storing wastes in a container made of reinforced concrete or other materials that have necessary watertight capability, strength, and durability to prevent infiltration of rainwater into the landfilling specified wastes for a period until the concentration of radioactive cesium in the said specified waste becomes less than 8,000 Bq/kg, the laying of the impermeable soil layer is not required.

[Example of Measures]

- The relevant case of the landfill disposal using a container which has a long-term durability is the case where the landfilling of the specified wastes is conducted after making a container made of the reinforced concrete, etc. and then landfilling the specified wastes which are made solidified by putting them into the said container or landfilling the solidified wastes after storing them in a container made of reinforced concrete, etc. (**Figure 5-10**).
- When landfilling specified wastes, the following matters shall be paid attention to:
 - The container made of reinforced concrete, etc. will not break due to the load of landfilling wastes, etc.
 - The containers are stabilized by filling the gap between the said containers with soil, etc.
 - The load of landfilling wastes and weight of the said containers will not damage any function of

the facilities at the final landfill site.

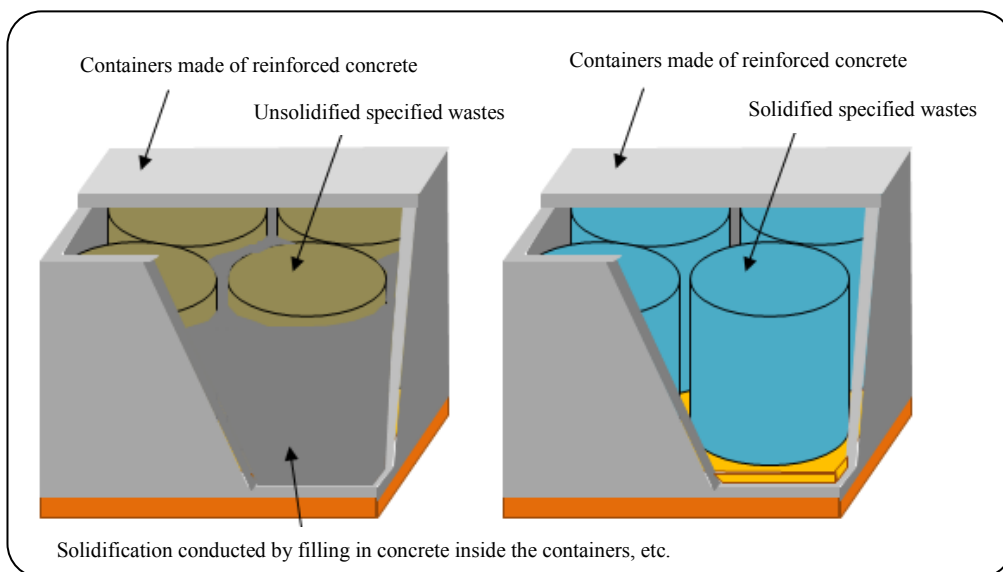


Figure 5-10: Landfill Disposal by Storing in Containers made of Reinforced Concrete (Example)

(6) Landfilling Wastes with Low Elution Amount of Radioactive Materials Discharged by the Accident

Ordinance, Article 26, paragraph (2), item (ii)

(e) Notwithstanding the provisions of (b) through (d), when conducting the landfill disposal of specified wastes that fall under the category of the requirements^{*1} prescribed by the Minister of the Environment as waste that has a low elution amount of radioactive materials discharged by the accident in the case of infiltrated rainwater or other water, the following measures shall be taken:

1. With regard to specified wastes listed in the following a. and b., the measures prescribed under the said a. and b. shall be taken in advance;
 - a. Sludge: It shall be incinerated at an incineration facility or its water content ratio shall be reduced to less than 85%.
 - b. Specified wastes listed in items (ii) (c) through (g) of the preceding paragraph: The measures prescribed under the said items (c) through (g) shall be taken.
2. With regard to the cases in the following a. and b., the measures prescribed under the said a. and b. shall be taken.
 - a. In the case set forth in item (d) (1), the thickness of one layer of the landfilling specified wastes shall be approximately less than 3 m and the surface of each layer shall be covered with soil that is approximately 50 cm in thickness;
 - b. In cases other than those set forth in items (d) 1. and 2., a soil layer that is approximately 50 cm or more in thickness shall be laid in advance at the place where specified wastes are to be landfilled and the thickness of the landfilling specified wastes shall be approximately less than 3 m and the surface of each layer shall be laid with the impermeable soil layer as provided by the Minister of the Environment.

Ministerial Notification No. 3 of the Ministry of the Environment on January 13, 2012

^{*1} Article 1 (Outline)

(The requirements of specified wastes with the low elution amount of radioactive materials discharged by the accident in the case of infiltrated rainwater or other water)

As a result of the measurement of the test liquid pertaining to the said specified wastes that is prepared based on the methods specified by Japanese Industrial Standards K0058-1^{*3}, the radioactive concentration of cesium-137 shall be less than 150 Bq/L.

*2 Article 2 (Outline)

(Requirements of the impermeable soil layer)

- (i) It shall be a layer of bentonite or other materials that is approximately 30 cm or more in thickness and has the permeability coefficient of less than 10^{-6} cm/s^{*4}.
- (ii) It shall be a layer of watertight asphalt concrete that is approximately 30 cm or more in thickness and has the permeability coefficient of less than 10^{-7} cm/s^{*5}.
- (iii) It shall be a layer that has seepage control effect that is equal to or higher than those layers under the preceding two items.

*3 Conduct the measurement by using any of the following gamma- ray spectrometers.

- Germanium semiconductor detector
- NaI (Tl) scintillation spectrometer
- LaBr₃ (Ce) scintillation spectrometer

*4 10 nanometers per second

*5 1 nanometer per second

[Purpose of Measures]

·With regard to specified wastes that have a low elution amount of radioactive cesium (less than 150 Bq/L of the radioactive concentration of cesium-137; hereinafter the same shall apply), since it is conceivable that there is less impact on the leachate, it is unnecessary to solidify such wastes by cement, etc., lay the impermeable soil layer on the bottom and sides, and store them in a container as mentioned in 5.3.2 (2) through 5.3.2 (4).

·For the landfilling of specified wastes that have a low elution amount of radioactive cesium, the following measures shall be taken:

- Lay the lower layer of soil (approximately 50 cm or more in thickness) (5.3.2 (1)).
- Keep the thickness of a layer to be landfilled approximately less than 3 m.
- Lay the impermeable soil layer on the surface of each layer.
- Conduct the pretreatment (shredding, incineration, solidification, etc.) in accordance with the type of wastes.

[Example of Measures]

- Specifically, it is necessary to prevent infiltration of rainwater by keeping a layer of specified wastes to be landfilled approximately less than 3m in thickness and covering each layer with an impermeable soil layer of approximately 30 cm or more (10^{-6} cm/s) in thickness (**Figure 5-11**).
- Along with providing it with gradient to avoid water stagnantting, to control water infiltrating from the sides, it may be appropriate to make the width of the impermeable soil layer extending 3m or

more to the sides of the edges of the landfilled specified wastes (**Figure 5-11**).

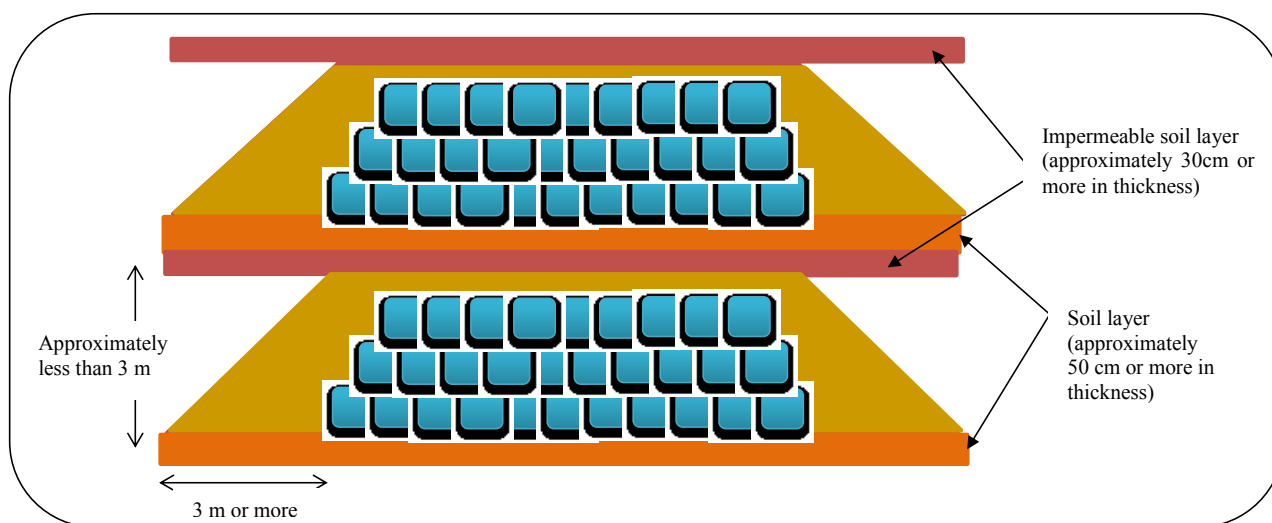


Figure 5-11: Landfilling of the Wastes with Low Elution Amount of Radioactive Materials Discharged by the Accident (Example)

(Pretreatment in Accordance with the Waste Type)

Ordinance, Article 26, paragraph (2), item (ii) (e)

Notwithstanding the provisions of (b) through (d), when conducting the landfill disposal of specified wastes that fall under the category of the requirements prescribed by the Minister of the Environment as waste that has a low elution amount of radioactive materials discharged by the accident in the case of infiltrated rainwater or other water, the following measures shall be taken:

1. With regard to specified wastes listed in the following a. and b., the measures prescribed under the said a. and b. shall be taken in advance;
 - a. Sludge: It shall be incinerated at an incineration facility or its water content ratio shall be reduced to less than 85%.
 - b. Specified wastes listed in items (ii) (c) through (g) of the preceding paragraph: The measures prescribed under the said items (c) through (g) shall be taken.

Ordinance, Article 26, paragraph (1), item (ii)

When conducting the landfill disposal of specified wastes listed in the following (a) through (g), the measures prescribed under the said (a) through (g) shall be taken in advance:

- (a), (b) (omitted);
- (c) Specified wastes that are perished or may perish (except for organic sludge) or waste oil (except for tar pitch types): It shall be incinerated using an incineration facility;
- (d) Waste plastic (except for asbestos-containing specified waste): It shall be shredded or cut into pieces of approximately less than 15 cm in maximum diameter so that there is no hollow space inside or incinerated using an incineration facility;
- (e) Rubber pieces: They shall be shredded or cut into pieces of approximately less than 15cm in maximum diameter or incinerated using an incineration facility;

- (f) Specified soot or burnt residue: To prevent it from scattering in the air, necessary measures such as adding water, solidifying, and packaging shall be taken; and
- (g) Specified waste asbestos, etc.: To prevent it from scattering in the air, it shall be double packaged with waterproof materials after taking measures to solidify, stabilize using chemicals, or any other measures equivalent thereto.

[Purpose of Measures]

When landfilling specified wastes, it is necessary to take measures in advance that are similar to the landfill disposal standards under the Waste Management Act for each type of specified wastes.

(7) Avoidance of the Contact with Water

[Purpose of Measures]

In order to prevent the elution of the radioactive cesium into water due to the landfilled specified wastes getting immersed in the rainwater, etc. infiltrated into the landfilled site, when landfilling at the final landfill site, it is important to avoid contact of specified wastes with water by not using any location where the water may easily get stagnant.

[Example of Measures]

- In order to prevent the elution of the radioactive cesium into water due to the landfilled wastes getting immersed in the rainwater, it is important to conduct the landfill disposal by avoiding to using any location of the final landfill site where the water may easily get stagnant
- When landfilling wastes at the existing final landfill site, the landfilling location is positioned at a location that is as distant as possible from the drainage pipes collecting leachate and the bottom part of the slope surface inside the landfill site. Therefore, it is effective to landfill wastes on top of the existing waste layer instead of the lowest layer (**Figure 5-12**).
- Since the surroundings of the degassing equipment installed at the landfill site and slope surface are prone to become water channels, it is important to landfill specified wastes at a location distant from such locations.
- In cases where the landfill must be conducted at a place where the water gets easily stagnant, it is important to raise the sole plate by piling up wastes, etc. on top of the existing waste layer and landfill wastes by laying soil on top of that (**Figure 5-13**).
- Moreover, to avoid contact of the landfilling wastes with rainwater and remove the rainwater promptly, it is also effective to form a step difference from other landfill layers.
- Even in the case of conducting the landfill of specified wastes by occupying a wide range of the final landfill site, to avoid contact of wastes with rainwater, it is important to ensure that wastes are not landfilled directly at the drainage pipes for collecting leachate located at the bottom of the landfill site or at the bottom of the slope surface inside the landfill site, the lower layer of soil and intermediate soil covers on each layer are laid on thoroughly. In cases where the infiltration of rainwater may be a particular concern due to having the slope surface located nearby, it is also important to take measures to restrain contact of wastes with rainwater even if the landfill is for

the wastes other than soot.

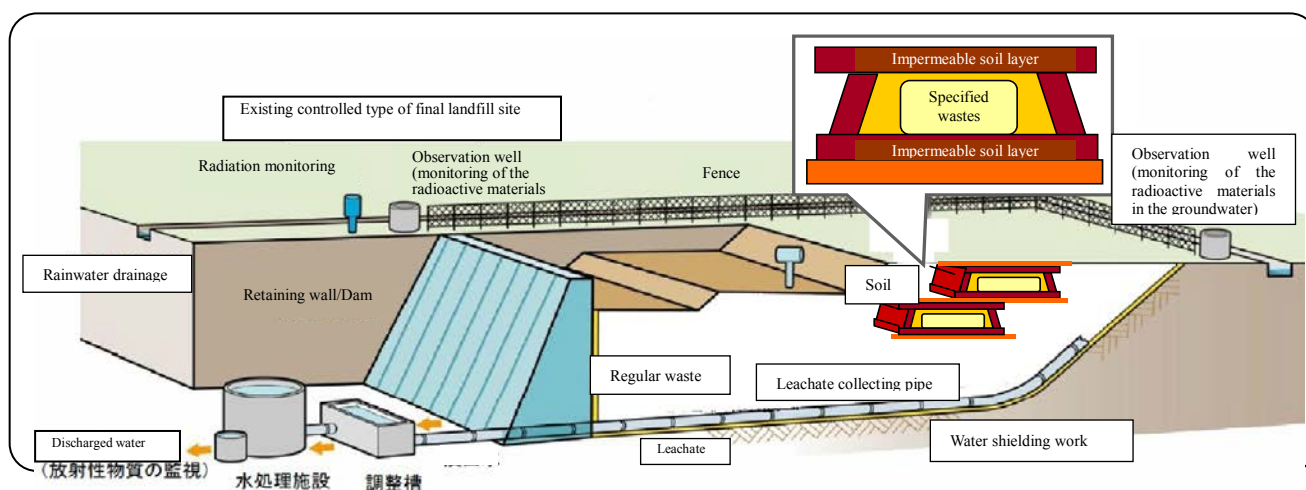


Figure 5-12: Landfill Location at the Existing Controlled Type of Final Landfill Site (Example)

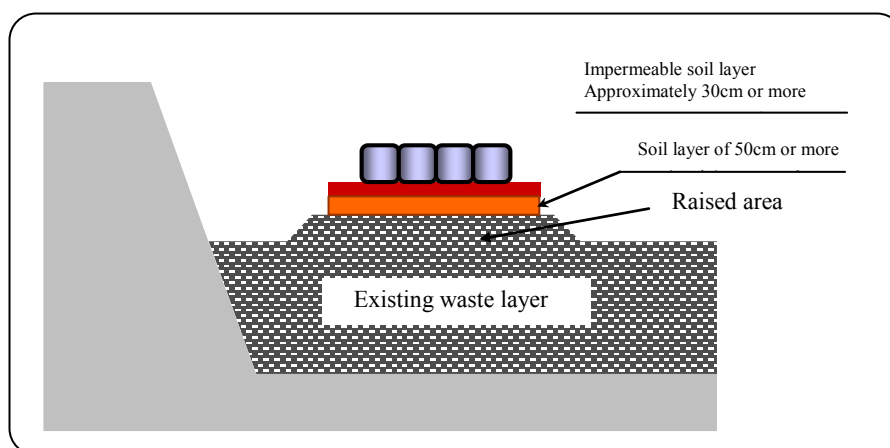


Figure 5-13: Image Figure of the Raised Landfill Section

5.3.3 Landfill Disposal at the Landfill Site Equivalent to the Isolated Type of Final Landfill Site

Ordinance, Article 26, paragraph (2), item (iii)

In the case of conducting the landfill disposal of specified wastes listed in the items (ii) (a) through (g) of the preceding paragraph at a place isolated from the public water area and groundwater, the measures prescribed under the said items (ii) (a) through (g) shall be taken in advance:

[Purpose of Measures]

- In the case of conducting the landfill disposal of specified wastes at a place that is isolated from the public water area and groundwater (landfill site that has structures equivalent to those of the isolated type of the final landfill site) (**Figure 5-14**), it is not required to take measures such as the laying of the lower layer of soil, storing wastes in a container not easily damageable, and laying of the impermeable soil layer, as listed in 5.3.2 (1) and (3) through (7).

- When landfilling the specified wastes prescribed under Article 26, paragraph (1), item (ii) (a) through (g) of the Ordinance (sludge, perishable waste, waste oil, waste plastics, rubber pieces, specified soot, burnt residues, specified waste asbestos, etc.), it is necessary to take measures that are similar to the landfill disposal standards of the Waste Management Act for each type of the specified waste in advance.

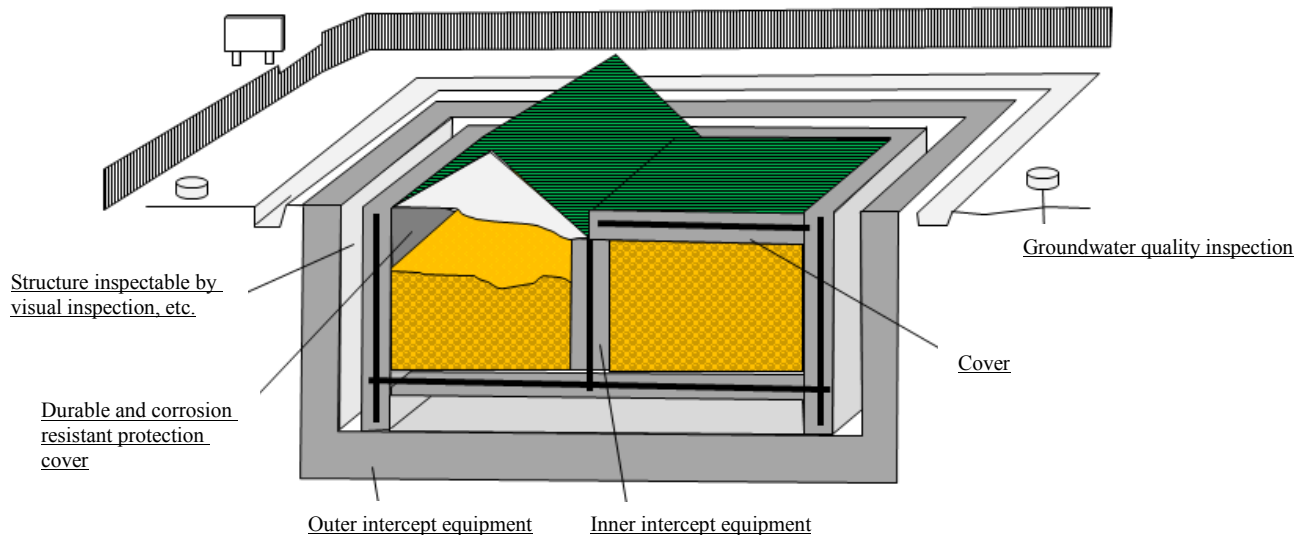


Figure 5-14: Landfill Site Equivalent to the Isolation Type of the Final Landfill Site (Example)

5.3.4 Measurement for Facilities of the Seepage Control Work etc. as well as Effluent Water and Groundwater

Ordinance, Article 26, paragraph (2), item (iv)

Necessary measures listed in the following (The measures listed in (d), when landfill disposal of specified waste is conducted at places where the public water area and groundwater are cut off.) shall be taken to prevent contamination of public water area and groundwater due to leachate from landfill site.

[Purpose of Measures]

It is necessary to take measures to prevent contamination of the public water area and groundwater due to leachate from the landfill site.

(1) Installation of facilities for seepage control work etc. (in the case of landfill site having a structure equivalent to the management type final landfill site)

Ordinance, Article 26, paragraph (2), item (iv) (a)

The facilities listed in the following (excluding the facilities listed in 2., when specified waste at the landfill site is landfilled where necessary measures are taken for the prevention of rainwater penetration) shall be installed.

1. The seepage control work that can prevent the seepage of retained water of specified waste and rainwater etc. (hereinafter referred to as “retained water etc.”) from landfill site (With regard to the

landfill site where separation and landfill disposal will be conducted after laying off, it shall be the compartment where landfill disposal is being conducted. The same shall apply in 4.). (Among landfill sites, the opening for injection of specified waste, as well as the location where retained water etc. drainage system as provided in 2. is installed, shall be excluded.)

2. Solid and durable structured pipes and drains and other drainage systems that can effectively collect retained water etc. (hereinafter referred to as “retained water etc. drainage system”).
3. Leachate processing equipment that can properly maintain the water quality of the effluent water related to the retained water etc. collected by retained water etc. drainage system
4. The pipes and drains and other facilities that can prevent the flow of surface water from the opening of landfill site into landfill site

[Purpose of Measures]

As is the case with the provisions of Waste Management Act, assuming landfilling specified waste at a landfill site with a structure equivalent to the management type final landfill site, it is necessary to install seepage control work, retained water etc. drainage system, leachate processing equipment, and flow prevention facilities for surface water.

(2) Maintenance of water quality of the effluent water (in the case of landfill site having a structure equivalent to the management type final landfill site)

Ordinance, Article 26, paragraph (2), item (iv) (b)

Water quality of effluent water shall be maintained as follows.

1. For every item listed in the upper column of appended table 4, water quality of the effluent water shall be adopted to the maximum permissible limit of dioxins as provided in standards listed in the lower column of the said Table and the lower column of appended table 2 in the Ordinance for Enforcement of the Act on Special Measures concerning Dioxins (Ordinance of the Prime Minister's Office No.67 of 1999).
2. By monitoring the concentration of radioactive materials discharged by the accident in effluent water at a drain port, it shall be ensured that the sum of the ratio of the three month average concentration for respective radioactive materials discharged by the accident listed in the first column of appended table 2 in the water at public water area in the neighborhood of the final landfill site, to the ratio of the concentration listed in the third column regarding radioactive materials discharged by the accident, will not exceed one.

[Purpose of Measures]

- Water quality of the effluent water should be adapted to reference value and maximum permissible limit listed in **Table 5-2** so that there will be no influence on the health and living environment of people around the landfill site.
- The three month average concentration for radiocesium in effluent water, that is the value calculated by the following formula (the sum of the ratio for each concentration limit of cesium 134 and cesium 137), should be managed not to exceed one, so that there will be no influence on living environment of

neighboring people due to radiocesium.

$$\frac{\text{The concentration of } ^{134}\text{Cs (Bq/L)}}{60 \text{ (Bq/L)}} + \frac{\text{The concentration of } ^{137}\text{Cs (Bq/L)}}{90 \text{ (Bq/L)}} \leq 1$$

[Example of Measures]

- If the concentration of radiocesium in effluent water exceeds the concentration limit, the concentration of radiocesium in public water areas downstream of the outlet port shall be measured. In addition, the measurement for the concentration of this radiocesium shall be conducted by the method prescribed in Chapter 5 “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”
- The following is considered to be a method to reduce the concentration of radiocesium in effluent water.

○Emergency time

- After suspending discharge, the retention water that is not processed by zeolite shall be returned to the seepage water balancing tank.
- Zeolite shall be added into the seepage water balancing tank or cohesion sedimentation tank to absorb cesium onto zeolite.
- By circulating retention water, it shall be ensured that retention water fully comes into contact with zeolite, and the concentration of radiocesium in the retention water goes below the concentration limit.
- Replacement of filter medium into zeolite at filtration facilities or new installation of zeolite adsorption tower is also effective.

○Stationary time

- It shall go through filtration facilities with replacement of filter medium into zeolite, or zeolite adsorption tower.

Table 5-2: Water Quality Standard etc. of Effluent water (Ordinance, Appended Table 4 and others)

Item	Reference Value		Notes
Alkyl mercury compound	Shall not be detected		
Mercury and alkyl mercury and other mercurial chemical compounds	0.005	mg/L	
Cadmium and its chemical compound	0.1	mg/L	
Lead and its chemical compound	0.1	mg/L	
Organophosphorus (limited to parathion, methyl parathion, methyl diMeton, and ethyl-p-nitrophenylthionobenzenphosphonate (alias EPN))	1	mg/L	
Sexivalent chrome chemical compound	0.5	mg/L	
Arsenic and its chemical compound	0.1	mg/L	
Cyanogen compound	1	mg/L	
Polychlorinated biphenyl	0.003	mg/L	
Trichloroethylene	0.3	mg/L	
Tetrachloroethylene	0.1	mg/L	
Dichloromethane	0.2	mg/L	
Carbon tetrachloride	0.02	mg/L	
1,2-Dichloroethane	0.04	mg/L	
1,1-Dichloro	0.2	mg/L	
Cis-1,1-Dichloro	0.4	mg/L	
1,1,1-Trichloroethane	3	mg/L	
1,3-Dichloropropene	0.02	mg/L	
Thiuram	0.06	mg/L	
Simazine	0.03	mg/L	
Thiobencarb	0.2	mg/L	
Benzene	0.1	mg/L	
Selenium and its chemical compound	0.1	mg/L	
Boron and its chemical compound	50	mg/L	Discharge to the public water areas other than the sea area
Same as above	230	mg/L	Discharge to the sea area
Fluorine and its chemical compound	15	mg/L	Those to be discharged to the public water areas other than the sea area shall be applied for the time being.
Ammonia, ammonium chemical compound, nitrite chemical compound and nitric acid chemical compound	200	mg/L	For the time being, total amount of ammoniacal nitrogen amount multiplied by 0.4, nitrite-nitrogen and nitrate-nitrogen
Hydrogen-ion concentration (hydrogen exponent)	5.8–8.6		Discharge to the public water areas other than the sea area
Same as above	5.0–9.0		Discharge to the sea area
Biochemical oxygen demand	60	mg/L	
Chemical oxygen demand	90	mg/L	
Float mass	60	mg/L	
Normal-hexane extracts content (mineral oils content)	5	mg/L	
Normal-hexane extracts content (animals and plants oils and fats content)	30	mg/L	
Phenols content	5	mg/L	
Copper content	3	mg/L	

Zinc content	2	mg/L	
Soluble iron content	10	mg/L	
Soluble manganese content	10	mg/L	
Chromic content	2	mg/L	
Coliform bacteria count	3000	number/cm ³	
Nitrogen content*1	120	mg/L	Daily average of less than 60 mg/L
Phosphorus content*2	16	mg/L	Daily average of less than 8 mg/L
Dioxins	10	pg-TEQ/L	The Act on Special Measures concerning Dioxins

*1 The effluent standard of nitrogen content shall be applied only limited to the wetlands determined by the Minister of the Environment as a wetland in which nitrogen might result in a significant multiplication of wetlands phytoplankton, the sea areas determined by the Minister of the Environment as a sea area in which nitrogen might result in a significant multiplication of marine phytoplankton (It shall be a wetland, and shall include those whose chlorine ion content in the water is over 9,000 mg/L. Hereinafter the same.), and the drainage to be discharged into the public water areas that flows into the abovementioned.

*2 The effluent standard of phosphorus content shall be applied only limited to the wetlands determined by the Minister of the Environment as a wetland in which phosphorus might result in a significant multiplication of wetlands phytoplankton, the sea areas determined by the Minister of the Environment as a sea area in which phosphorus might result in a significant multiplication of marine phytoplankton, and the drainage to be discharged into the public water areas that flows into the abovementioned.

In the above, the wetlands and the sea areas determined by the Minister of the Environment shall mean the wetlands as provided in Ministerial Notification No.27 of the Ministry of the Environment on May, 1985 (matters stipulating the wetlands regarding the effluent standard of nitrogen content or phosphorus content), as well as the sea areas as provided in Ministerial Notification No.67 of the Ministry of the Environment on August, 1933 (matters stipulating the sea areas regarding the effluent standard of nitrogen content or phosphorus content). (Ministerial Notification No.119 of the Ministry of the Environment on August 9, 2012)

(3) Water examination of the effluent water (in the case of the landfill site having a structure equivalent to the management type final landfill site)

Ordinance, Article 26, paragraph (2), item (iv) (c)

Water examination of the effluent water shall be conducted as follows.

1. The items listed in the upper column of Appended Table 4 (excluding the items as provided in 3.) and dioxins shall be measured and recorded once or more a year by the methods (*) determined by the Minister of the Environment.
2. Radioactive materials discharged by the accident shall be measured and recorded once or more a month by the methods (*8) determined by the Minister of the Environment.
3. Hydrogen-ion concentration, biochemical oxygen demand, chemical oxygen demand, float mass and nitrogen content (only if it is provided in notes 4 of Appended Table 4) shall be measured and recorded once or more a month by the methods determined by the Minister of the Environment.
(Once or more a year for the items that clearly show no risks of the occurrence of contamination of the public water area and groundwater, in light of types of specified waste to be landfilled and water quality of the retained water etc.)

*Ministerial Notification No.130 of the Ministry of the Environment on August 28, 2012

- The items listed in the upper column of Ordinance, appended tTable 4
The method as provided respectively in each item for the items listed in each item of Ministerial Notification No.64 of the Ministry of the Environment on September, 1974 (matters stipulating the examination method regarding the effluent standard determined by the Minister of the Environment)
- Dioxins
The method as provided in Ministerial Notification No.1 of the Ministry of Health and Welfare and the Ministry of the Environment on January, 2000 (matters stipulating the method of the water examination for dioxins regarding the final landfill site)
- Radioactive materials discharged by the accident
The method to measure using germanium semiconductor detector

[Purpose of Measures]

- At a landfill site having a structure equivalent to the management type final landfill site, the items and frequency of the water examination necessary for the management of water quality of the effluent water from landfill site are stipulated.
- With respect to the measurement of the effluent water, among the items listed in **Table 5-2**, hydrogen-ion concentration, biochemical oxygen demand, chemical oxygen demand, float mass, and nitrogen content should be measured and recorded once or more a month (once or more a year in the absence of a risk for the occurrence of the contamination), and other items shall be measured and recorded once or more a year.
- Also, with respect to the measurement of radiocesium concentration in the effluent water, it should be measured and recorded once or more a month by the method prescribed in Chapter 5 “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”

(4) Water examination of groundwater

Ordinance, Article 26, paragraph (2), item (iv) (d)

The measures listed in the preceding paragraph, item (iii), from (a) to (c) shall be taken.

Ordinance, Article 26, paragraph (1), item (iii)

Necessary measures listed in the following shall be taken to prevent contamination of public water area and groundwater due to leachate from a location of landfill disposal (hereinafter referred to as “landfill site”).

(a) Water examination of the groundwater, which is collected from two or more locations where the existence or nonexistence of influence can be judged on water quality of the periclinal groundwater at the final landfill site due to leachate from landfill site, or which is exhausted from groundwater drainage system (It refers to solid and durable pipes and drains and other drainage systems that can effectively collect and drain groundwater. Hereinafter the same.) shall be conducted by the following.

1. Before the start of landfill disposal, the items listed in the upper column of appended table 3 (hereinafter referred to as “groundwater inspection items”), dioxins, radioactive materials discharged by the accident, electric conductivity and chloride ion shall be measured and recorded by the methods (*) determined by the Minister of the Environment. However, at a final landfill site where it is not appropriate to use the concentration of electric conductivity, and chloride ions as index of the existence or nonexistence of the contamination of the periclinal groundwater at the final landfill site, this shall not apply to electric conductivity, and chloride ions.
2. After the start of landfill disposal, the items listed in the following a. through c. shall be measured and recorded by the methods determined by the Minister of the Environment in 1. at a frequency set forth in the said a. through c.. However, among the items listed in a. and b., this shall not apply to the items that clearly show no risks of the occurrence of contamination of the periclinal groundwater at the final landfill site, in light of types of specified waste to be landfilled and other circumstances.
 - a. Groundwater inspection items – Once or more a year (once or more every six months for the final landfill site as provided in the exceptional clause 1.)
 - b. Dioxins - Once or more a year
 - c. Radioactive materials discharged by the accident – Once or more a month
3. After the start of landfill disposal, electric conductivity or chloride ions shall be measured and recorded once or more a month by the methods determined by the Minister of the Environment in 1.. However, this shall not apply at the final landfill site as he exceptional clause1.
4. If abnormality is revealed in the concentration of electric conductivity or chloride ions measured pursuant to the provision of 3., groundwater inspection items and dioxins shall be promptly measured and recorded by the methods determined by the Minister of the Environment in 1..

- (b) As a result of water examination related to groundwater inspection items, dioxins and radioactive materials discharged by the accident, in accordance with the provisions of (a) 1., 2., or 4., if deterioration of the water quality (excluding those that clearly show that their causes are attributable to places other than the said final landfill site) is revealed, an investigation of such cause as well as necessary measures for the preservation of other living environments shall be carried out.
- (c) Other necessary measures

*Ministerial Notification No. 130 of the Ministry of the Environment on August 28, 2012

- Groundwater inspection items
The methods as provided respectively in the column of the measurement method in the Table for each item listed in the column of the items in appended table of t Ministerial Notification No. 10 of March, 1997 (notice of environmental standard regarding the water pollution of groundwater)
- Dioxins
The method as provided in Ministerial Notification No. 1 of the Ministry of Health and Welfare and the Ministry of the Environment on January, 2000 (matters stipulating the method of the water examination for dioxins regarding the final landfill site)
- Radioactive materials discharged the accident
The method to measure by using germanium semiconductor detector
- Electric conductivity
The method as provide in 12 of JIS K 0101
- Chloride ions
The method as provide in 32 of JIS K 0101

[Purpose of Measures]

- In order to confirm that there is no influence on the water quality of the groundwater in the periphery of the final landfill site due to seepage water from landfill site, it is necessary to measure and record the concentration as provided in the ordinance once or more a month, before the start of landfill disposal as well as after the start of landfill disposal.
- The measurement of radiocesium shall be conducted by the method prescribed in Chapter 5 “Part V: Guidelines for Method of Measurement of Radioactive Concentration.”
- For the collection location of the groundwater, existing groundwater observation well installed at the upper stream and downstream of disposal site may be diverted.

(Measure when the deterioration of water quality in the groundwater is admitted.)

- When the deterioration of water quality in the groundwater is admitted, there is a possibility of the outflow of seepage water outside the landfill site due to damages etc. of seepage control work at the final landfill site. Therefore, it is necessary to promptly conduct inspection and confirm whether the outflow of the seepage water exists.
- As a result, if abnormality is found, it is necessary to cease the landfill and to take measures such as investigation of the causes and function recovery arrangement.

(Content of the maintenance)

- Summary of the measurement of radiation amount regarding the maintenance of the final action, as well as the measurement of effluent water and groundwater shall be as shown in **Table 5-3**.

Table 5-3: Content of the maintenance

Item	Measurement Location	Measurement Item	Frequency	Measurement Method	Reference	Notes
Radiation quantity	Border line of lot (4 places)	Air dose rate	Once or more/7 days (once or more/month after the termination of landfill)	Measuring instrument for gamma ray measurement (height from the land surface is between 50cm to 1m)	Refer to Chapter 2, 2.4 Guidelines for Measurement of Radioactive Concentration	<ul style="list-style-type: none"> It is necessary to measure as background prior to the start of landfill. When landfill is ongoing, one remote place shall be measured as background.
Effluent water	Outlet port	The items in appended table 4 of Ordinance (except those in the lower column)	Once or more / year	The method determined by the Minister of the Environment		
		pH, BOD, COD, SS, N*	Once or more / month	The method determined by the Minister of the Environment		* This shall be applied when draining into the wetlands and the sea areas determined by the Minister of the Environment, as well as the public water areas which flow into the abovementioned.
		Radiocesium (¹³⁴ Cs, ¹³⁷ Cs)	Once or more / month	Germanium semiconductor detector	Refer to Chapter 5 of Guidelines for Measurement of Radioactive Concentration	<ul style="list-style-type: none"> If the average of three months exceeds one for the sum of the ratios for each concentration limit of cesium 134 and cesium 137, the measurement shall be conducted downstream below the point joining the public water area.
Groundwater	Two or more places in the periphery of the final landfill site	Groundwater inspection items Dioxins	Once or more / year	The method determined by the Minister of the Environment		
		Electric conductivity * and chloride ion	Once or more / month	The method determined by the Minister of the Environment		*Abbreviation is possible, if it is not appropriate as an index for the existence or non-existence of contamination in the groundwater.
		Radiocesium (¹³⁴ Cs, ¹³⁷ Cs)	Once or more / month	Germanium semiconductor detector	Refer to Chapter 6 of Guidelines for Measurement of	

					Radioactive Concentration	
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5.3.5 Recording and Retention

Ordinance, Article 26, paragraph (2), item (v)

Recording of the items listed in the following and drawing showing a position landfilled with specified waste (when landfilled with specified waste listed in from (a) to (c) of Article 23, paragraph (1), item (v), the drawing showing the position is included.) shall be created, and retained until such final landfill site is abolished.

- (a) Types of specified waste landfilled (if such specified waste includes any specified waste listed in from (a) to (c) of Article 23, paragraph (1), item (v), such fact shall be included) and its quantity,
- (b) The dates on which the landfill disposal of each specified waste landfilled is conducted,
- (c) Pertaining to the specified waste delivered, the names of the person in charge of delivering such specified waste and the person in charge of receiving the delivery of such specified waste, and in cases where transportation pertaining to such delivery is carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle, and
- (d) Measurement, inspection, examination and any other measures taken upon maintenance and management of final landfill site (including measurement pursuant to the provision under item (iv) of the preceding paragraph that shall be governed by the provision of item (1), water examination pursuant to the provision under (c) of the preceding item, and measures pursuant to the provision under (d) of the said item (limited to that pertaining to (a) and (b) of the said paragraph, item (iii))

[Purpose of Measures]

It is necessary to create recording determined by the Ordinance and to retain it to control the conditions of the landfill disposal of specified waste appropriately.

[Example of Measures]

- Recording in final landfill site is as shown in **Table 5-4**, and it is necessary to retain recording etc. until such final landfill site is abolished.

Table 5-4: Recording and retention in the case of the landfill disposal

	Item	Content	Storage Period
Drawing	Position diagram	Whole 2D diagram (including the position of landfill section), (landfill part) tectonic profile, etc.	Until final landfill site is abolished
Record of pertaining to the final disposal	Landfilled object	Type, quantity, acceptance date, the concentration of radioactive materials	
	Record of carrying in	Vehicle number used for carrying in, and the names of the person in charge of delivering and the person in charge of receiving	

Record on maintenance and management	Air dose rate	Form for recording the result of measurement	
	Final effluent water*		
	Groundwater		
Others	Measures	Record the contents and the results of measures, and the execution timing	

* Unnecessary in the case of final landfill site having a structure equivalent to final landfill site of isolated type

- It is effective in the maintenance and management of the facilities to record execution day and layer thickness of soil layer, impermeable soil layer, soil layer mingling clay and final cover soil as recording pertaining to the structure with respect to final landfill site having a structure equivalent to final landfill site of controlled type, and to record execution day and layer thickness etc. of cover with the effect of prevention of radiation damage as recording pertaining to the structure with respect to final landfill site having a structure equivalent to final landfill site of isolated type.

5.3.6 Measure at the time of finishing the day's landfill work

Ordinance, Article 26, paragraph (2), item (vi)

In the case of finishing the day's landfill work, comply with the followings.

- (a) Necessary measures such as covering the surface of specified waste with soils for prevention of radiation damage shall be taken.
- (b) In the case of taking measures as provided in the main text of item (ii) (d) or the said item (e) 2., necessary measures shall be taken, such as covering the surface with a seepage control sheet to prevent such specified waste from infiltration of rainwater until the impermeable soil layer is established on the surface of specified waste.

[Purpose of Measures]

- For prevention of radiation damage by landfill of the specified waste and from scatter of landfilling object, it is necessary to conduct daily cover etc. after finishing the daily landfill work.
- Also at the final landfill site having a structure equivalent to final landfill site of controlled type, it is necessary to take measures to prevent infiltration of rainwater until the impermeable soil layer is established on the surface of landfilling object.

[Example of Measures]

- It is effective to cover with a sheet having seepage control properties (such as seepage control sheet, waterproof sheet) as infiltration preventive measure of the rainwater.

5.3.7 Measures at the Time of finishing the landfill work

Ordinance, Article 26, paragraph (2), item (vii)

In the case of finishing the landfill disposal, comply with the following. (If landfill disposal is conducted

by laying off the landfill site, finishing the landfill disposal pertaining to such laying off is included.)

(a) The opening shall be closed with the cover of soils that is approximately fifty (50) centimeters or more in thickness, or by other cover which is similar to these, or other measures* determined by the Minister of the Environment shall be taken. Provided, however, at places where public water area and groundwater are cut off, it shall be closed with the cover with the necessary requirements determined by the Minister of the Environment, or other measures* determined by the Minister of the Environment shall be taken.

(b) When measures as provided in the main text of item (ii) (d) or said item (e) 2. are taken, necessary measures shall be taken to prevent outflow of such impermeable soil layer by infiltration of rainwater, such as providing a slope that can effectively drain away rainwater for a cover as provided in the main text of (a).

* Ministerial Notification No.16 of the Ministry of the Environment on of February 28, 2013

(Measures in the case of finishing the landfill disposal of specified waste whose total radioactive concentration is more than 100,000 becquerels per kilogram)

Article 1

With respect to Article 26, paragraph 1, item (vii) of Ordinance for Enforcement of the Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District - Off the Pacific Ocean Earthquake that Occurred on March 11, 2011 (hereinafter referred to as the “Ordinance”) measure determined by the Minister of the Environment shall be to close the opening by the cover with the necessary requirements listed in the following. (If landfill disposal is conducted by laying off the landfill site, it is limited to an opening pertaining to the section where the landfill disposal is finished. The same shall apply hereafter.)

- (i) Unconfined compression strength measured by Japanese Industrial Standard A 1108 (compressive strength testing method of the concrete) shall be more than 25 Newton per 1 square millimeter, and it shall be made with steel reinforced concrete having watertightness and also the thickness shall be 35 centimeters or more, or it shall have effect of the interception that is the same or more than it.
- (ii) It shall be safe enough from the point of view of structural strength for its own weight, earth pressure, water pressure, tidal power and seismic force etc.
- (iii) The surface where specified waste landfilled touches shall be fully covered with materials having effect of seepage control and effect of corrosion control.
- (iv) Efficient measures for corrosion control complying with property of surface water; groundwater and soils shall be taken.
- (v) It shall have the effect of radiation shield required for prevention of radiation damage. (Measures in the case of finishing the landfill disposal of specified waste whose total radioactive concentration is 100,000 becquerels per kilogram or less at places other than places where public water area and groundwater are cut off)

Article 2

Measures determined by the Minister of the Environment of the main text of Ordinance, Article 26, paragraph 2, item (vii), (a) shall be to close the opening by the cover with the necessary requirements listed in the following.

- (i) It shall be a soil that is approximately 50 centimeters or more in thickness, or other thing which is similar to this.
- (ii) It shall have the effect of radiation shield required for prevention of radiation damage.

Article 3

Measures determined by the Minister of the Environment of the main text of Ordinance, Article 26, paragraph (2), item (vii), (a) that shall be governed by the provision of Ordinance, Article 26, paragraph (3), item (i) and paragraph (4), item (i), shall be to close the opening by the cover with the necessary requirements listed in item (i) of the preceding article. (Measures in the case of finishing the landfill disposal of specified waste whose total radioactive concentration is 100,000 becquerels per kilogram or less at places where public water area and groundwater are cut off)

Article 4

Measures determined by the Minister of the Environment of exceptional clause under Ordinance, Article 26, paragraph (2), item (vii), (a), shall be to close the opening by the cover with the necessary requirements listed in each item of Article 1.

Article 5

Measures determined by the Minister of the Environment of exceptional clause under Ordinance, Article 26, paragraph (2), item (vii), (a) that shall be governed by the provision of Ordinance, Article 26, paragraph (3), item (i) and paragraph 4, item (i), shall be to close the opening by the cover with the necessary requirements listed in from item (i) to (iv) of Article 1.

[Purpose of Measures]

- It is required to take measures such as closing the opening by soil that is approximately 50 centimeters or more in thickness as measures at the time of finishing the landfill work.
- Also, it is necessary to prevent the outflow of the impermeable soil by providing a slope for a soil of surface layer and making surface water of rainfall time eliminate from the landfill section etc.

[Example of Measures]

(Rainwater elimination countermeasures)

- With respect to cover soil after finishing the landfill work, it is effective that the inclines shall be around 5% percent (even if they sink, around two 2% of inclines shall be secured) from the aspect of eliminating surface water.
- To prevent infiltration of the rainwater and to protect impermeable soil layer, it is effective to establish the discharging water zone by stones etc. between impermeable soil layer of the surface of the waste material layer and final cover soil. (**Figure 5 -15**)

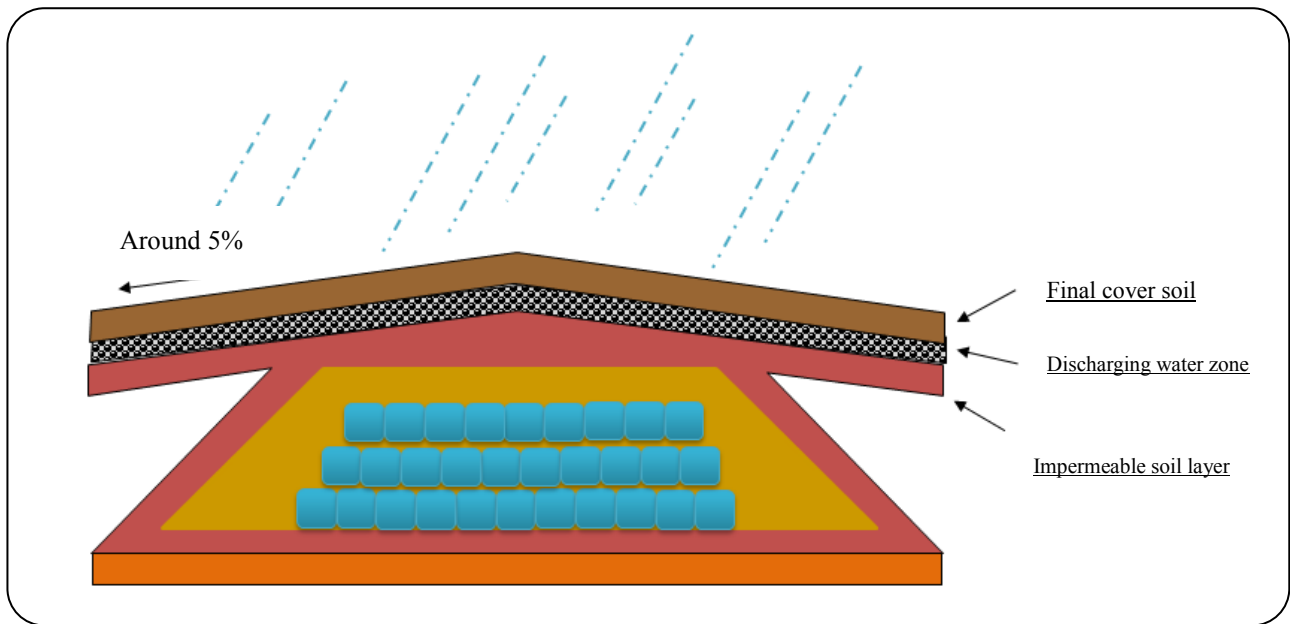


Figure 5 -15: Measures at the time of finishing the landfill work (1) (Example)

- If landfill disposal of the specified waste is conducted by occupying the widespread area in the disposal field, it is effective to establish the drainage pipe. **(Figure 5 -16)**

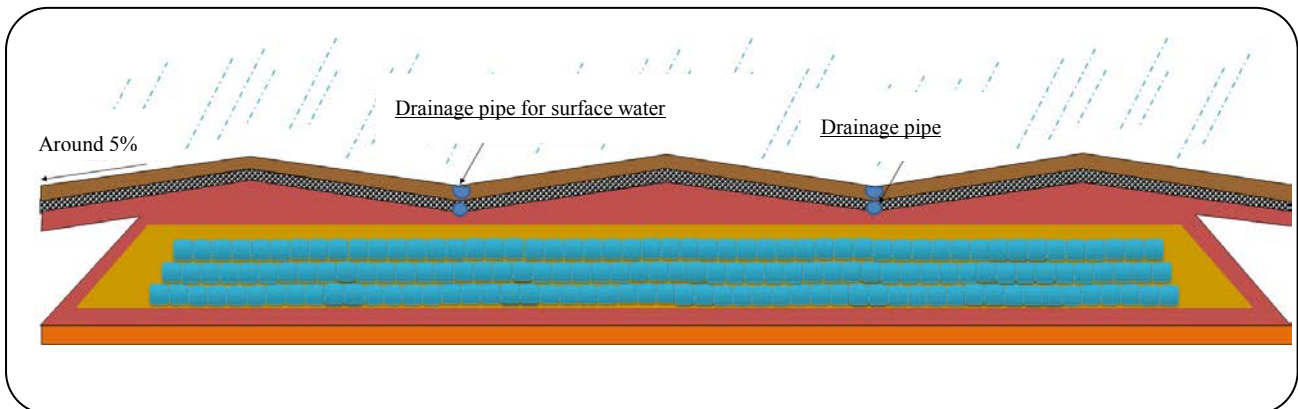


Figure 5-16: Measures at the time of finishing the landfill work (2) (Example)

5.4 Standards on Landfill Disposal for Standard Conformable Specified Waste

Ordinance, Article 26, paragraph (3)

The standards on landfill disposal for standard conformable specified waste (excluding standard conformable specified waste provided in parts other than parts mentioned in the following paragraph each item. The same shall apply hereinafter in this paragraph) shall be as follows.

[Purpose of Measures]

Standards for specified waste of 8,000 Bq/kg or less as standard conformable specified waste are established, which are different from standards on landfill disposal for specified waste of more than 8,000 Bq/kg. In addition, at the descriptions of Ordinance text in each item, “specified waste” shall be read and described as “standard conformable specified waste.”

5.4.1 Standards Regarding Landfill Disposal

Ordinance, Article 26, paragraph (3), item (i)

The provisions of paragraph (1), item (i) (excluding (d)), item (iii), item (iv) and item (viii) through item (x) and item (iv) (excluding the part related to (d) in the same item) and item (vii) (excluding (b)) in the preceding paragraph shall govern.

From Ordinance, Article 26, paragraph (1)

- (i) Landfill disposal shall be conducted as follows.
 - (a) It shall be ensured that standard conformable specified waste is not scattered or flowed out.
 - (b) Necessary measures shall be taken not to cause interference with living environmental conservation by foul odors, noises, or vibrations associated with landfill disposal.
 - (c) It shall be carried out at a location where enclosures are installed surrounding and the display is shown as a disposal location of specified waste.
 - (d) It shall be carried out not to disperse standard conformable specified waste at a certain location out of final landfill sites.
- (iii) Necessary measures listed in the followings shall be taken to prevent contamination of public water area and groundwater due to leachate from a location of landfill disposal (hereinafter referred to as “landfill site”).
 - (a) Water examination of the groundwater, which is collected from two or more locations where the existence or nonexistence of influence can be judged on water quality of the periclinal groundwater at the final landfill site due to leachate from landfill site, or which is exhausted from groundwater drainage system (It refers to solid and durable pipes and drains and other drainage systems which can effectively collect and drain groundwater. Hereinafter the same.) shall be conducted by the following.

1. Before the start of landfill disposal, the items listed in the upper column of Appended Table 3 (hereinafter referred to as “groundwater inspection items”), dioxins, radioactive materials discharged by the accident, electric conductivity, and chloride ions shall be measured and recorded by the methods determined by the Minister of the Environment. However, at a final landfill site where it is not appropriate to use the concentration of electric conductivity and chloride ion as index of the existence or nonexistence of the contamination of the periclinal groundwater at the final landfill site, this shall not apply to electric conductivity and chloride ions.
 2. After the start of landfill disposal, the items listed in the following a. through c. shall be measured and recorded by the methods determined by the Minister of the Environment in 1. at a frequency set forth in the said a. through c.. However, among the items listed in a. and b., this shall not apply to the items that clearly show no risks of the occurrence of contamination of the periclinal groundwater at the final landfill site, in light of types of specified waste to be landfilled and other circumstances.
 - a. Groundwater inspection items – Once or more a year (once or more every six months for the final landfill site as provided in the exceptional clause 1)
 - b. Dioxins – Once or more a year
 - c. Radioactive materials discharged by the accident – Once or more a month
 3. After the start of landfill disposal, electric conductivity or chloride ions shall be measured and recorded once or more a month by the methods determined by the Minister of the Environment in (1). However, this shall not apply at the final landfill site as provided in proviso (1).
 4. If abnormality is revealed in the concentration of electric conductivity or chloride ions measured pursuant to the provision of 3., groundwater inspection items and dioxins shall be promptly measured and recorded by the methods determined by the Minister of the Environment in 1..
- (b) As a result of water examination related to groundwater inspection items, dioxins and radioactive materials discharged by the accident, in accordance with the provisions of (a) 1., 2. or 4., if deterioration of the water quality (excluding those that clearly show that their causes are attributable to places other than the said final landfill site) is revealed, an investigation of such causes as well as necessary measures for the preservation of other living environments shall be carried out.
- (c) Other necessary measures
- (iv) At the border of lot at the final landfill site, the quantity of radiation shall be measured and recorded by the methods determined by the Minister of the Environment in Article 15, item (xi), once or more per seven days (once or more a month at the final landfill site where landfill disposal is finished.)
- (viii) It shall be ensured that no rodents grow and no mosquitos, flies or other harmful insects emerge at the landfill site.
- (ix) If facilities are established for landfill disposal of standard conformable specified waste,

necessary measures shall be taken not to cause interference with living environmental conservation.

- (x) Landfill disposal shall not be conducted for waste acid and waste alkali.

From Ordinance, Article 26, paragraph (2)

- (iv) Necessary measures listed in the following shall be taken to prevent contamination of public water area and groundwater due to leachate from landfill site.

- (a) Facilities listed in the following (excluding the facilities listed in 2., when standard conformable specified waste is landfilled at the landfill site where necessary measures are taken for the prevention of rainwater penetration)

1. The seepage control work that can prevent the seepage of retained water of standard conformable specified waste and rainwater etc. (hereinafter referred to as “retained water etc. ”) from landfill site (With regard to the landfill site where separation and landfill disposal will be conducted after laying off, it shall be the compartment where landfill disposal is being conducted. The same shall apply in 4.). (Among landfill sites, the opening for injection of standard conformable specified waste, as well as the location where retained water etc. drainage system as provided in 2. is installed, shall be excluded.)
2. Solid and durable structured pipes and drains and other drainage systems that can effectively collect retained water etc. (hereinafter referred to as “retained water etc. drainage system”)
3. Leachate processing equipment that can properly maintain the water quality of the effluent water related to the retained water etc. collected by retained water etc. drainage system
4. The pipes and drains and other facilities that can prevent the flow of surface water from the opening of landfill site into landfill site

- (b) Water quality of effluent water shall be maintained as follows.

1. For every item listed in the upper column of Appended Table 4, water quality of the effluent water shall be adopted to the maximum permissible limit of dioxins as provided in standards listed in the lower column of the said Table and the lower column of appended table 2 in the Ordinance for Enforcement of the Act on Special Measures Concerning Dioxins (Ordinance of the Prime Minister’s Office No. 67 of 1999).
2. By monitoring the concentration of radioactive materials discharged by the accident in effluent water at a drain port, it shall be ensured that the sum of the ratios of the three month average concentration for respective radioactive materials discharged by the accident listed in the 1st column of appended table 2 in the water at public water area in the neighborhood of the final landfill site, to the ratio of the concentration listed in the 3rd column regarding radioactive materials discharged by the accident, will not exceed one.

- (c) Water examination of the effluent water shall be conducted as follows.

1. The items listed in the upper column of appended table 4 (excluding the items as provided

<p>in 3.) and dioxins shall be measured and recorded once or more a year by the methods determined by the Minister of the Environment.</p> <p>2. Radioactive materials discharged by the accident shall be measured and recorded once or more a month by the methods determined by the Minister of the Environment.</p> <p>3. Hydrogen-ion concentration, biochemical oxygen demand, chemical oxygen demand, float mass and nitrogen content (only if it is provided in notes 4 of appended table 4) shall be measured and recorded once or more a month by the methods determined by the Minister of the Environment. (Once or more a year for the items that clearly show no risks of the occurrence of contamination of the public water area and groundwater, in light of types of specified waste to be landfilled and water quality of the retained water etc.)</p> <p>(vii) When landfill is terminated (If landfill disposal will be conducted after separating landfill site, termination of the landfill disposal regarding such compartment is included.)</p> <p>(a) The opening shall be closed by the cover with soil with thickness of about 50 cm or more or other cover that is similar to the above, and other measures determined by the Minister of the Environment shall be taken.</p>

[Purpose of Measures]

Standards are stipulated for standard conformable specified waste as is the case with landfilling specified waste, and standards are stipulated Measures taken at the time of landfill disposal (5.3.1 (1)), Water examination of groundwater (5.3.4 (4)), Measurement of amount of radiation at the boundary of the premises (5.3.1 (2)), Prevention of emergence of harmful insects (5.3.1 (3)), Conservation of the living environment pertaining to establishment of facilities (5.3.1 (4)), Prohibitions on landfill of waste acid and waste alkali (5.3.1 (5)), and Installation of facilities such as seepage control work as well as maintenance and measurement of water quality of the effluent water (5.3.4 (1) to (3)), Measures at the time of the landfill disposal termination (5.3.7), as well as when landfilling standard conformable specified waste, as is the case when landfilling specified waste other than standard conformable specified waste in the case of landfilling.

5.4.2 Preprocessing Appropriate for Types of Specified Waste Regarding Landfill Disposal

<p>Ordinance, Article 26, paragraph (3), item (ii)</p> <p>When conducting landfill disposal of standard conformable specified waste listed in the following (a) and (b), measures set forth in such (a) and (b) shall be taken in advance.</p> <p>(a) It shall be incinerated by using sludge incineration facilities, or shall have the water content level of 85% or less.</p> <p>(b) Measures as provided in (c) through (g), paragraph 1, item (ii) shall be taken for the specified waste listed in such (c) through (g) (limited to those that are standard conformable specified waste).</p> <p>From Article 26, paragraph (1), item (ii)</p>
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- (c) Rubber waste It shall be crushed or cut into the greatest dimension of about 15 cm or less, or shall be incinerated by using incineration facilities.
- (d) Standard conformable specified soot and dust or burnt residue Necessary measures shall be taken not to disperse it into the atmosphere by adding water, solidifying, and packing, etc.
- (e) Standard conformable specified waste asbestos, etc. It shall be doubly packed with water resistant materials so that it will not be dispersed into the atmosphere, after solidification, stabilization by medicament, and other measures equivalent to these.
- (f) Standard conformable specified soot and dust or burnt residue Necessary measures shall be taken not to disperse it into the atmosphere by adding water, solidifying, and packing, etc.
- (g) Standard conformable specified waste asbestos, etc. It shall be doubly packed with water resistant materials so that it will not be dispersed into the atmosphere, after solidification, stabilization by medicament, and other measures equivalent to these.

[Purpose of Measures]

When landfilling standard conformable specified waste, measures equivalent to landfill disposal standard of Waste Management Act shall be taken in advance for every type of standard conformable specified waste.

5.4.3 Lower Soil Layer, Stratified Landfill, Landfill Disposal of Specified Soot and Dust

Ordinance, Article 26, paragraph (3), item (iii)

Landfill disposal of standard conformable specified waste other than the areas blocked from public water area and groundwater as follows.

(1) Laying Lower Layer of Soil

Ordinance, Article 26, paragraph (3), item (iii)

- (a) Comply with the examples of provision in previous paragraph item (ii) (a)

Ordinance, Article 26, paragraph (2), item (ii)

- (a) Landfill shall be conducted in areas where soil layer thickness is more than around 50cm (thickness of total thickness in case two layers of soil have been laid)

[Purpose of Measures]

Since radioactive cesium is easily absorbed in soil, it is necessary to lay a soil layer of more than about 50cm under standard conformable waste landfill to prevent outflow of radioactive cesium around the landfilled layer.

[Example of Measures]

Refer to 5.3.2(1) Laying of the Lower Layer of Soil.

(2) Stratified Landfill

Ordinance, Article 26, paragraph (3), item (iii)

(b) Thickness of standard conformable specified waste landfill layer shall be under about 3 m and each surface of the layer shall be covered with about 50 cm of soil.

[Purpose of Measures]

When conducting landfill disposal of standard conformable specified waste, regardless of the nature of the waste, the layer of the waste shall be less than 3 m thick and each layer shall be covered with about 50cm of soil to prevent the movement of eluted radioactive cesium.

[Example of Measures]

- To make sure that radioactive cesium is absorbed and fixed to the soil, the surface of waste shall be covered with soil at regular intervals. Standard disposal regulations for stratified landfill by sand for domestic waste (excluding those incinerated and ignition loss of under 15%) and perishable industrial waste (excluding those incinerated and ignition loss of under 15% and solidified with concrete) have already been set under the Waste Management Act. It is important to use soil for standard conformable the specified waste when stratified landfill method is used.
- Also, coverage with soil is effective for blocking radioactive rays and preventing scattering of radioactive materials.
- It is thought that the width of soil layer covering waste and the width of the lower layer of soil underlying waste should be extended more than 3m from the edge of landfilled (waste) layers (set up in a way that will not cause effusion of lateral soil by other waste landfills) to improve the stability of landfilled layer and prevent the penetration of water from the side as well as leak of radioactive cesium in case it was eluted. **(Figure 5-17)**
- The type of soil shall be the same as those for lower soil layers which is of fine fraction content between 5% and 15% etc.
- At the end of daily landfill work, an effective and appropriate action is to cover the surface with impermeable sheets or daily earth cover to prevent releasing of waste and penetration of rain water.

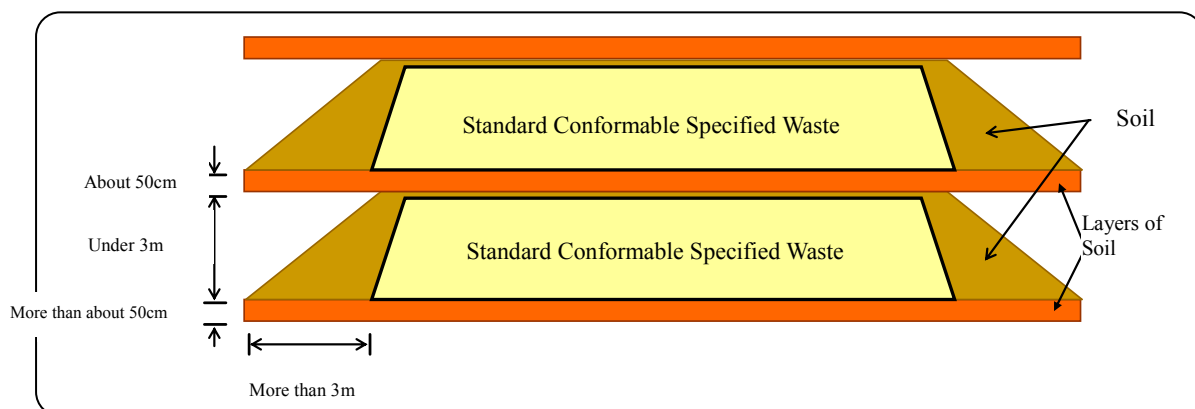


Figure 5-17: Image Figure of Soil Layers and Stratified Landfill

(3) Landfill Disposal of Specified Soot and Dust

Ordinance, Article 26, paragraph (3), item (iii)

(c) When conducting landfill disposal of specified soot and dust (only those in category of standard conformable specified waste), necessary measures shall be taken to prevent penetration of rain water into the specified soot and dust.

[Purpose of Measures]

Some soot and dust have a high elution ratio of radioactive cesium. When conducting landfill disposal of dust and soot that is standard conformable specified waste, it is necessary to take measures to prevent penetration of rain water to avoid leakage of radioactive cesium caused by contact with rain water.

[Example of Measures]

As measures to prevent the penetration of rain-water, one effective method is to cover the surface of landfilled soot and dust with an impermeable layer (impermeable layers* such as clayish soil layer with low impermeability or seepage control sheets.)

(Measures to take during landfill disposal process)

- An effective measure is to cover the surface with impermeable sheets etc. to prevent penetration of rain water when rain is expected.

(Measures to take after landfill disposal of soot and dust)

- It is necessary to cover the surface of the landfilled area with impermeable layers* such as seepage control sheets or clayish soil etc. to prevent permeating rain water upon the completion of landfill disposal of soot and dust.
- Also, to prevent water permeating from the side, the width of the impermeable layer shall be extended more than 3 m from the edge of the layer of landfilled disposal of soot and dust.
- If no more waste will be landfilled on top of impermeable layer, an effective approach is to create a slope with about 5% gradient (to secure at least 2% gradient in case of sinkage) with soil to let the rain-water on the surface flow outside the landfill disposal areas. **(Figure 5-18)**
- When another layer of waste other than dust and soot is landfilled on top of an impermeable layer, an effective approach is to create a slope with about 5% gradient (to secure at least 2% gradient in case of sinkage) with soil on the waste layer to let the rain-water on the surface flow outside the landfill disposal areas. **(Figure 5-19)**

*Impermeable Layer

Clayish soil layer made with bentonite mixture soil or seepage control sheets made with synthetic resin/bentonite or watertight asphalt can be used as impermeable layers on completion of landfill disposal of dust and soot.

If bentonite mixture soil is used for the clayish soil layer, it shall be constructed by either managing bentonite content or by sufficiently compacting bentonite so that permeability coefficient shall be around 10^{-6} cm/s.

Also, when laying seepage control sheets of synthetic resin, measures to protect sheets from damage

caused by projecting objects or heavy machinery shall be taken by laying a protection mat such as nonwoven material or laying soil. It is also necessary to take particular care around the adjoining area of each sheet (cohesion etc.).

(Others)

- Landfill is most effective in areas where water does not accumulate, using the cell method followed by daily covering of earth.

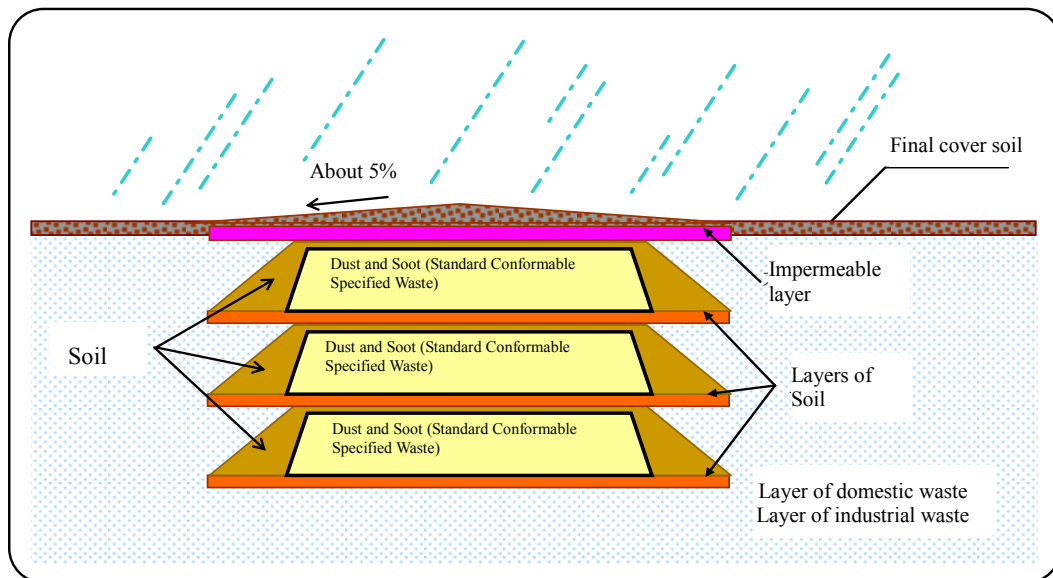


Figure 5-18: Image of measures to take upon completion of landfill (1)

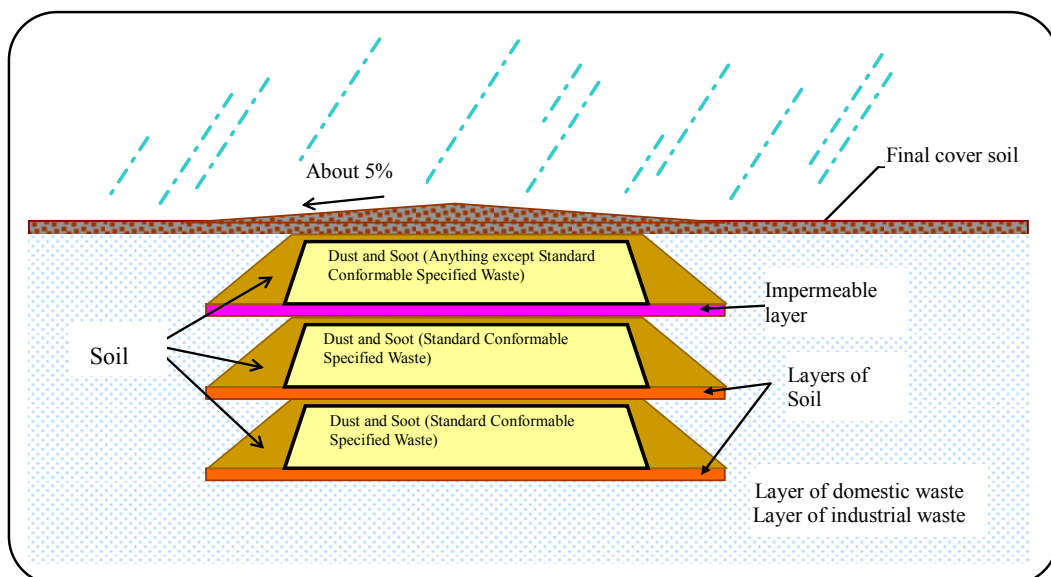


Figure 5-19: Image of measures to take upon completion of landfill (2)

<Other elements to note>

It is important to take the same measures for the waste other than dust and soot if radioactive cesium is easily eluted with the waste.

5.4.4 Recording and Retention

Ordinance, Article 26, paragraph (3), item (iv)

Recording of items listed in the the following and a drawing that shows the location of the landfill disposal of standard conformable specified waste (if in case specified waste described under Article 23, paragraph (1), item (v), (a) to (c) (only limited to standard conformable specified waste) was landfilled, include a drawing that shows the location) shall be prepared and retained until the abolition of the final landfill site.

- (a) Types of standard conformable specified waste that was landfilled (if it includes specified waste described under Article 23, paragraph (1), item (v), (a) to (c) (only limited to standard conformable specified waste), such fact shall be included) and its quantity;
- (b) The dates on which each standard conformable specified waste was landfilled;
- (c) Pertaining to the standard conformable specified waste delivered, the names of the person who delivered such standard conformable specified waste and the person who received the delivery of such standard conformable specified waste, and in cases where transportation pertaining to such delivery was carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle; and
- (d) Measurement, inspection, examination and any other measures taken upon maintenance and management of such final landfill site (including water examination prescribed under paragraph (1), item (iii), (a) and item (iv), (c) of the preceding paragraph, that shall be governed by the provision of the item (i), measures prescribed under paragraph (1), item (iii) that shall be governed by the provision of item (i) and measurements prescribed under item (iv) in the same paragraph that shall be governed by the item (i).

[Purpose of Measures]

It is necessary to create a record set out by the Ordinance and retain it to appropriately manage the status of landfill disposals of standard conformable specified waste.

[Example of Measures]

The record in final landfill sites with similar configuration to those of controlled final landfill sites is described in **Table 5-5** in detail. The record etc. will have to be kept until the final landfill sites are closed.

Table 5-5: Recording and Retention of Landfill Disposal (in case of standard conformable specified waste)

	Item	Contents	Period of retention
Drawing	Position diagram	Whole 2D diagram (including location of the landfill site), (landfill part) tectonic profile etc.	Until final landfill site is abolished
Record of pertaining to the final disposal	Landfilled waste	Type, quantity, dates of acceptance, the concentration of radioactive materials	
		Vehicle number used for carrying in, and the	

	Record of carrying in	names of the person in charge of delivering and the person in charge of receiving	
Record on maintenance and management	Air dose rate	Form for recording the result of measurement	
	Final effluent water		
	Groundwater		
Others	Measures	Record the contents and the results of measures, and the execution timing	

- For final landfill sites of comparable structure to controlled final landfill sites, it is useful to record information related to the structure such as soil layer, date of last earth cover, and thickness of layer for maintenance and management of the site.

5.5 Standard Rules for Landfill Disposal of Standard Conformable Specified Waste on Landfill Site

Comparable to Stabilized Final Landfill Site

Ordinance, Article 26, paragraph (4)

The following are standard rules for landfill disposal of standard conformable specified waste (only limited to items which meet the requirements* set out by the Minister of the Environment as those that will not cause any contamination of a public water area and groundwater. The same shall apply hereinafter in this paragraph).

* Ministerial Notification No. 169 of the Ministry of the Environment on December 25, 2012

Requirements set by the Minister of Environment shall apply to any of the following items.

- (i) Standard conformable specified waste falling into any of the below categories.
 - (a) Plastic waste
 - (b) Waste rubber
 - (c) Metal scraps
 - (d) Waste glass and ceramics (excluding waste gypsum *board*)
 - (e) Fragments of concrete or similar waste
- (ii) Standard conformable specified waste shall be separated at source so that any of the following materials is either incorporated or attached, as well as during the time of collection, transport, storage and disposal.
 - (a) Materials that are listed in the bottom column of the appended table 5 from the Order for Enforcement of the Waste Management and Public Cleansing Act (Cabinet Order No. 300 of 1971)
 - (b) Organic substances
 - (c) Asbestos blown materials or those containing asbestos (only limited to the followings) or asbestos removed from these materials.
 - (1) Asbestos lagging materials
 - (2) Diatomite lagging materials
 - (3) Perlite lagging materials

- (4) Lagging materials, insulating materials and fire-resistant coating materials which may pose a risk of scattering asbestos of either equaling or surpassing level compared to the materials described in (1)-(3) due to human contact, airflow and vibration.

(iii) The test liquid of standard conformable specified waste that shall be prepared following the method pursuant to the provision of Japanese Industrial Standards K005811, shall not detect cesium 134 and Cesium 137 as a result of measuring by using germanium semiconductor detector.

[Purpose of Measures]

Standards are specified of materials that will not cause contamination in a public water area and groundwater of standard conformable specified waste (applied to under 8,000Bq/kg) to be landfilled in the landfill site with a structure comparable to stabilized final landfill site

5.5.1 Standards for Landfill Disposal

Ordinance, Article 26, paragraph (4), item (i)

The provisions of paragraph (1), item (i) (excluding (d)), item (ii), item (iv), item (viii) through item (x) and paragraph (2), item (vii) (excluding (b)) shall govern.

Ordinance, Article 26, paragraph (1)

(i) Landfill disposal shall be conducted as follows:

- (a) Ensure that standard conformable specified wastes shall not be scattered or subject to an outflow.
 - (b) Necessary measures shall be taken so that the conservation of the living environment will not be impaired by any foul odors, noise, or vibration accompanying the landfill disposal.
 - (c) An enclosure shall be set up around the site with a sign indicating that it is a disposal site of standard conformable specified waste.
 - (e) Standard conformable specified waste shall not be scattered and shall only be disposed of at the fixed area in the final landfill site.
- (ii) In case of landfill disposal of standard conformable specified waste listed as (a) through (h), measures ordained by (a) through (g) shall be taken in advance.
- (a) Organic sludge – Incinerate by incineration system or use concrete solidification after reducing water content to under 85%.
 - (b) Sludge (excluding organic sludge) – Incinerate by incineration system or reduce moisture content to under 85%.
 - (c) Standard conformable specified waste (excluding organic sludge) that is either perished or perishable, or oil waste (except for tar pitch type). Incinerate by incineration system.
 - (d) Types of plastic waste (excluding asbestos-containing specified waste) – to ensure no hollow spaces inside, break or cut into pieces with a maximum diameter of under about 15cm or incinerate by incineration system.
 - (e) Rubber waste - Break or cut into pieces with a maximum diameter of under about 15cm or

incinerate by incineration system.

- (f) Specified soot and dust and combustion residue – Take necessary measures such as packing up after solidification so that it is not scattered in the air.
- (g) Specified Waste Asbestos – After taking measures such as solidification or stabilization with chemicals etc. to prevent scattering in the air or similar, double pack with waterproof materials.
- (iv) Measure emission of radioactive rays and record them once every 7 days (once a month at the final landfill site where the landfill disposal has completed) at the border of the site of final landfill site by measures set out in Article 15, item (xi) by the Minister of the Environment.
- (viii) It shall be ensured that neither will any rodents live nor will any mosquitoes, flies, or any other insect pests break out at the landfill site.
- (ix) Necessary measures shall be taken so that the conservation of the living environment will not be impaired when setting up the site for landfill disposal of standard conformable specified waste.
- (x) Waste acid and waste alkali shall not be processed through landfill disposal.

Ordinance, Article 26, paragraph (2)

- (vii) Upon completion of landfill disposal (including the section where landfill disposal took place in case of section landfill site).
 - (a) Opening section shall be sealed by covering soil with the thickness of more than about 50 cm or similar coverage or any measures set by the Minister of the Environment.

[Purpose of Measures]

With regard to standard conformable specified waste (limited to under 8,000Bq/kg) that will not cause any contamination on a public water area and groundwater, it is necessary to take the same measures of landfill disposal of specified waste other than standard conformable specified waste (that will not cause any contamination on a public water area and groundwater) such as Measures taken at the time of landfill disposal (5.3.1(1)), measures to be taken in advance of landfill disposal (pretreatment in accordance with the waste type in 5.3.2(6)), Measurement of amount of radiation at the boundary of the premises (5.3.1(2)), Prevention of emergence of harmful insects (5.3.1(3)), conservation of the living environment pertaining to establishment of facilities (5.3.1(4)), prohibition of landfill disposal of waste acid and waste alkali (5.3.1(5)), and Measures at the time of the landfill termination (5.3.7) .

5.5.2 Water Quality Inspection of Groundwater and Percolating Water etc.

Ordinance, Article 26, paragraph (4), item (ii)

Measures that are necessary to prevent contamination of public water area and groundwater by percolating water (defined as rain water etc. that has passed through layers of standard conformable specified waste. The same shall apply hereinafter in this item) shall be taken as follows. However, this is not

the case in case the measures described in paragraph (2), item (iv), (a) through (d) (in case of landfill disposal of standard conformable specified waste in the area that is detached from public water area and groundwater, measures described in the same item (d)) are taken.

- (a) Water quality inspection of ground water taken from more than two places from which it could be assessed whether or not there is an impact on ground water quality around the final landfill site from percolating water shall be conducted as follows.
 - 1. Take measurements of groundwater inspection samples and radioactive materials discharged by the accident prior to the start of landfill disposal by methods* set out by the Minister of the Environment and record them.
 - 2. Upon start of landfill disposal, take measurements of the items described in following a. and b. by methods set out by the Minister of the Environment in 1. at the frequency described in a. and b. and record them. However, this is not the case if no risk of contamination of groundwater around the final landfill site is assessed in light of quality of percolating water with regard to the items described in a.
 - a. Groundwater quality inspection samples – more than once per year
 - b. Radioactive material discharged by the accident – more than once a month
- (b) In cases where deterioration of water quality (excluding cases that it is clear where it was caused by anything outside the final landfill site) is recognized as a result of the water quality inspection set out in (a), necessary measures shall be taken to investigate the cause and other measures to conserve living environment.
- (c) Water quality inspection of percolating water that was collected through the equipment that can collect percolating water for water quality inspection from landfill site on following 1. through 3. items shall take place at the frequency described in following 1. through 3. by methods* set out by the Minister of the Environment and be recorded.
 - 1. Groundwater quality inspection samples – more than once per year
 - 2. Radioactive material discharged by the accident – more than once a month
 - 3. Biochemical oxygen demand or chemical oxygen demand – once a month (once in three months at landfill sites where landfill is completed).
- (d) In case of the following, terminate transfer of standard conformable specified waste to final landfill site as well as landfill disposal at once and take necessary measures to investigate the cause and other measures to conserve living environment.
 - 1. The percolating water does not comply with any of the standards of the groundwater quality inspection items described in the lower column of appended table 3 as a result of groundwater quality inspection concerning the groundwater quality inspection items.
 - 2. Deterioration of water quality (excluding cases that it is clear that it was caused by anything outside the final landfill site) was detected as a result of water quality inspection concerning radioactive materials derived from the accident.
 - 3. When the biochemical oxygen demand of the percolating water is above 20 mg /L or chemical oxygen demand of the percolating water is above 40 mg/L in the results of water quality inspection concerning biochemical oxygen demand or chemical oxygen demand.

(e) Other necessary measures

* Ministerial Notification No.130 of the Ministry of the Environment on 28th August 2012

- Groundwater quality inspection samples Ministerial notification No. 10 of the Ministry of Environment on March, 1997 (notification on environmental standard concerning water contamination of groundwater). Methods described in columns of inspection methods according to each column of items in the separate table.
- Radioactive materials discharged by the accident Inspection method using germanium semiconductor detector
- Biochemical oxygen demand Ministerial notification No. 59 of the Ministry of the Environment on December, 1971 (notification of environmental standards for water contamination. “notification of environmental standard on water quality” hereafter. Methods described in columns of inspection methods of the biochemical oxygen demand in appended table 2-1, (1).
- Chemical oxygen demand Methods described in columns of inspection methods for chemical oxygen demand in notification of environmental standards on water quality, appended table 2-1, (2).

[Purpose of Measures]

- In case landfill disposal took place in a landfill site with a comparable structure to a stabilized final landfill site, inspection of groundwater and percolating water around the final landfill site shall be conducted. In case of any unusual result, it is necessary to take measures to prevent contamination of a public water area and groundwater.
- Items and frequency of water quality inspection of groundwater and percolating water around the final landfill site are shown in **Table 5-6**.

Table 5-6: Water quality inspection and maintenance

Items	Place of inspection	Items for inspection	Frequency	Methods	Reference	Note
Groundwater	More than two locations from the border of final landfill site	Groundwater inspection items	More than once a year	Methods set out by the Minister of the Environment		Inspection is necessary before landfill starts
		Radioactive cesium (^{134}Cs , ^{137}Cs)	More than once a month		“Part VI: Guidelines for Method of Measurement of Radioactive Concentration”	
Percolating Water	Percolating water collection equipment	Groundwater inspection items	More than once a year	Methods set out by the Minister of		

				the Environment		
		Radioactive cesium (^{134}Cs , ^{137}Cs)	More than once a month		“Part VI: Guidelines for Method of Measurement of Radioactive Concentration”	
		BOD or COD	More than once a month	Methods set out by the Minister of the Environment		- More than once in 3 months upon completion of landfill - BOD below 20 mg/L, COD below 40 mg/L

5.5.3 Recording and Retention

Ordinance, Article 26, paragraph (4), item (iii)

Prepare records on the following items as well as drawings that show the locations where standard conformable specified waste was landfilled (including drawings with locations where specified waste (limited to standard conformable waste) described in Article 23, paragraph (1), item (v), (a) through (c) was landfilled if this was the case) and keep them until the abolition of the final landfill site.

- (a) Kinds of standard conformable specified waste disposed in landfill (including those in case it includes specified waste (limited to standard conformable specified waste) that is described in Article 23, paragraph (1), item (v), (a) through (c)) and quantity
- (b) The dates of landfill disposal of each standard conformable specified waste
- (c) Pertaining to the standard conformable specified waste delivered, the names of the person who delivered such standard conformable specified waste and the person who received the delivery of such standard conformable specified waste, and in cases where transportation pertaining to such delivery was carried out using a transportation vehicle, the vehicle identification number or vehicle number of such transportation vehicle
- (d) Any measures taken as well as measurement, inspection and test conducted for maintenance of final landfill site (including measurement prescribed under paragraph (1), item (iv) that shall be governed by provision of item (i), water quality inspection prescribed under (a) and (c) of the preceding item and measures prescribed under (b) and (d) of the same item (in case of prescribed in the exceptional clause of item (ii), water quality inspection prescribed in paragraph (2), item (iv) (c) that shall be conducted by the provision of exceptional clause of the same item and measures prescribed in (d) of the same item (only limited to those related to paragraph (1), item (iii), (a) and (b)).

[Purpose of Measures]

It is necessary to prepare records and retain them to appropriately maintain the landfill condition of standard conformable specified waste (those that will not cause contamination in a public water area and groundwater).

[Example of Measures]

- Details for record of final landfill site are shown in **Table 5-7**. The retention period of the records is until the abolition of the final landfill site.

Table 5-7 Recording and retention for waste disposal
(In case of standard conformable specified waste that will not cause contamination in public water area and groundwater)

	Item	Content	Storage Period
Drawing	Position diagram	Whole 2D diagram (including the position of landfill section), (landfill part) tectonic profile, etc.	Until final landfill site is abolished
Record of pertaining to the final disposal	Landfilled object	Type, quantity, acceptance date, the concentration of radioactive materials	
	Record of carrying in	Vehicle number used for carrying in, and the names of the person in charge of delivering and the person in charge of receiving	
Record on maintenance and management	Air dose rate	Form for recording the result of measurement	
	Final effluent water*		
	Groundwater		
Others	Measures	Record the contents and the results of measures, and the execution timing	

- Recording the dates of last earth cover and its thickness is effective for maintenance relating to a final landfill site that is comparable to stabilized final landfill site.

5.6 Prohibition of Ocean Dumping

Ordinance, Article 26, paragraph (5)

Standards ocean dumping of specified waste prohibits ocean dumping of specified waste.

[Purpose of Measures]

As it is prohibited to dispose waste by ocean dumping Ordinance for enforcement for Waste management law, Article 3, paragraph (4), Article 6, paragraph (2), item (v), Article 6 (5), paragraph (1), item (iv), it is prohibited to dispose specified waste by ocean dumping.

Safety Management of Workers

6.1 In Case of Specified Waste (Excluding Standard Conformable Specified Waste)

[Example of Measures]

- Concerning the prevention of scattering and outflow of specified waste, the Ordinance on Prevention of Ionizing Radiation Hazards, Ministry of Labour Ordinance No. 41 of September 30, 1972, Ordinance on prevention of ionizing radiation hazards concerning works of decontaminating soil contaminated by radioactive materials due to Great East Japan Earthquake, Ministry of Health, Labour and Welfare No. 152 of December 22, 2011, and Guidelines for prevention of radiation hazards for workers engaged in works such as decontamination etc., Ministry of Health, Labour and Welfare, December 22, 2011 shall be complied with to prevent radiation damage to workers engaged in storing work etc.

<Outline>

- Basic principal: Keep workers' exposure to ionizing radiation to a minimum
- Assuming work involves specified waste that contains radiodensity of radioactive cesium of more than 10,000 Bq/kg
- Setting up of a controlled area (in case effective dose could exceed 2.5μSv/h based on Ordinance on Prevention of Ionizing Radiation Hazards)
- Limit of workers' exposure to radiation dose
- Measurement of radiation dose
- Prevention of contamination etc.

6.2 In Case of Standard Conformable Specified Waste

[Example of Measures]

- Concerning prevention of scattering and outflow of standard conformable specified waste, Ordinance on prevention of ionizing radiation hazards concerning works of decontaminating soil contaminated by radioactive materials due to Great East Japan Earthquake, Ministry of Health, Labour and Welfare No. 152 of December 22, 2011, and Guidelines for prevention of radiation hazards of works engaged in works such as decontamination etc., Ministry of Health, Labour and Welfare, December 22, 2011 shall be referred to prevent radiation damage to workers engaged in storing work.

<Outline>

- Basic principal: Keep workers' exposure to ionizing radiation to a minimum
- Limit of workers' exposure to radiation dose
- Measurement of radiation dose
- Prevention of contamination (controlling effusion of dust, usage of containers etc.) etc.

Chapter 7 Prohibitions and Penal Provisions

7.1 Prohibition on the Dumping of Contaminated Waste, etc.

(Prohibition on the Dumping of Contaminated Waste, etc.)

Act, Article 46

No person shall unnecessarily dump specified waste, etc.

Act, Article 60, paragraph (1), item (i)

A person who dumps specified waste, in breach of the provision of Article 46 shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

[Purpose of Measures]

A person who dumps legitimate specified waste shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

7.2 Prohibition of the Incineration of Specified Waste

(Prohibition of the Incineration of Specified Waste)

Act, Article 47

No person shall incinerate specified waste. However, this shall not apply to the incineration of specified waste carried out in accordance with the standards set forth in the Ordinance of the Ministry of the Environment referred to in Article 20 by, the national government, a person or entity entrusted with such incineration by the national government, or any other person, or entity as provided for in the relevant Ordinance of the Ministry of the Environment.

Act, Article 60, paragraph (1), item (ii)

A person who incinerates specified waste in breach of the provision of Article 47 shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

[Purpose of Measures]

It is prohibited for anyone to incinerate specified waste other than the national government, a person entrusted with such incineration by the national government, or any other person as provided for in the Ordinance, Article 61. A person who incinerated specified waste in breach of this shall be punished by imprisonment not more than five (5) years or fined not more than 10 million yen or both.

7.3 Prohibition on the Treatment of Contaminated Waste, etc., on a Commercial Basis

(Prohibition on the Treatment of Contaminated Waste, etc., on a Commercial Basis)

Act, Article 48, paragraph (1)

No person other than the national government, a person or entity entrusted with the collection, transfer, storage, or disposal of specified waste by the national government, or any other person or entity as provided for in the Ordinance of the Ministry of the Environment shall engage in the collection, transfer, storage or disposal of specified waste on a commercial basis.

Act, Article 60, paragraph (1), item (iii)

A person who conducted collection, transportation, storage, or disposal of specified waste on a commercial basis in breach of the provision in the Article 48, paragraph (1) shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

[Purpose of Measures]

No person other than the national government, a person or entity entrusted with the collection, transfer, storage or disposal of specified waste by the national government, or any other person or entity as provided for in the Ordinance, Article 62 shall engage in the collection, transfer, storage or disposal of specified waste on a commercial basis. Any person who conducted collection, transportation, storage or disposal of specified waste on a commercial basis in breach of this shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

7.4 Orders Relating to Storage etc., Not in Accordance with the Relevant Standards

(Orders for action)

Act, Article 51

The Minister of the Environment may, when designated waste has not been stored in accordance with the standards provided for in the Ordinance of the Ministry of the Environment, Article 17, paragraph (2) (including the case this will apply correspondingly with Article 18, paragraph (5)) and it is determined to be necessary to ensure proper storage of the designated waste, order the person or entity that has executed the storage, within the limits necessary, to take measures for the proper storage of the designated waste or any other necessary measures, specifying a time limit for compliance.

(2) The Minister of the Environment may, when specified waste has not been collected, transferred, stored, and disposed in accordance with the standards provided for in the Ordinance of the Ministry of the Environment, Article 20 and it is determined to be necessary to ensure proper treatment of the specified waste, order the person or entity (excluding the national government that conducted the collection, transfer, storage, and disposal in accordance with the standards provided for in the Article

15 and the Article 19) that has executed the collection, transfer, storage, and disposal, within the limits necessary, to change the methods of collection, transfer, storage, and disposal of the specified waste, or to take measures for the proper conduct or any other necessary measures, specifying a time limit for compliance.

(3) – (6) Omitted

Act, Article 60, paragraph (1), item (v)

A person who breached these orders shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.

[Purpose of Measures]

The Minister of the Environment may, when specified waste has not been stored in accordance with the standards provided, order the person or entity that has executed the storage, within the limits necessary, to take measures for the proper storage of the specified waste or any other necessary measures. A person who stored specified waste in breach of these orders shall be punished by imprisonment not more than five (5) years or fined not more than ¥10 million or both.