Environmental Purification System Using Mechanical-Ceramics Catalytic Water

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SGM INC.

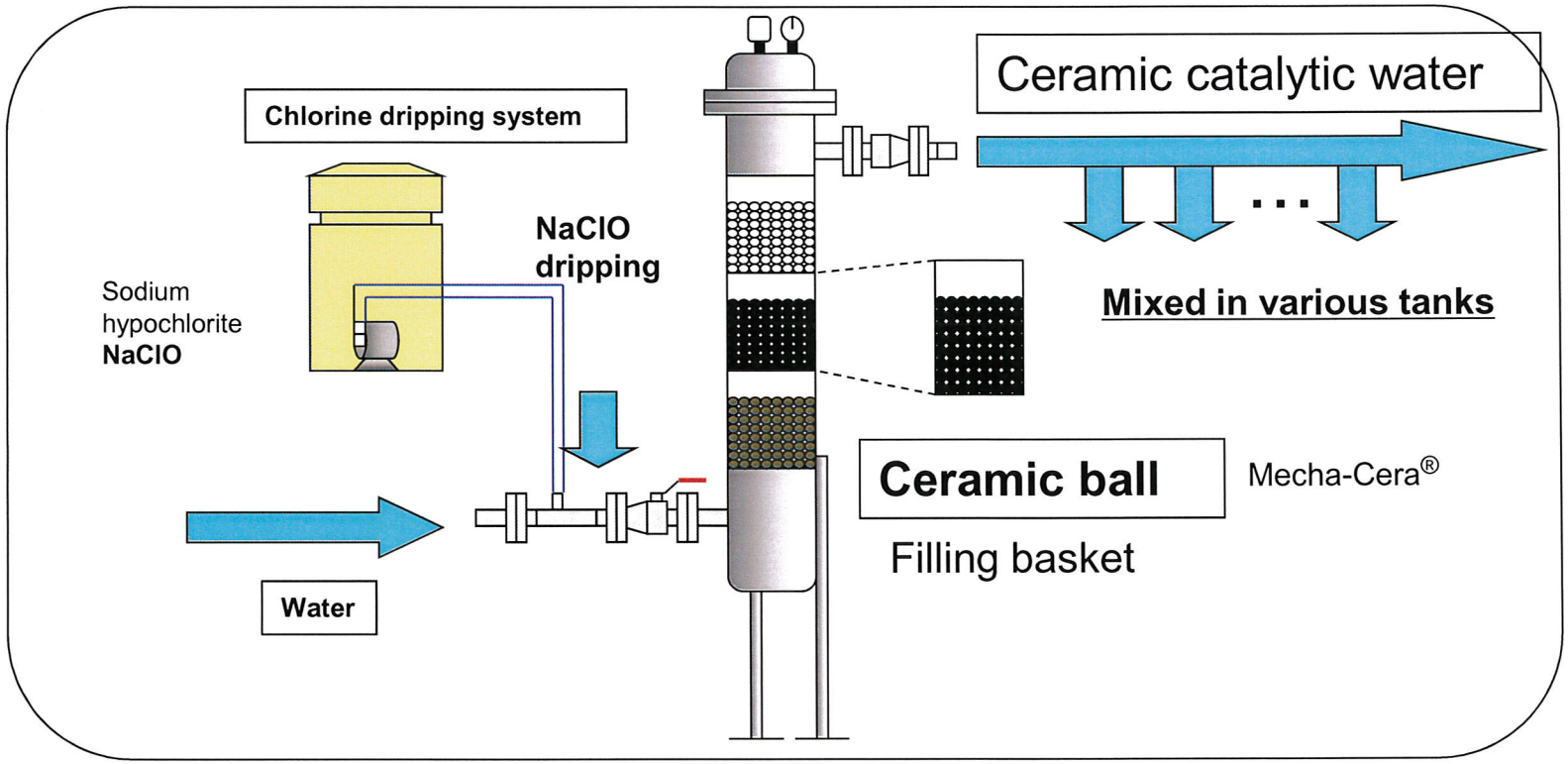
Kanagawa, Japan

Targets and Utilization

Target (effect)	Facility
Deodorizing	General waste water treatment facilities
Reduction of sludge	Agricultural community effluent treatment facilities, and public sewerage systems
Decomposition of oil (animal and vegetable oil, mineral oil)	Oil and fat separation tanks (grease trap)
Decomposition of scale	Cool and hot water facilities (cooling tower, etc.)
Removal and killing bacteria and biofilms	General waste water treatment facilities

Environmental Purification System

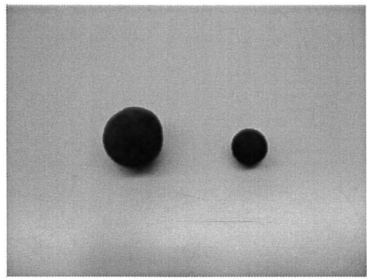
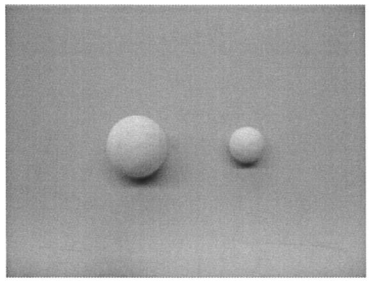
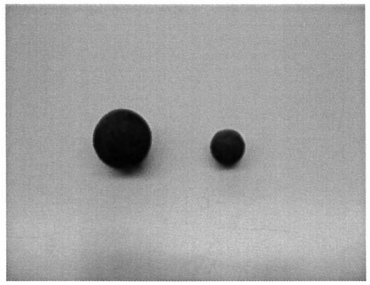
Sodium hypochlorite is added to the water with a metal oxide ceramic ball, and mixed in the holding tank. Purified by catalysis.



[Merits]

- Installable to the existing system
- Compact, long life
- Easy maintenance and management and low running cost

Mechanical Ceramics Ball

	Appearance	Note
(1) Black ball		Iron oxide group
(2) White ball		Alumina group
(3) Brown ball		Titanium group

Mecha-Cera®

Environmental Purification Action

Extracted from the brochure

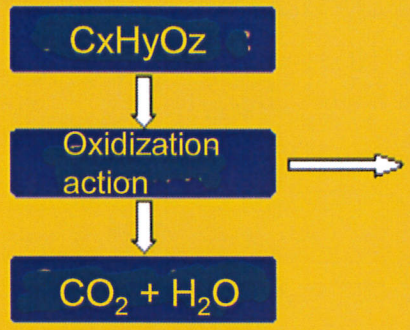
Reduction of sludge

Agricultural community sewerage waste water treatment facility

Food factory effluent organic substances

Generation of O_2 and OH radicals

Inorganic substance residuals



Conventional waste water treatment facilities purify water by the microbial activation process method. The microbial digestive action decomposes underwater organic substances, and water is purified. Consequently, the debris of organic substances that are eaten by microbes and corpses of microbes, etc. became sludge.

When using the new Mecha-Cera equipment, organic substances become inorganic substances due to an oxidation reaction of the Mecha-Cera catalyst + chlorine by a chemical reaction. This advanced microbial action generates OH radicals and less sludge by an ordinary microbe chlorine reaction without depending on the digestive action of microbes.

Deodorizing effect

Hydrogen sulfide
ammonia

Reacts with O_2 and becomes H_2SO_4 having water solubility and is deodorized.

Nitrate – becomes nitrite and is decomposed by water and is deodorized as N_2 gas.

Waste oil decomposition (mineral and food) ·· Element of oil (C, H)

H_2O_2 hydroxyl ion chemical reaction causes an oxidization action (COOH). The carboxyl group changes it to CH_3COOH (acetic acid), which is decomposed into carbon dioxide and water.

When sampling water and the oil content, normal hexane extract is 20 ppm or under for animal or vegetable oils, and 6 ppm or under for mineral oils.

Demonstration1) Sludge reduction

Background; Biological purification

→ Reclamation and incineration cost for generated sludge is large.

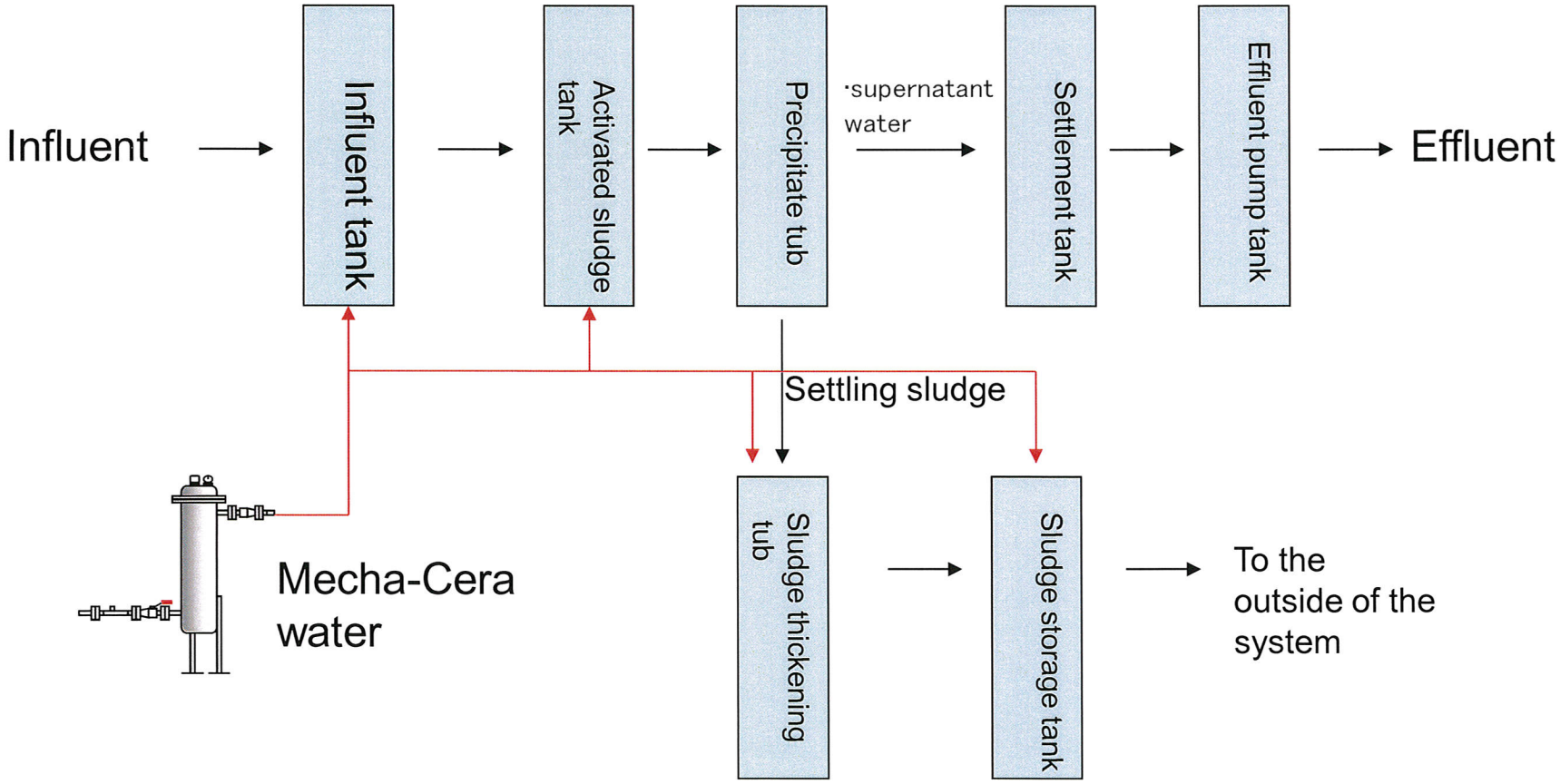
Processes night-soil and miscellaneous drainage from a agricultural community where a sewerage system is lightly developed.

- Intended users: 2,200
- Average waste water flow: 597 m^3 /day
- Influent BOD :200 mg/L ↓ Effluent BOD :20 mg/L
  Influent SS :200 mg/L ↓ Effluent SS :50 mg/L
- Ordinary sludge treatment cost

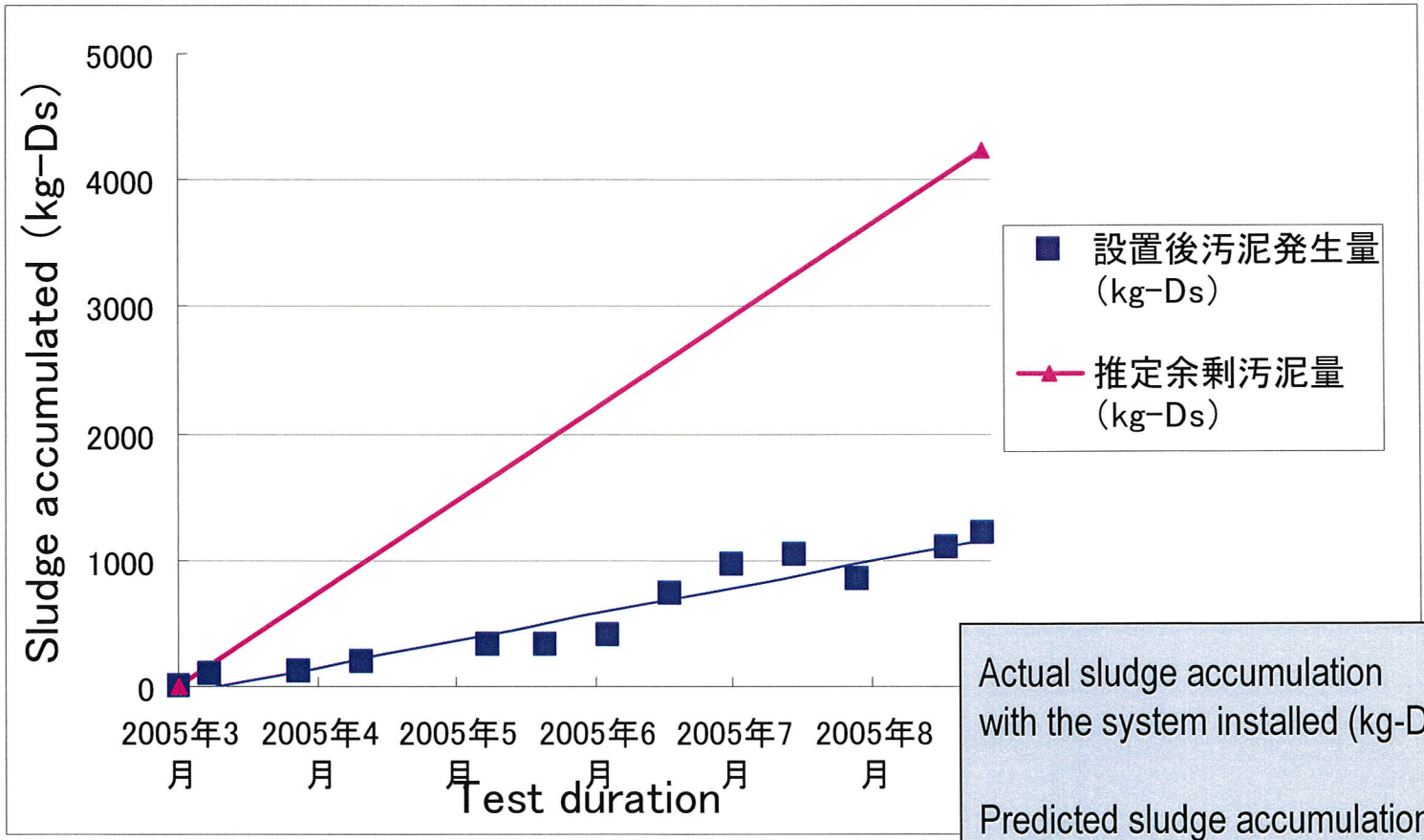
  ¥4-5 million/year

*Constructions so far: about 250

- **Test period: March-August 2005 (Water survey during 3 months before testing)**
- **Water analysis: pH, BOD, COD, suspended solid (SS), total nitrogen, total phosphorus**
- **Mecha-Cera water injection rate: 15% to inflow water**
- **Mecha-Cera water residual chlorine concentration: 2-5 ppm**



Change in the Amount of Sludge

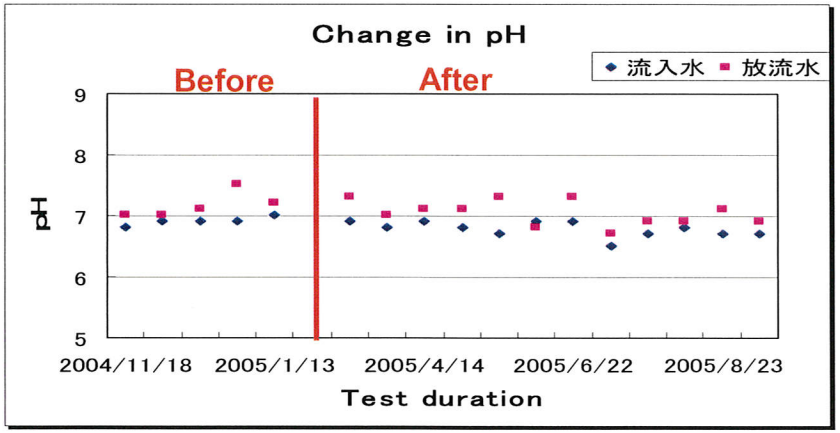


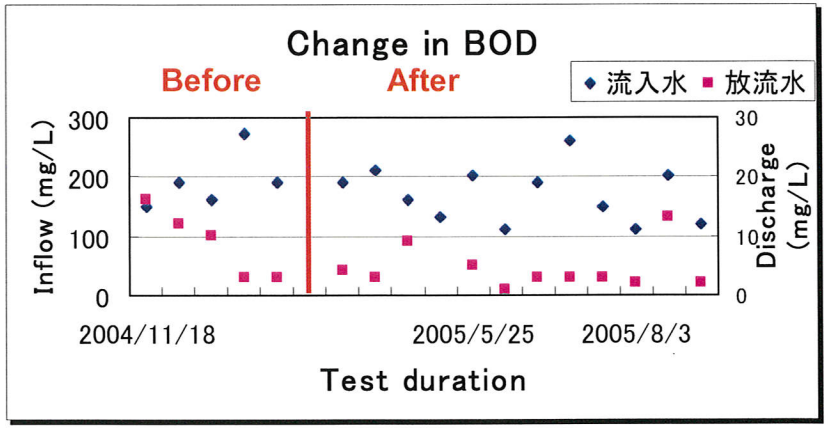
Actual sludge accumulation with the system installed (kg-Ds)

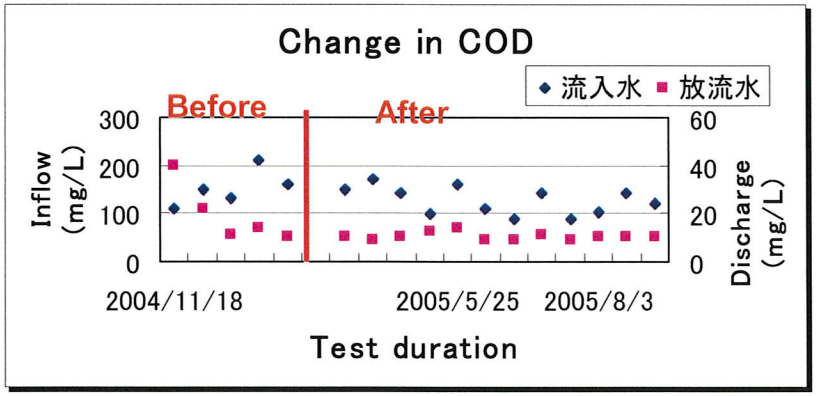
Predicted sludge accumulation without the system installed (kg-Ds)

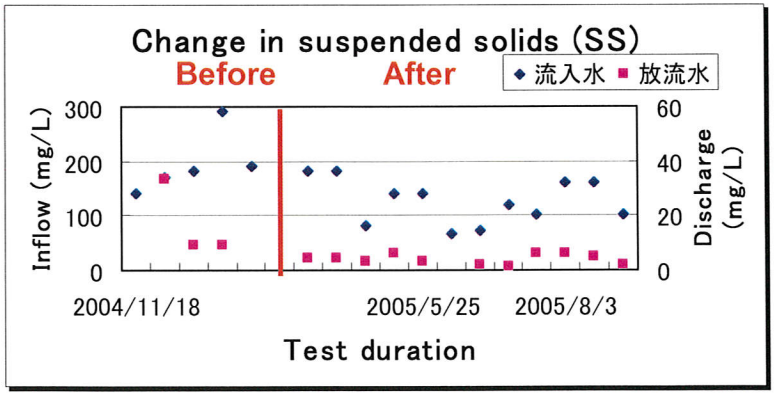
The system has an effect of reducing the sludge produced to about 1/3

Water Quality of the Discharge 1)

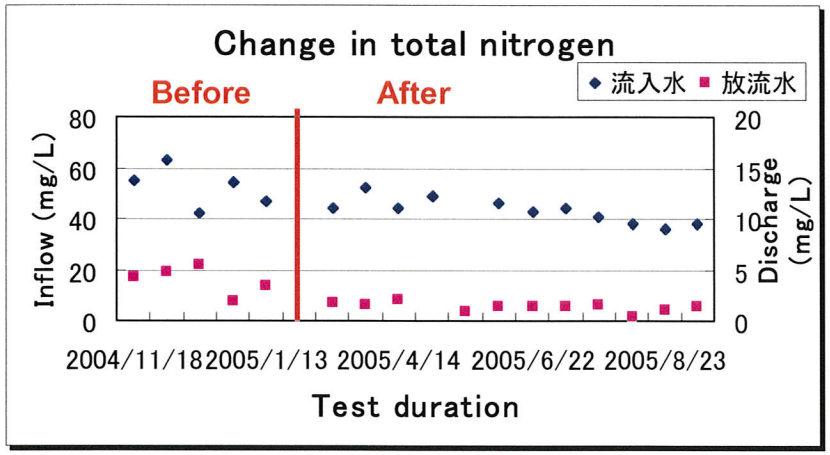


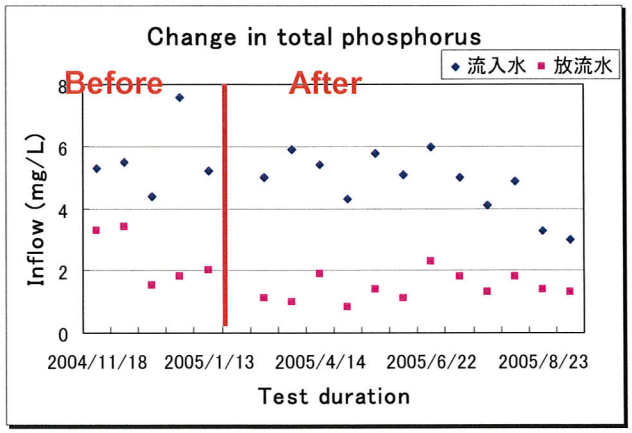






Water Quality of the Discharge 2)





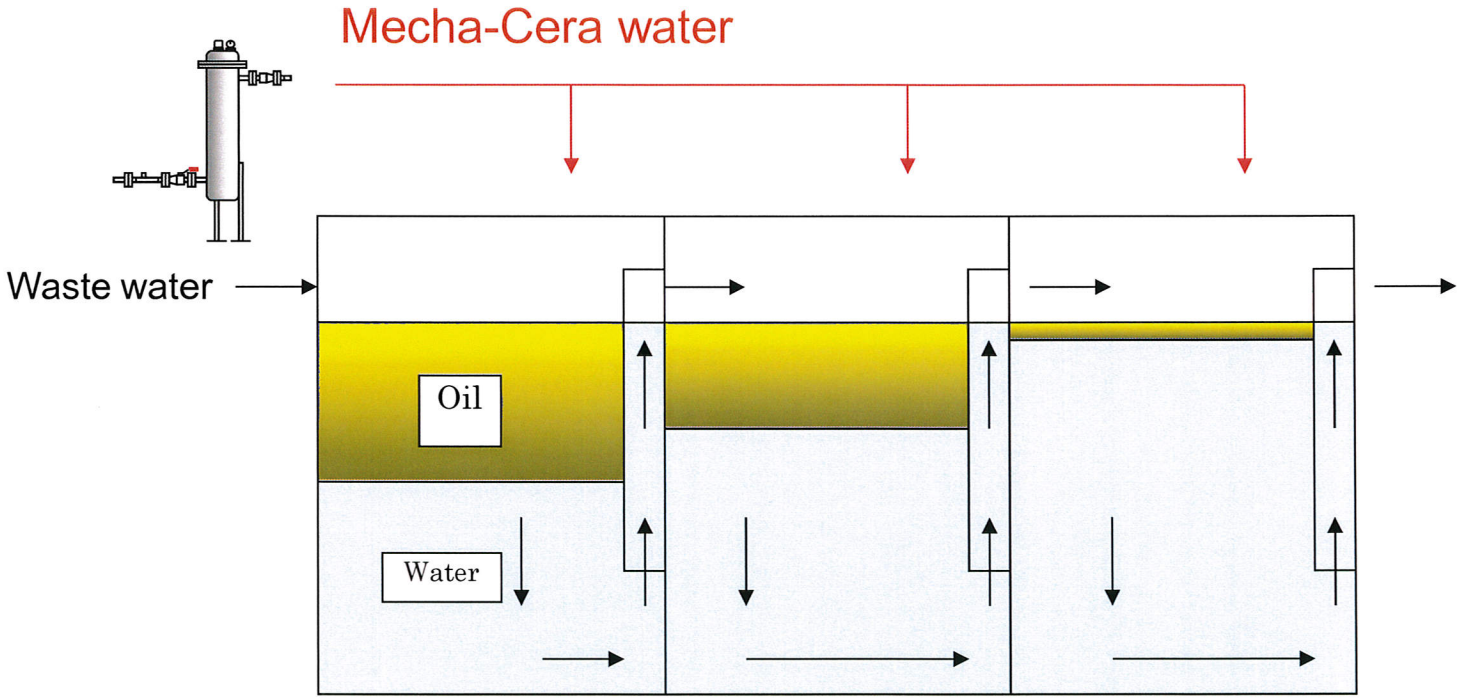
From the results, the quality of the discharged water is confirmed to be good and stable.

The amount of sludge produced was reduced without changing the operational conditions of the sewage treatment facility.

Demonstration 2) Purification of Oily Content

Background: Stagnant fatty deposit at the grease trap (oil and fat separation tank)

- Festering – bad odor
- The water quality of the dischargedeteriorates

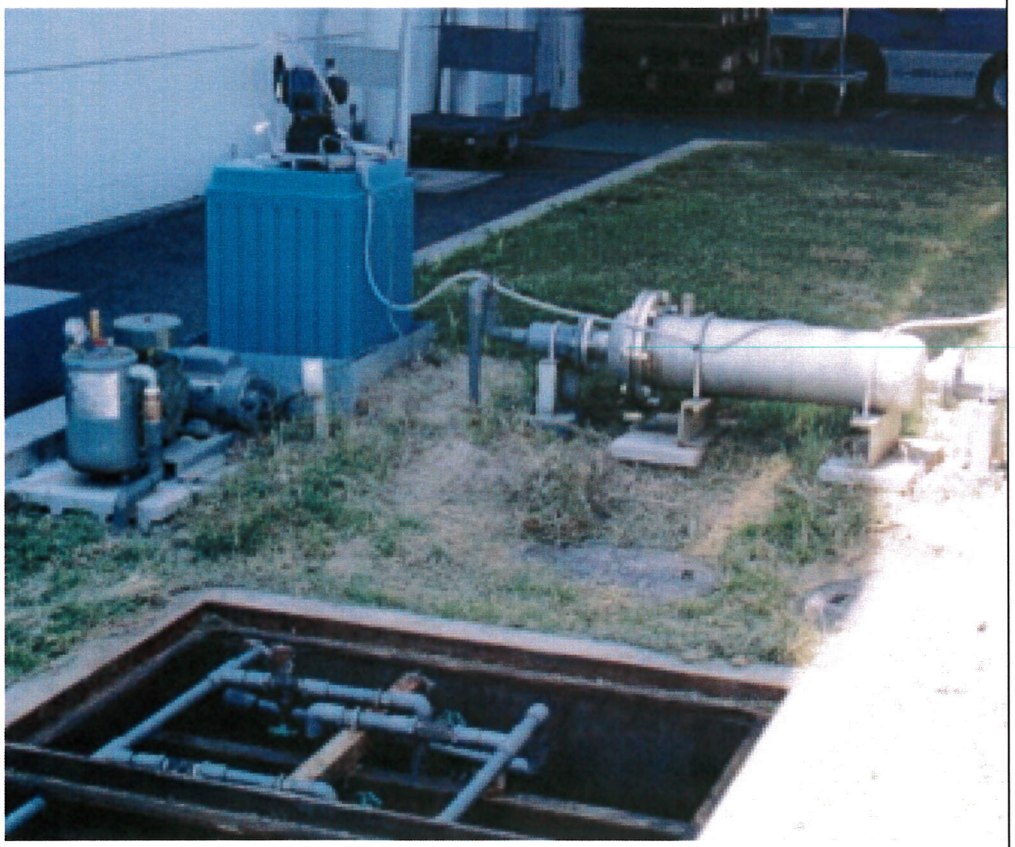


Number of Mecha-Cera applications: ca. 500 including food processing factories, big super markets, company cafeterias and hotels

Kitchen Water Purification

(waste water with animal and vegetable oil)

Site photo

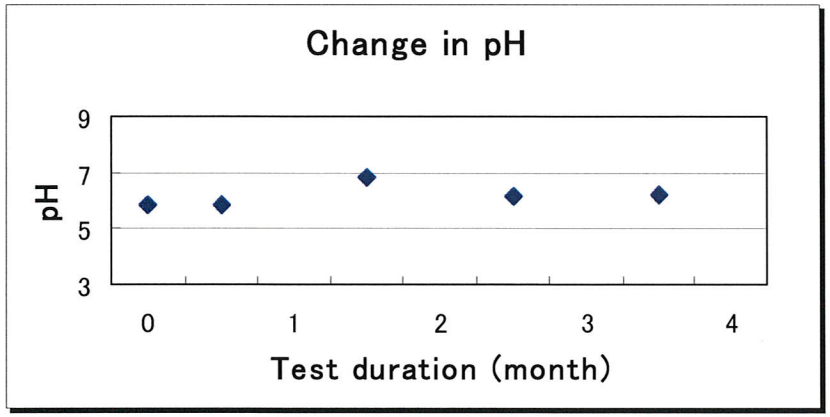


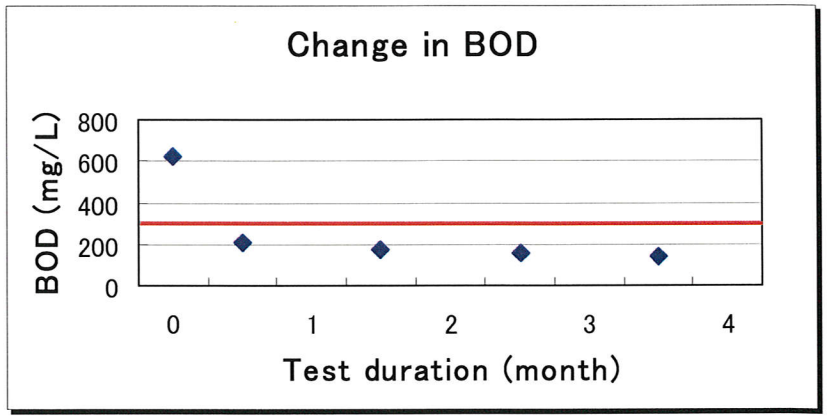
Test details

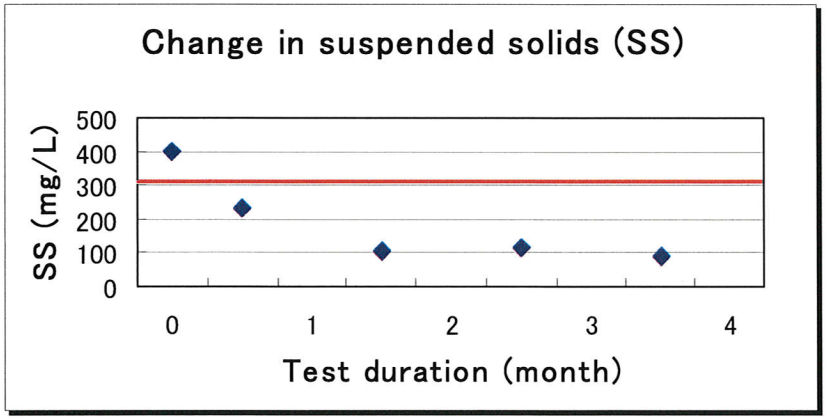
- Test duration:
  ca. 3.5 months
- Water quality analysis:
  pH, BOD, suspended solids (SS),
  normal hexane extractive chemicals
- Amount of Mecha-Cera water added:
  15% of inflow water volume
- Residual chlorine concentration of Mecha-Cera water:
  5 ppm

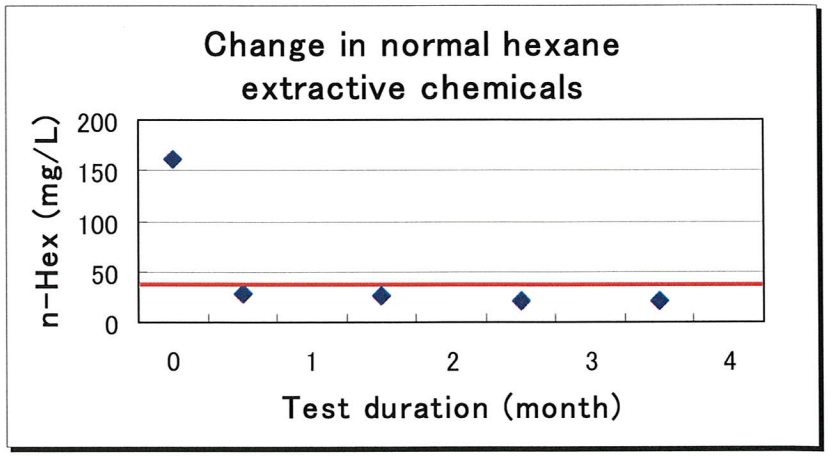
Change in Water Quality

: Water quality standards for the sewerage









Appearance Before and After Testing

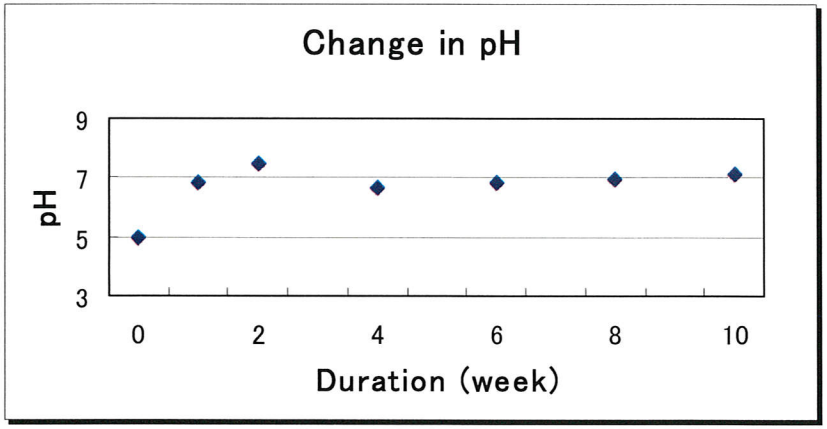
Before	After one month
	

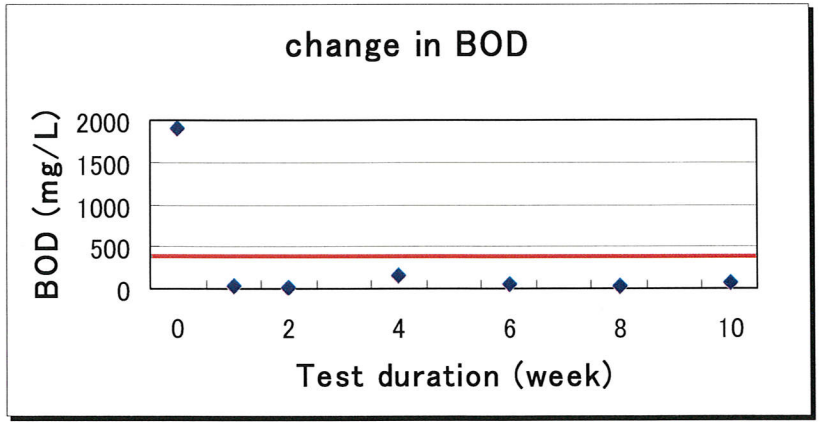
The internal oil and fat separation tank was purified.

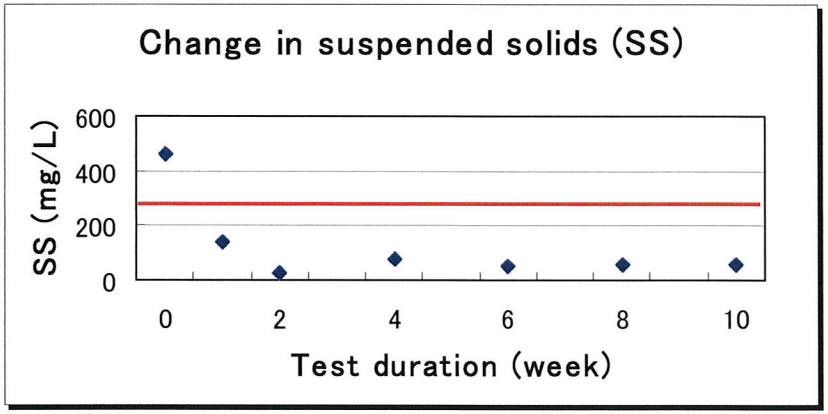
The water quality of the discharge was good.

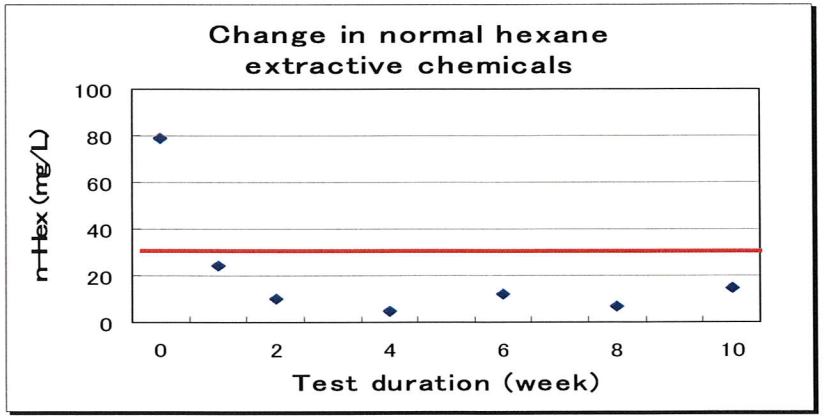
[Treatment of Mineral Oil Waste Water]

Results of water quality analysis









: Water quality standards for the sewerage

Test details

- Test duration: ca. 3 months
- Water quality analysis: pH, BOD, suspended solids (SS), normal hexane extractive chemicals
- Ratio of Mech-Cera water to inflow water: 1:1
- Residual chlorine concentration of Mecha-Cera water: 10 ppm

Appearance Before and After Testing

Auto dismantling site

Before	After 3 months
	

Water purification was confirmed by the results of water quality analysis and appearance of the discharged waste water. The festering odor had disappeared.

Demonstration 3) Removal of Scale and Bacteria

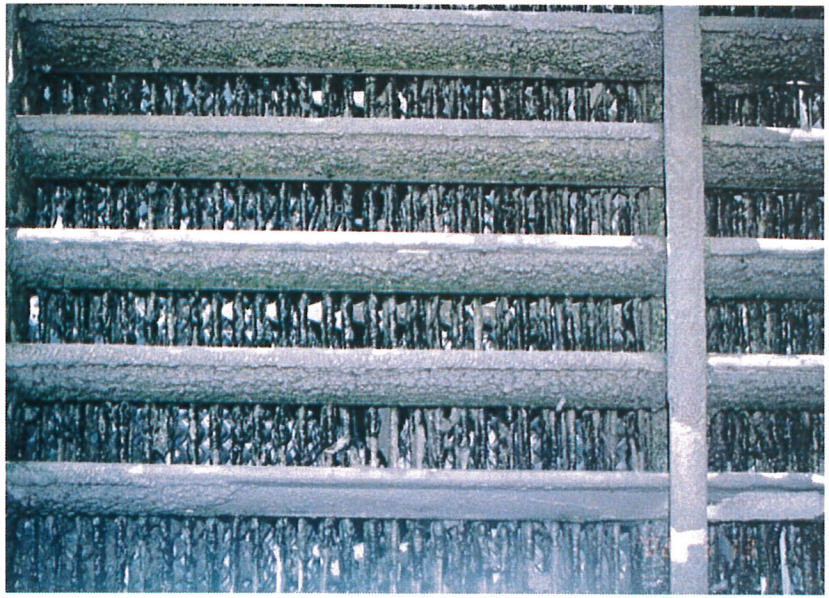
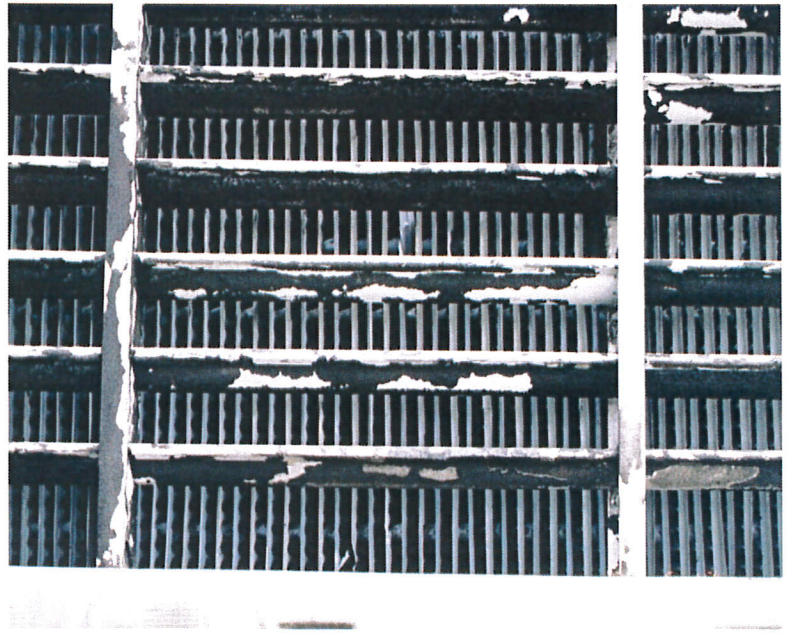
Background: Part of the circulating water evaporates and salts dissolved in water precipitate and adhere to the surface

- Cooling ability is lowered by scale deposits
- Heterotrophic bacteria and Legionella repeatedly contaminate the inside of the tower with circulating water

Cooling tower
(counterflow type)

Site photo

Appearance of Scale Detachment

Before	After 1 month
	

Scale adhering to the louvers and fins can be easily removed

Effect of Bacteria Removal

	Before	After	
		After 1 month	After 2 months
Heterotrophic bacteria (total bacterial counts/ml)	230	Less than 10	Less than 10
Legionella (CFU/100 ml)	250	120	Less than 10

The system has a significant effect on removing/killing bacteria due to its oxidizing and reducing ability (OH radical reaction)