

▶ II-ii Landfill operation plan

For every fiscal year, the plan stipulates the receiving cell, receiving layer, receiving period etc., for each type of waste received. Each cell is filled with alternating layers of waste and covering soil, referred to as the Sandwich Method.

Heavy machinery used for landfilling of waste

Type	Application	Quantity
Bulldozer	Leveling the area for incombustible/bulky waste and other operations	2
Backhoe	Leveling the received waste (of which there are six types, including incinerated ash) and other operations	6

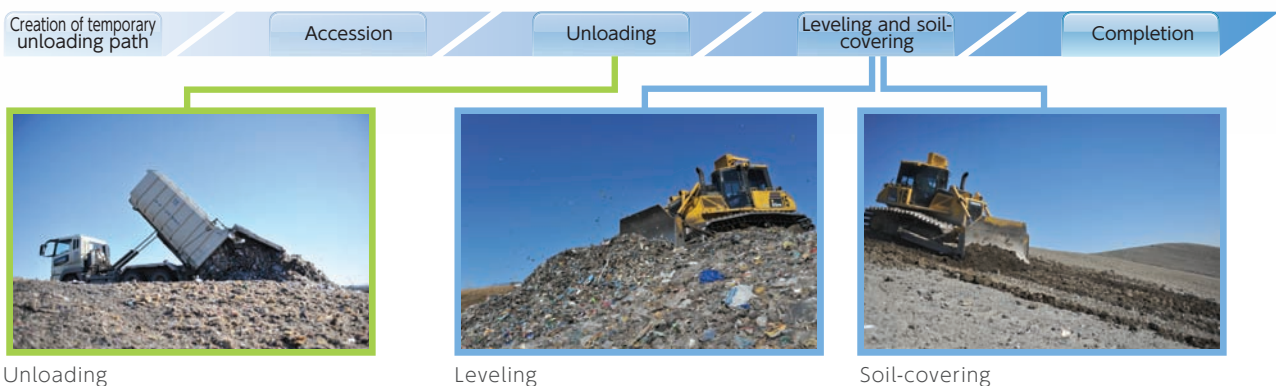
Landfill disposal Volume (FY2012)

(unit : thousand tons)

Municipal solid waste	419
Industrial waste	21
Urban facility waste	160
Total	600

▶ II-iii Landfilling, covering soil and leveling

After intermediate treatments, the waste is transported to the disposal site by container trucks or dump trucks, and is then buried in its designated place depending on the type of waste. The landfilled place is leveled, compacted, and rolled by a bulldozer. The operation is performed effectively and safely.



■ Temporary unloading paths

Creation of temporary unloading paths and platforms

Unloading paths and platforms for the trucks are created temporarily at each cell. When each cell has been filled with waste, the unloading paths and platforms are removed, and valuable space for future waste landfill is recovered.



■ Sandwich Method

Sandwich Method

When the waste has reached a certain thickness, it is covered with a layer of soil. Another layer of waste is then added on top of the soil, which is then covered by more soil. The Sandwich Method has several advantages.

- ① Prevention of waste scattering
- ② Prevention of waste odor spreading
- ③ Prevention of insect outbreaks (prevention of insect hatchings)
- ④ Prevention of fires (because of blockage of air)



Other efforts

• Patrolling the site

In addition to carefully controlling the progress of landfill operations, the entire disposal site is managed, including pest control operations, detection of dangerous items, and handling of any accidents involving unloading trucks on the site.

• Insect proof countermeasures

To keep a sanitary environment, the presence of flies is surveyed daily and pesticide is sprayed according to the survey results.

• Gas ventilation

After landfilling, the decomposing waste generates methane gas. To prevent potential fires caused by the gas, it is vented by driving pipes into the site.

• Scattering prevention

Net fences are installed on the periphery of the disposal site along the peripheral road to prevent the waste on the site from contaminating the sea.



Patrolling the site



Insect proof countermeasures



Gas ventilation



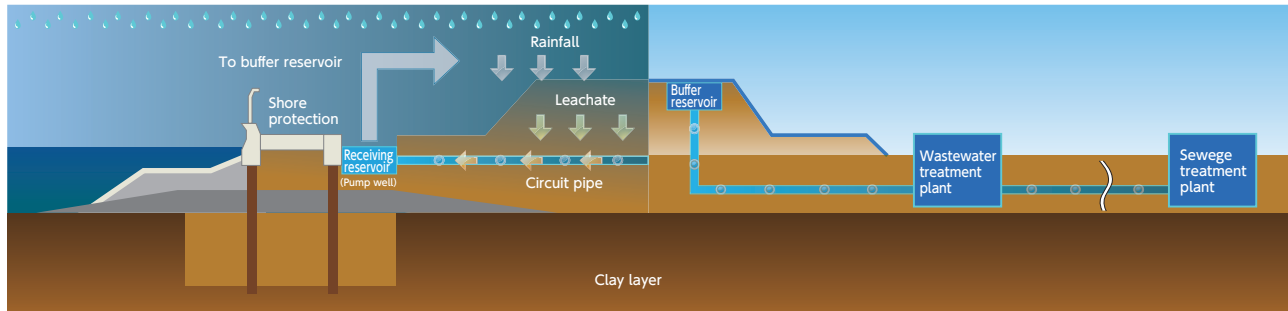
Scattering prevention

▶ II-iv Leachate treatment

Since this site is a controlled final disposal site isolated from the sea, it is necessary to purify the rainwater that falls on the disposal site. The leachate, which refers to rainwater that has passed through the layers of waste, contains many contaminants, such as nitrogen and organic substances in particular. The leachate is treated at the wastewater treatment plant and then released into the sewerage system.

The degree of dirtiness of leachate fluctuates significantly by kinds of waste, landfill period, amount of rainfall, and various other factors. Therefore, daily water quality inspections and appropriate wastewater treatment are carried out thoroughly.

■ Leachate treatment flow



• Receiving reservoir (Pump well)

The leachate is collected in a small artificial pond and then sent to a buffer reservoir using a pump.



Receiving reservoir

• Buffer reservoir

Capacity : 75,000 m³ x 2 units = 150,000 m³

Dimensions : Length 195 meters x Width 150 meters (x 2 units)



Buffer reservoir

The leachate is collected in the two buffer reservoirs located in the Central Breakwater Outer Landfill Site through each receiving reservoir.

The pumped leachate is mixed and agitated here to allow the stable operation of wastewater treatment at the next process.

When a vast amount of leachate is collected due to heavy rain, the wastewater treatment plant is required to regulate the amount of leachate flow into the plant by increasing the pondage.

■ Wastewater treatment plant

The leachate undergoes purification treatment at the wastewater treatment plant located in the Central Breakwater Inner Reclamation Area through various processes.

Wastewater treatment plant No.1

- Start of operation : 1979
- Treatment capacity : 4,500 m³ /day
- Construction cost : 2.195 billion yen
- Site area : 13,000 m²
- Treatment method : Biological treatment/ coagulation-sedimentation method



Wastewater treatment plant No.1



Wastewater treatment plant No.3

Wastewater treatment plant No.3

- Start of operation : 1987
- Treatment capacity : 11,500 m³ /day
- Construction cost : 20.7 billion yen
- Site area : 28,000 m²
- Treatment method : Denitrogenation /coagulation-sedimentation method

The cost of leachate treatment is substantial since there is a huge amount of leachate discharging from the vast bay-side disposal sites. To operate and maintain the wastewater treatment plant efficiently and economically, two plants treat the different types of wastewater.

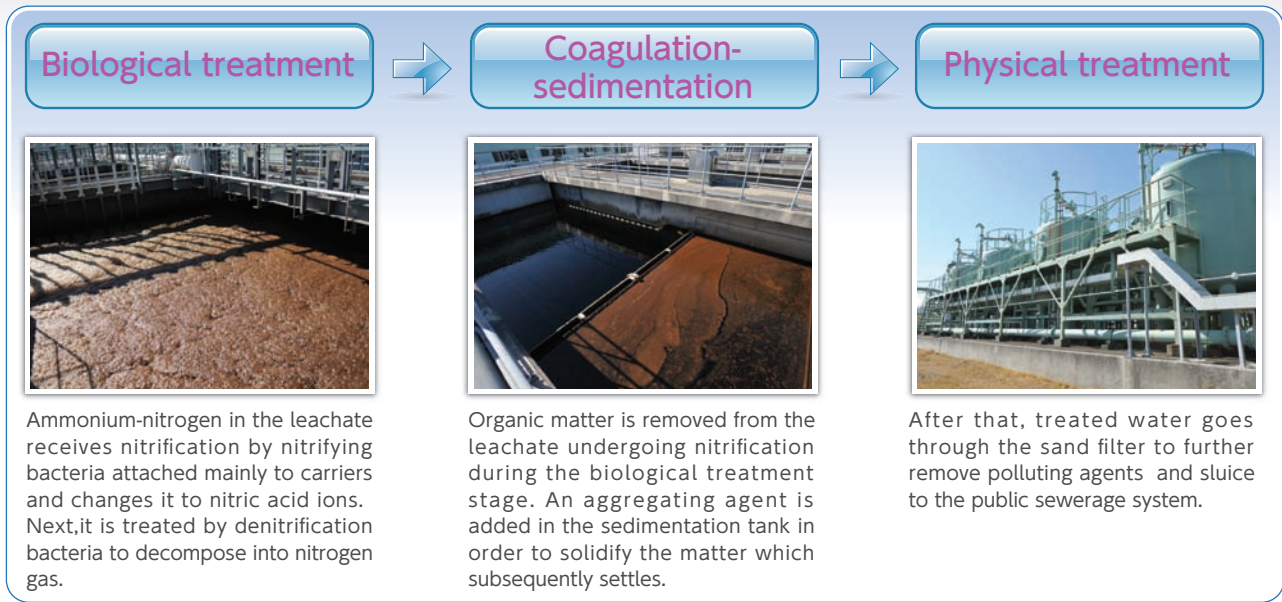
〈Wastewater treatment plant No.1〉

Plant No.1 treats leachate which is collected from an area of the disposal site landfilled mainly by incineration ash and is less dirty.

〈Wastewater treatment plant No.3〉

Plant No.3 treats leachate which is collected from an area of the disposal site landfilled by organic waste without any intermediate treatments years ago and is dirtier.

■ The process of leachate treatment



Water quality data before/after treatment

	Before	After	Standard
pH	8.2	7.4	5-9
COD(mg/l)	360	74	150
NOx(mg/l)	460	29	120

■ Water quality inspection of treated leachate and seawater sampled from surrounding ocean area

[Inspection of seawater sampled from the surrounding ocean area]

Water quality inspections are conducted through regular sampling from certain points in the surrounding ocean area alongside disposal sites.

- Frequency: four times a year (inspection for dioxins once a year only)
- Items of inspection: items related to living environment and health, and dioxins

[Inspection of treated leachate]

A water quality inspection must be conducted on the treated leachate in accordance with the Ordinance for Enforcement of Sewerage Service Law.

- Frequency: 12 times a year (twice a year for dioxins and 8 times a year for alkyl mercury)
- Items of inspection: items related to living environment and health, and dioxins

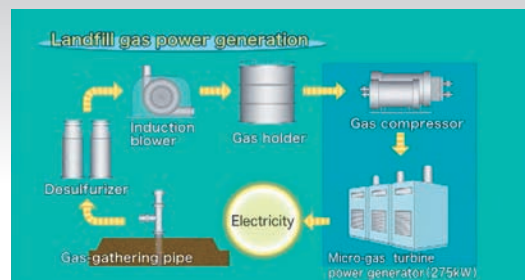
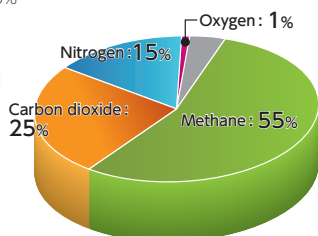
Results of the inspections are disclosed to the public through the Tokyo Metropolitan Government website.

▶ II-v Landfill gas power generation

At the Central Breakwater Inner and Outer Landfill Sites, landfill gases, including methane gas, are generated when the waste is decomposed. The landfill gases are collected and used for power generation to utilize the methane gas and reduce the environmental burden. The generated power is used as part of the power consumed by the facilities at the disposal sites.

Micro gas turbine generator

- Power generation capacity: 30kW x 6units, 95kW x 1unit
- Gas usage: 1,600,000m³ N/year
- Gas composition: Methane -55%
Carbon dioxide - 25%
Nitrogen - 15%
Oxygen - 1% or less
- Gas calorific value: 18MJ/m³ N (4,300kcal/m³ N)



Micro-gas turbine generator



Facilities related to gas collection

Operation status data of gas power generation

FY	2005 (Only February and March)	2006	2007	2008	2009	2010	2011	2012 (April to December)
Amount of power generation (kWh)	162,960	1,398,660	1,193,390	1,185,360	1,213,980	1,309,530	1,031,510	1,603,662
Used amount of gas (Nm ³)	139,906	1,308,523	1,157,243	1,160,901	1,266,259	1,154,358	1,029,912	1,251,277

In 2006, micro-gas turbines started operation.

In 2012, new 95kW turbine was installed.



III Land-use after closure

▶ III-i The Port and Harbor Plan of the Port of Tokyo

The land-use plan of the area of the New Sea Surface Disposal Site is defined in the Port and Harbor Plan.

According to the partial modification of the 5th Revised port and Harbor Plan in 1992, the plan for the development of the New Sea Surface Disposal Site for the landfilling of soil and waste was concluded. Moreover, according to the Basic Policy of the Long-Term Vision for the Port of Tokyo and 6th Revised Port and Harbor Plan in 1994, the basic policy for the land-use of its area was determined.

Basic policy - Excerpt

- The bay-side disposal site should be used effectively as the bay area is extremely valuable.
- It is necessary to improve the port facilities primarily to deal with the increasing volume of imported cargo from larger container ships and to enrich and streamline the logistics system in Tokyo.
- The landfill site should be developed as an environmental space that can compensate sufficiently enough for the loss of bay-side value.



7th Revised Port and Harbor Plan of the Port of Tokyo - Map of zones by function