

1 Bio-treatment without using activated sludge

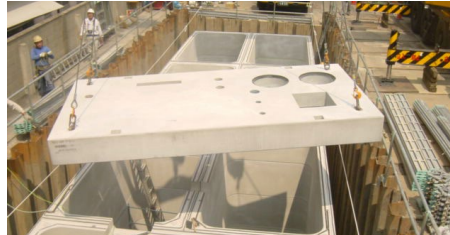
- Low-cost wastewater treatment system for public sewer discharge



■ Problems solved and costs reduced

Aquablaster diffusion pipe

A sewer discharge system was used, but the cost of treatment was high.



After shifting to wastewater treatment using the Aquablaster diffusion pipe, the cost was reduced by 10 million yen per year and complaints about the odor from neighbors completely disappeared. (Boxed lunch factory)

Treated wastewater was at levels higher than sewage discharge standards.



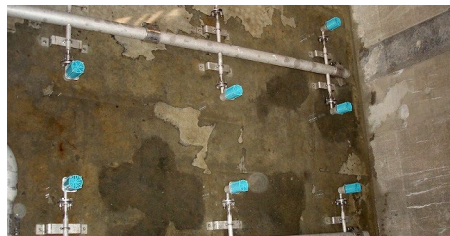
After shifting to wastewater treatment using the Aquablaster diffusion pipe, wastewater could be treated up to levels lower than the sewage discharge standards, and wastewater containing mineral oil could be treated at the same time successfully. (Precision equipment factory)

The cost of sludge treatment through pressurized flotation was high and there was an odor problem.



The use of a pressurized flotation unit, which requires sludge treatment and chemical agent costs, was not desired; the introduction of the Aquablaster diffusion pipe was a success. (Baked goods factory)

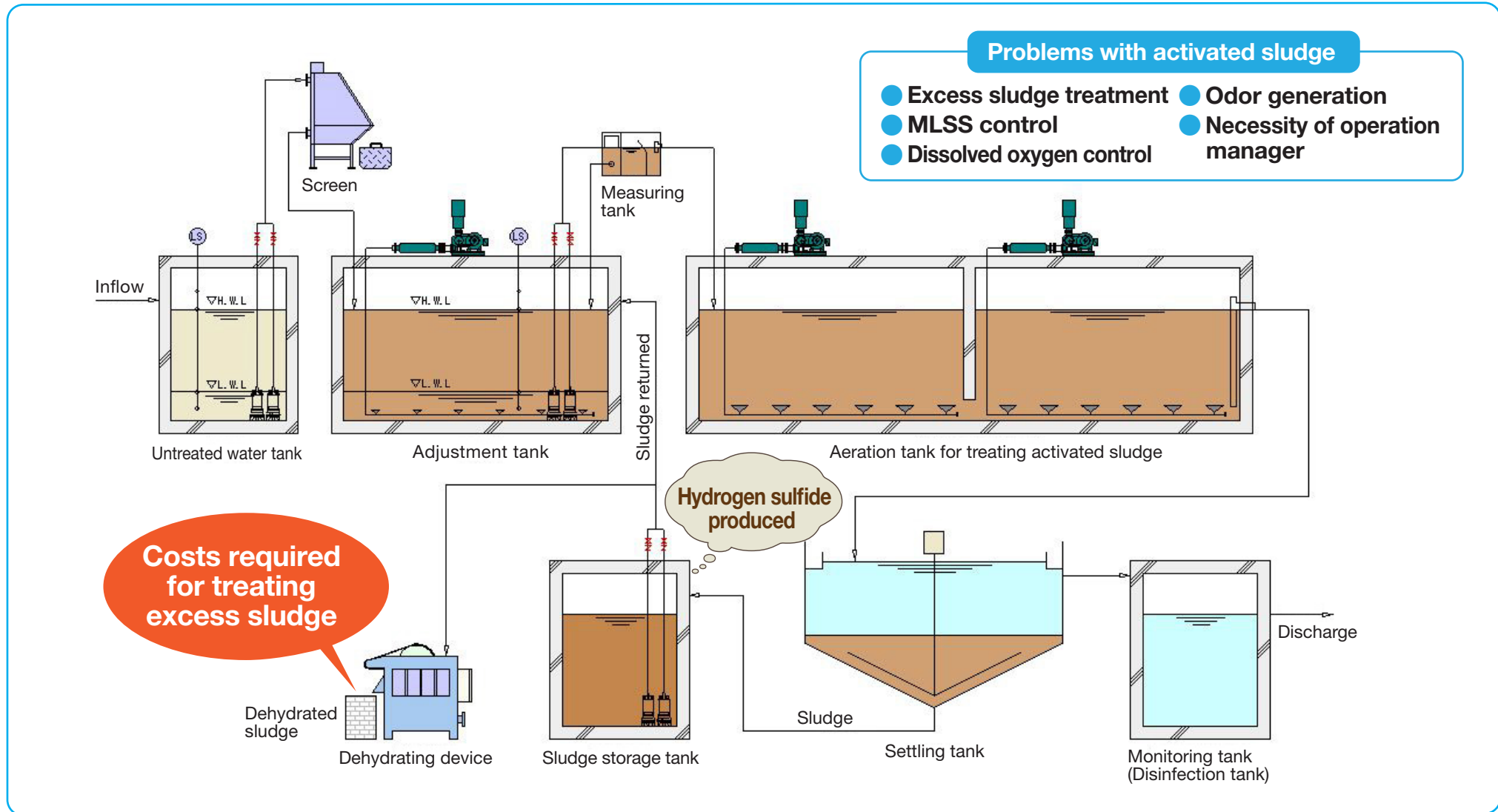
There was a problem with the odor of substances such as hydrogen sulfide and fatty acids.



Places such as the guest rooms and banquet room smelt like a sewer. Such a smell disappeared after the Aquablaster diffusion pipe was introduced, and even the water became clean. (First class hotel)

Conventional activated sludge system flow and problems

Aquablaster diffusion pipe



Problems with activated sludge

- Excess sludge treatment
- MLSS control
- Dissolved oxygen control
- Odor generation
- Necessity of operation manager

Food plant treatment flow example

Aquablaster diffusion pipe

- Wastewater type : Boxed lunch factory wastewater
 - Wastewater amount : 220 to 250m³/day
 - Discharged to : Public sewer
 - BOD : 2100mg/L reduced to 350mg/L or less
 - SS : 1500mg/L reduced to 200mg/L or less
 - n-hex : 300mg/L reduced to 35mg/L or less
- * The values for treatment are not discharge standards. They are values in the contract.



Aquablaster diffusion pipe AS

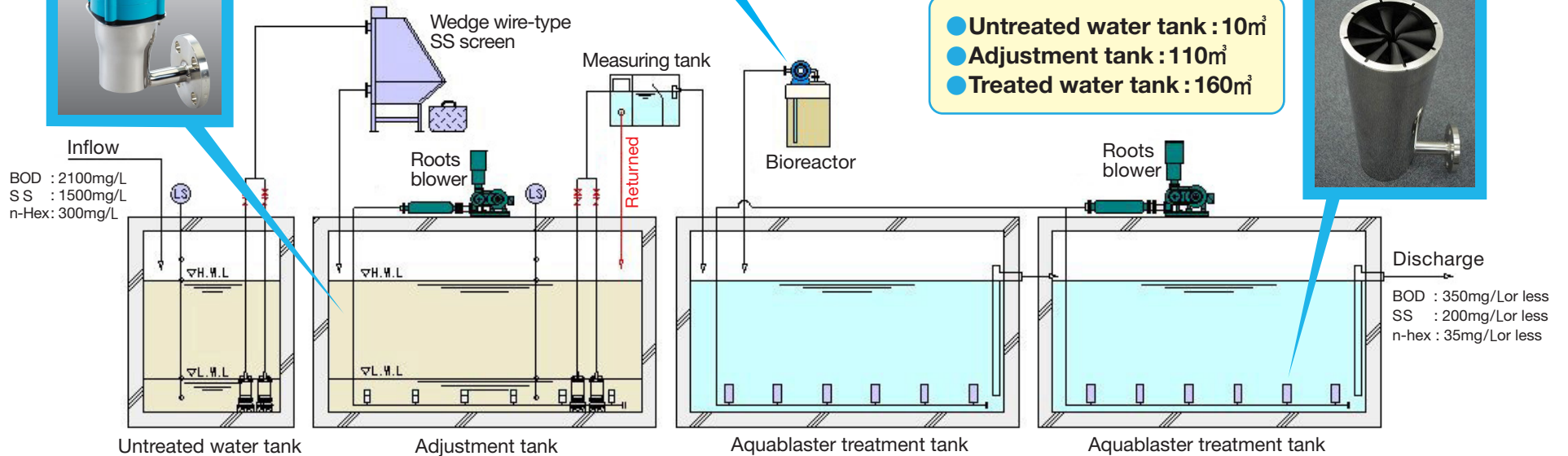


Just perform aeration with the Aquablaster diffusion pipe and supply degrading bacteria.

Keeps SS below the standard discharge value, so there is absolutely no need for sludge treatment.

- Untreated water tank : 10m³
- Adjustment tank : 110m³
- Treated water tank : 160m³

Aquablaster AL



■ Aquablaster diffusion pipe layout in each tank

Aquablaster diffusion pipe



Adjustment tank internal piping



Treatment tank internal piping

Based on fluid dynamics and empirical values, design calculation is elaborately performed according to the shape of each water tank's bottom, water depth, water amount, and wastewater load, so that without adjusting valves, the same amount of air is emitted as an air blast from each Aquablaster pipe and there is no place left unstirred at the bottom of each water tank and at the water surface.

■ Cost comparison before and after introduction

Aquablaster diffusion pipe

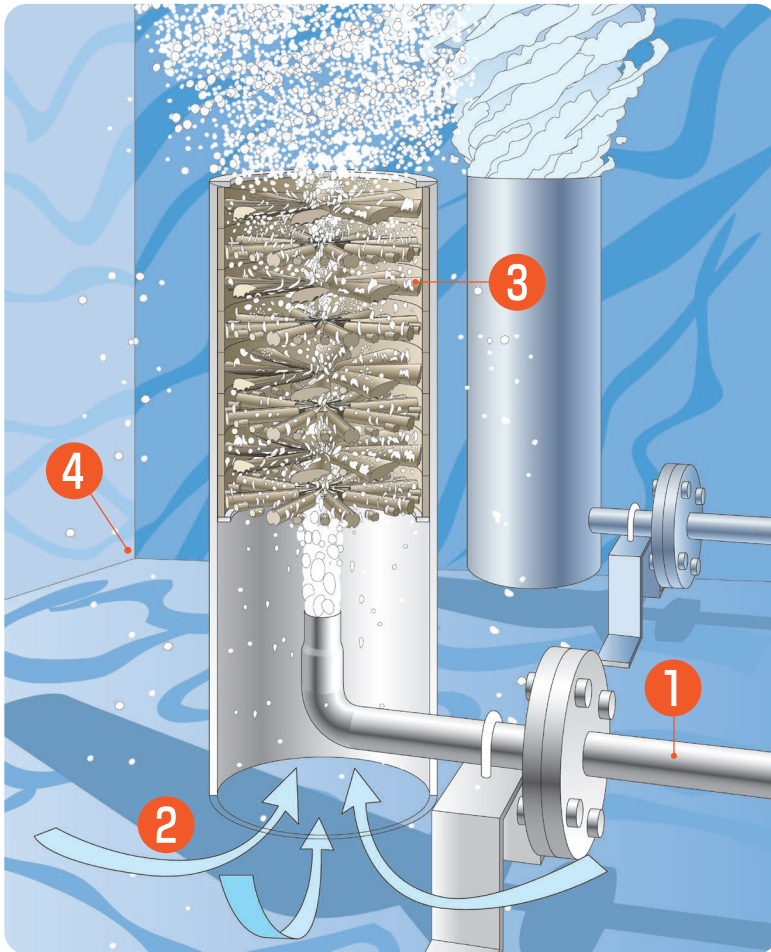
Wastewater had been treated using a pressurized flotation device before, but, after shifting to treatment using the Aquablaster diffusion pipe, cost reduction of 12 million or more yen per year was achieved.

Annual cost comparison table			
Item	Pressurized flotation used	Aquablaster	Difference
Sewerage charge	9,900,000	2,100,000	▲ 7,800,000
Cost of sludge collection	3,600,000	0	▲ 3,600,000
Cost of power consumption	3,024,000	3,456,000	432,000
Cost of chemical agents such as coagulants	1,200,000	0	▲ 1,200,000
Total	17,724,000	5,556,000	▲ 12,168,000

* The above sewerage charge refers to a cumulative amount added to the regular sewerage charge when wastewater is at levels higher than discharge standards.

■ Diffusion pipe Aquablaster mechanism

Aquablaster diffusion pipe

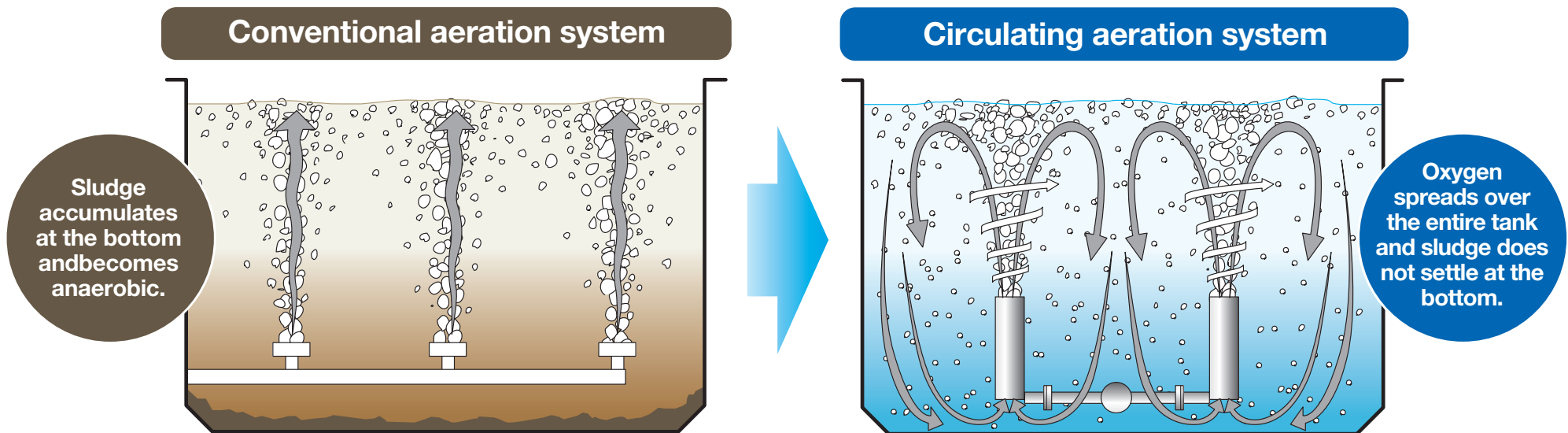


- 1 Air from the blower is emitted as a high speed air blast.
- 2 Water and sludge at the bottom are swept up by an air lift effect.
- 3 With special shaped fins developed by using fluid dynamics, air and water are vigorously mixed together to generate nano air bubbles and circulating currents in the tank. (Patent pending)
- 4 When circulating currents are generated, oxygen is also supplied to the corner sections at the bottom of the water tank, where the dissolved oxygen concentration does not increase easily.
- 5 By keeping the dissolved oxygen concentration at 2.0mg/L or more, microorganisms are activated maximally.

■ Aquablaster diffusion pipe circulating power

Aquablaster diffusion pipe

By spreading internally-generated nano air bubbles over the entire water tank, not only is the dissolved oxygen concentration at the bottom of the tank increased, but also it becomes difficult for sludge to settle - This is a major characteristic of the Aquablaster diffusion pipe.



When the Aquablaster diffusion pipe is used, microorganisms can perform anaerobic respiration metabolism even with high-load wastewater; odor is therefore not generated.

Comparison with other systems

Aquablaster diffusion pipe

	Activated sludge	Pressurized flotation	Aquablaster diffusion pipe
Installation space	NO	YES	MAYBE
	A large area is required.	Installation is possible as far as the machine and installation space are available.	Installation is possible in a space equal to 1/3 to 1/4 of the space required for an activated sludge system.
Initial costs	NO	YES	MAYBE
	A large water tank and sludge treatment equipment are required.	Only the cost of a pressurized flotation device and sludge dehydration unit is required.	A treatment tank of a certain size is required.
Running costs	MAYBE	NO	YES
	Costs are mounting for sludge treatment and operation management.	Costs are mounting for sludge treatment, chemical agents, and operation management.	Only the cost of electricity and the cost of bio-supply are required.
Odor generation	MAYBE	NO	YES
	Hydrogen sulfide and rotting odors are generated in the sludge storage tank.	Structurally, hydrogen sulfide and rotting odors are generated.	An offensive odor substance such as hydrogen sulfide is not generated.
Treatment capability	YES	NO	YES
	Wastewater can be treated up to levels equal to river discharge standards.	A problem with BOD treatment remains.	Wastewater can be treated up to levels equal to sewage discharge standards.
Operation management	NO	NO	YES
	For such work as sludge concentration control, dedicated personnel need to be assigned.	For chemical agent injection, sludge control, and others, a considerable amount of labor is required.	Roughly, only machine operation check is required

Other wastewater treatment records

Aquablaster diffusion pipe



Waste plastic recycling plant (12 sets OEMed to Nikko)			
Unit mg/L	Raw water	Treated water	River discharge
BOD	2000	80	100 or less
COD	1600	70	100 or less
SS	2000	40	30 or less
N-Hex	200	1	5 or less



Food processing factory wastewater treatment			
Unit mg/L	Raw water	Treated water	Sewage discharge
BOD	450	5	300 or less
SS	430	4	300 or less
N-Hex	380	2	(Mineral) 5 or less



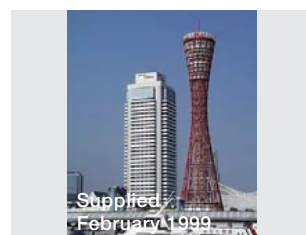
SHIMADZU CORPORATION Seta factory Kitchen & industrial wastewater treatment			
Unit mg/L	Raw water	Treated water	Sewage discharge
BOD	1200	85	300 or less
SS	800	80	300 or less
N-Hex	120	12	30 or less



Food waste recycling plant wastewater treatment			
Unit mg/L	Raw water	Treated water	Discharge standard
BOD	150	10	Water being circulated and reused as coolant water for machines
SS	100	10	
N-Hex	15	1	



Food processing factory wastewater treatment			
Unit mg/L	Raw water	Treated water	Value in the contract
BOD	2100	350	400 or less
SS	1500	200	300 or less
N-Hex	350	35	40 or less



Major hotel (modification work) Kitchen wastewater treatment			
Unit mg/L	Raw water	Treated water	Sewage discharge
BOD	680	78	200 or less
SS	500	57	200 or less
N-Hex	150	10	30 or less



Food processing factory wastewater treatment			
Unit mg/L	Raw water	Treated water	Discharge standard
BOD	1200	220	300 or less
SS	800	300	300 or less
N-Hex	400	20	30 or less



SHIMADZU CORPORATION Head office Kitchen wastewater treatment			
Unit mg/L	Raw water	Treated water	Sewage discharge
BOD	2000	100	200 or less
SS	2500	120	200 or less
N-Hex	250	15	30 or less



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