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○ Overview

Target verification technology/environmental technology developer	Oil-degrading-bacteria-adhered fixed-bed contact aeration method / Kondo FRP Industries Co., Ltd.
Verification organization (Conducted by)	Environmental Pollution Control Center, Osaka Prefecture (Environmental Management and Technology Center in Kansai)
Verification-test period	Nov. 20, 2003 to Feb. 20, 2004
Object of technology	a. Decomposition of the pollutants in oil-containing organic wastewater b. Suppression of the generation of waste (including sludge) and foul odor

1. Summary of the target verification technology

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graph LR
    Kitchen((From kitchen)) --> Regulation[Regulation tank]
    Microbes[Super-H Microbes] --> Regulation
    Regulation --> Bio[Biological-treatment tank (fixed bed)]
    Bio --> Sed[Sedimentation tank]
    Sed --> Discharge[Effluent discharge tank]
    Discharge --> Sewage((To sewage))
    Sed -.->|Returned sludge| Regulation
    
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For the sampling of raw water in the regulation tank, Super-H Microbes were added and the sludge was fed back to the biological treatment tank during the verification-test period.

Principle

Pollutants including animal and vegetable oils contained in kitchen wastewater are decomposed by highly active oil-degrading microbes (Super-H Microbes) adhered to a fixed bed of a special biofilter. After fluctuations in the flow rate in the regulation tank are controlled, the wastewater from a kitchen is processed in the biological treatment tank in which the adhered fixed bed is installed. The sludge sediment separated in the sedimentation tank is fed back to the regulation tank. The processed wastewater is discharged from the effluent discharge tank. The oil-degrading activity is kept constant through the periodic addition of highly active oil-degrading microbes.

2. Summary of the verification test

○ Summary of the verification-test site

Type of business	Hotel
Business scale	Accommodation facility: 504 guest rooms, 723 guests; banquet hall: 400 guests; restaurant: 156 seats; and others (chapel, convenience store, etc.)
Location	1-7, Orai-kita, Rinku, Izumisano City, Osaka Prefecture
Wastewater flow rate during the verification-test period	

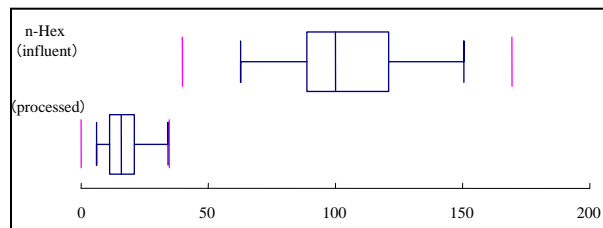
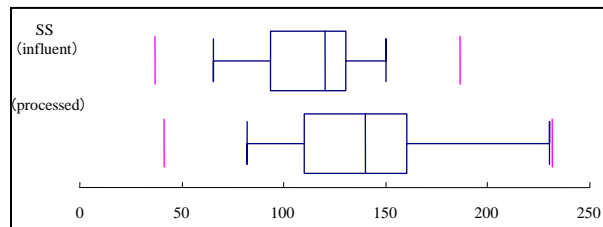
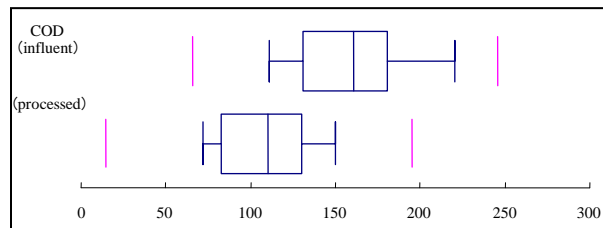
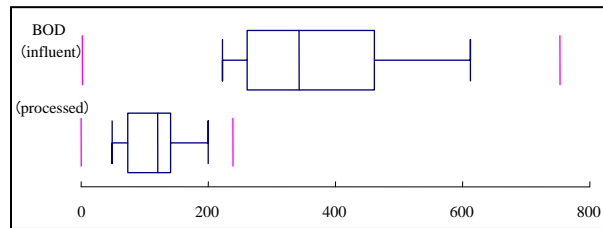
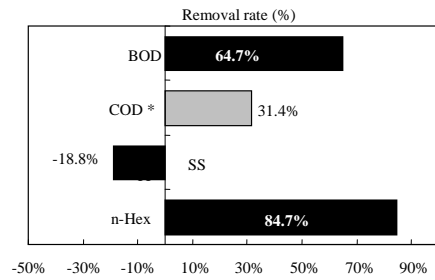
○ Specification and processing capacity of the target verification apparatus

Classification	Item	Specification and processing capacity
Summary of facility	Name/type	Oil-degrading-bacteria-adhered fixed-bed contact aeration method (BN Clean system)
	Size and weight	4,000 mm (W) × 4,000 mm (D) × 3,000 mm (H); approximately 5,000 kg
Design conditions	Target substance	BOD, SS, pH, and n-Hex
	Daily wastewater flow rate	48 m ³ /day at maximum
	Inflow period	10 hours
	Hourly inflow rate	Average: 3.2 m ³ /hour
	Influent-wastewater quality	(BOD) 800 mg/L, (SS) 600 mg/L, (pH) 5.8-8.6, and (n-Hex) 150 mg/L
	Processed-wastewater quality	(BOD) 600 mg/L, (SS) 600 mg/L, (pH) 5.8-8.6, and (n-Hex) 30 mg/L
Others	Chemicals used	Oil-degrading microbes (Super-H Microbes): 3.2 kg/month

3. Verification-test results

○ Verification items concerning water quality

Item	Unit	Verification results (lower neighboring value to higher neighboring value, and median value)			
		Influent wastewater		Processed (effluent) wastewater	
pH	-	6.9-7.6	7.3	7.3-8.1	7.7
BOD	mg/L	220-610	340	48-200	120
COD *	mg/L	220-110	160	72-150	110
SS	mg/L	65-150	120	82-230	140
n-Hex	mg/L	62-150	99	6-34	16



Note 1: Median value of the removal rates determined daily: "(load in influent wastewater - load in processed wastewater) / load in influent wastewater"

Note 2: * indicates items the removal of which is not intended in the target verification apparatus.

Note 3: Number of pieces of influent-wastewater data: 22; number of pieces of processed-wastewater data: 22

○ Items concerning environmental impact

Item	Verification result
Amount of generated sludge	No withdrawal of excess sludge during the verification period
Amount of generated waste	No generation of waste during the verification period
Noise	54 decibels (including environmental noise other than that from the facility)
Odor	Odor index: less than 10; odor intensity: 0 to 0.5 (6-level odor-intensity scale)



○ Items concerning used resources

Item	Verification result
Electricity consumption	114 kWh/day
Wastewater treatment chemicals and other consumption	Oil-degrading microbes (Super-H Microbes): 3.2 kg/month Bulking inhibitor: 1.0 kg (used only in the event of problems) Antifoam (solid): 0.4 kg (used only in the event of problems) Antifoam (liquid): 0.1 L (used only in the event of problems)

○ Items concerning operation and maintenance performance

Control point	Time and frequency of maintenance and management	Number and technical skill of the operators needed for operation and maintenance
Periodic maintenance (addition of microbial preparation, inspection and adjustment of instruments, confirmation and adjustment of processing conditions, and inspection of water quality)	140 to 170 minutes (average: 150 minutes) (Once per month)	Two operators are required for periodic maintenance. Specialized knowledge and experience with operation and maintenance of the overall facility, instruments, and electric devices required.

○ Qualitative findings

Item	Findings
Water-quality findings	  Influent wastewater Processed wastewater
Period required for startup	Not verified, as the facility exists and is in operation.
Reliability of target verification apparatus	The facility generally operated normally during the verification period. However, malfunction of a flow-rate control pump (once), the large-scale proliferation of fungi, malfunction of a float switch (once), and other incidents occurred.
Evaluation of the operation and maintenance manual	No particular problems to be solved
Others	-----

(Reference information)

All information on this page is provided by the environmental-technology developer on its own authority; the Ministry of the Environment and the verification organization are in no way responsible for the contents of this page.

○ Product data

Item	Description given by the environmental-technology developer				
Name/type	BN Clean system				
Manufacturer (distributor) name	Kondo FRP Industries Co., Ltd.				
Contact address	Tel/Fax	TEL : 06-6376-0810 FAX : 06-6376-0819			
	Website	http://www.kondoh-frp.co.jp			
	E-mail	info@kondoh-frp.co.jp			
Necessity of pre- and post-treatment	None				
Additional facility	None				
Life of target verification apparatus	Approximately 10 years or more				
Approximate cost (yen)		Item	Unit cost	Quantity	Total
		Initial cost			19,000,000
		FRP water tank (Including materials and labor)		1	8,500,000
		System parts		1 set	8,000,000
		System installation work		1 set	2,000,000
		Trial run and adjustment		1 set	500,000
		Regulation-tank installation work			Separately estimated
		Operating cost (month)			204,980
		Sludge disposal	-----	-----	-----
		Waste disposal	-----	-----	-----
		Electricity	1,166 yen/day	30 days	34,980
		Water	-----	-----	-----
		Wastewater treatment chemicals			Included in *
	Other consumables			Included in *	
	Maintenance and management subcontracting (month) *		1 set/month	170,000	
	Per m ³ of processed wastewater (assumed amount of processed wastewater: 1,440 m ³ /month)			142	

○ Other information from manufacturer

* The cost of maintenance and management subcontracting includes costs for inspection of water quality, various parts, and consumables, preparation and submission of a management report, and others.