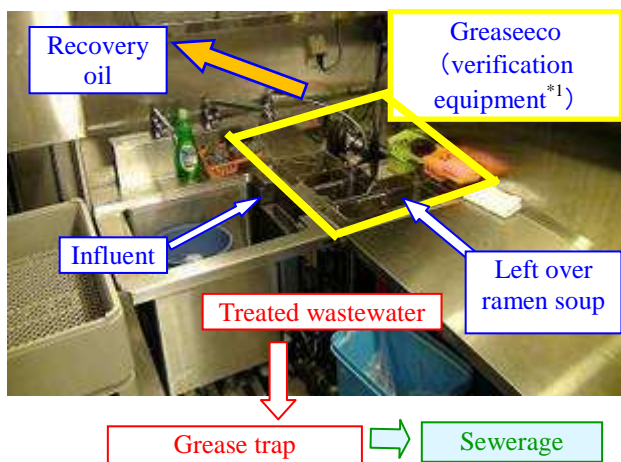


**○ Overview**

Technology intended for verification / verification applicants	Oil separating recovery equipment for restaurant having no holiday in compound building Greaseco DS-2 750-600W (corresponding type for high concentration of oil) / Daitogiken Co., Ltd.
Demonstration institution	Saitama-ken Environmental Analysis & Research Association
Period of the experiment for verification	February 11, 2012 8:00 a.m. to February 12, 2012 4:00 a.m.
Purpose of this technology	This verified technology was developed for organic wastewater treatment devices to treat oily wastewater discharged from ramen restaurants and similar facilities that operate continuously in a multi-tenant building. Large amounts of fat are discharged depending on the kinds of ramen along with the leftover ramen soup and wastewater after washing the eating utensils. This device can reduce the pollution load, prevent clogging of pipes and decrease the load on subsequent treatment tanks.

**1. Outline of the technology intended for verification**

Flow diagram (Same flow of wastewater as the verification experiment.)



**Principle**

This device<sup>\*1</sup> (within the yellow frame) separates the fat contained in the leftover ramen soup and wastewater discharged after washing the eating utensils while the fat concentration is still high. The fat in the wastewater is easily separated due to the difference in specific gravity between fat and water, and then the floating fat is collected.

\*1 : An actual device incorporating the verified technology was used for this verification test.

## 2. Outline of the verification experiment

(1) Outline of the location for performing the verification experiment and conditions of the place for performing the verification experiment (equipment ・ influent quantity)

Project type	Ramen restaurant
Project scale	Number of seats: 48, Operating hours: A week day 10:00 a.m. to 12:00 a.m. (a holiday: 9:00 a.m. to 2:00 a.m. of next day), Regular holidays: none
Address	MT building first floor 4-4-7 Sotokanda, Chiyodaku, Tokyo
Influent quantity into the equipment intended for verification <sup>*2</sup> (Box plot <sup>*3</sup> )	<p>Influent quantity (m<sup>3</sup>/h)</p> <p>1.691m<sup>3</sup>/day</p> <p>[ Leftover ramen soup from 779 ramen servings ]</p> <p><sup>*2</sup> : For influent quantity, see Section 7.1 “Results of Monitoring Items” of the detailed version (Page 15, 16 of main part). <sup>*3</sup> : For the box plot, see “How to Read the Box Plot” (for Reference) (Page 16 of the main section in the detailed part).</p>

(2) Specification and performance of the equipment used for verification

Category	Item	Specifications and water treatment capacity
Outline of the facility	Model	Oil separating recovery equipment for restaurant having no holiday in compound building Greaseco DS-2 750-600W (corresponding type for high concentration of oil)
	Size and weight	Body of equipment for verification experiment W600mm×D750mm×H800mm ・ 58kg
Design conditions	Object	n-hexane extract content (n-Hex)
	Performance	Wastewater treatment 25 L/min
	Treatment object	n-hexane extract content (n-Hex) Reducing rate of concentration 90% or over.

## 3. Results of the verification experiment

### 3.1 Use of existing data

The same type of treatment device has been installed in other facilities, and the test data previously obtained from those facilities was used in this verification test to shorten the verification test period.

Results of existing data (water collection date: May 11, 2008, number of served ramen dishes: 500)

(Concentration water quality)

Water sampling time	n-hexane extract content (n-Hex)			Biochemical oxygen demand (BOD)		
	Left over ramen soup (mg/L)	Treated wastewater (mg/L)	Reducing rate (%)	Left over ramen soup (mg/L)	Treated wastewater (mg/L)	Reducing rate (%)
15:50	260,000	100	99.96	101,000	1,440	98.6
16:50	280,000	310	99.89	76,900	4,310	94.4
19:30	30,000	100	99.67	83,500	852	99.0
Average value	190,000	170	99.9	87,100	2,200	97.5

### 3.2 Water quality verification experiment

The verification test was conducted at a location where the wastewater was very fatty due to leftover ramen soup containing pork fat. The test results were assessed in terms of water quality concentration.

The concentration of n-hexane extract (n-Hex) was reduced by 98.4%, achieving the target reduction ratio of at least 90% in water quality concentration. Thus, the treatment device exhibited a very high removal ratio of highly concentrated fat.

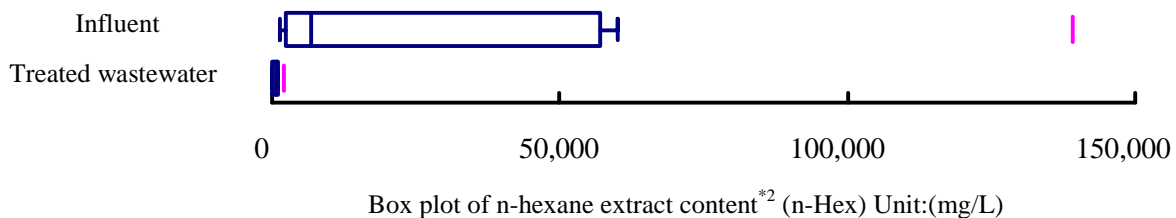
Results of the verification experiment [n-hexane extract content (n-Hex) is indicated below.]

Measurement value	Influent <sup>*1</sup>		Treated wastewater <sup>*2</sup>		Reducing rate
	Minimum to maximum value	Average value	Minimum to maximum value	Average value	
Concentration of water quality (mg/L)	1,400~60,000	32,000	27~970	520	98.4%

\*1 : The concentration of substances in the influent includes the average concentration in the leftover ramen soup from 627 ramen dishes served from 1:00 p.m. to 2:00 a.m. the next day. Meanwhile, 779 ramen dishes were served during the normal operating hours (from 9:00 a.m. to 2:00 a.m. the next day).

\*2 : Regarding the concentration of substances in the treated wastewater, partial treatment was performed because the water collection equipment disrupted the treatment process.

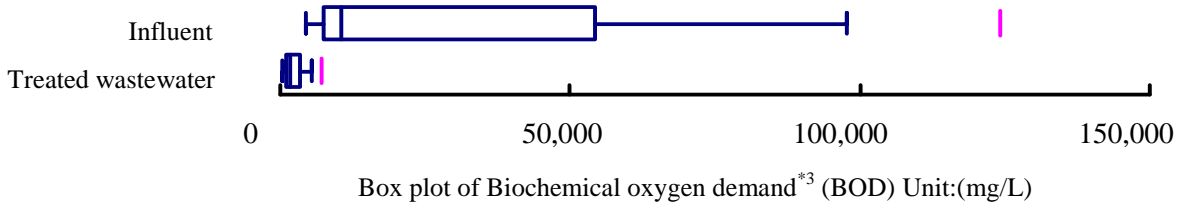
The verification test results, particularly the box plot for the water quality concentration, show that the concentration of substances in the treated wastewater is within a fixed range. This indicates that the wastewater treatment is stable although some measurement values show a high concentration of the substance.



\* Results of biochemical oxygen demand (BOD) are as follows for reference.

Verification examination results of reference test item [Biochemical oxygen demand (BOD) is indicated below.]

Measurement value	Influent <sup>*1</sup>		Treated wastewater <sup>*2</sup>		Reducing rate
	Minimum to maximum value	Average value	Minimum to maximum value	Average value	
Concentration of water quality (mg/L)	4,450~97,800	37,000	402~25,200	11,200	69.7%



\*3 : For the box plot, see “How to Read the Box Plot” (for Reference) (Page 16 of the main section in the detailed part).

### 3.3 Operation and maintenance item

#### (1) Environmental impact item

Item	Verification result
Amount of sludge	No sludge is generated in the treatment process using this device.
Amount of wastes	No waste is generated in the treatment process using this device. However, the ramen residues attached to the strainer must be removed when cleaning the treatment device.
Noise	The treatment device did not generate loud noise compared with the surrounding noises.
Odor	When operating or stopping the device, no unusual odors were emitted compared with the cooking odors in the kitchen.
Recovery of valuables	Collected fat amount: 16.8 L / ramen soup residue: 779 dishes / one operating day (the amount was measured) No water was found at the bottom of the fat collection container, and the fat contained only a very small amount of water.


#### (2) Used resources index

Item	Verification result
Amount of electric energy used	11.97kWh/8:00 a.m.~ 5:26 a.m. of the next day (21 hours 26minutes)/1business day
Amount of chemical used for waste water treatment	No chemicals, biochemicals or aeration were used.

#### (3) Operation and maintenance performance item

Maintenance item	Maintenance time per operation and maintenance frequency	Number of people and skill required for maintenance
Check before use	5 minutes/day, check of water volume (when starting the day's work)	One person without any special skills is required.
Recovery of oil	5 minutes/one collection, when the fat container is full or the work is finished	One person without any special skills is required.
Cleaning of the equipment intended for verification	20 minutes/day (after finishing the day's work) Disassembly, washing and reassembly of the treatment device	One person without any special skills is required.

(4) Qualitative remark

Item	Remark
Remark on water quality	<p>The verification test results show that the concentration of n-hexane extract (n-Hex) was reduced by 98.4%, achieving the target. Although the concentration of n-hexane extract (n-Hex) in the influent fluctuated significantly between 1,400 and 60,000 mg/L, the wastewater treatment was stable, even when the concentration of the substance was high. Collecting the fat reduces the pollution load on subsequent treatment facilities (grease traps and public sewerage systems).</p>  <p style="text-align: center;">Influent                  Treated wastewater</p> <p>Influent                  : n-Hex 6,800mg/L、BOD 10,600mg/L Treated wastewater : n-Hex 27mg/L、BOD 402mg/L</p>
Operations required for initiation	After checking that the verification equipment was filled with the specified amount of water, the power switch was turned on.
Operations required for shutdown	The power switch was turned off and then the verification equipment was disassembled and washed.
Reliability of the equipment intended for verification	No trouble occurred in the verification equipment during the experiment.
How to solve the problems	If a trouble occurs, contact the manufacturer (applicant for verification).
Evaluation of the instruction manual of operation and maintenance	The instruction manual for operation and maintenance was easy to understand. The operator could sufficiently understand the equipment and perform proper maintenance.
Others	This device can be installed in a small space such as in a restaurant in a multi-tenant building and can efficiently remove even a high concentration of fat. Since no chemicals are added and high heat is not applied in the treatment process, the separated fat degenerates only very slightly, and so the collected fat can be reused as raw material for fatty acid production. Thus, this device can reduce the amount of waste treatment, recycle the resources, prevent clogging of pipes and decrease the pollution and environmental load on subsequent wastewater treatment facilities (such as grease traps and public sewerage systems).

#### 4. Reference information

The information shown in this chapter is provided by the applicant for verification at its responsibility for publication of the technical data and not the subject of the verification experiment. The Ministry of the Environment and the organization conducting the verification experiment are not responsible for the information in this chapter.

##### ○ Product data

Items		Column to be filled in by the applicant for verification				
Name/type		Oil separating recovery equipment for restaurant having no holiday in compound building Greaseeco DS-2 750-600W (corresponding type for high concentration of oil)				
Manufacturer (distributor)		Daitogiken Co., Ltd.				
Contact address	TEL/FAX	TEL (0282) 28-0606 / FAX (0282) 28-1221				
	Web address	<a href="http://www.greaseeco.co.jp">http://www.greaseeco.co.jp</a>				
	E-mail	daito@greaseeco.co.jp				
Size and weight		W600mm×D750mm×H800mm • 58kg				
Necessity for pre-treatment and post-treatment		None				
Supplementary facility		None				
Life of the equipment		20 years for the main body and 4 years for the driving parts (The warranty period is one year. The equipment has been used for 3 years to date, without failure.)				
Time for initiation		The equipment can be used immediately after installation.				
Approximate cost (yen)		Expense item	Unit price	Quantity	Total	
		Initial cost				3,520,000 yen~
		Body type	3,500,000 yen~	1 set	3,500,000 yen~	
		Delivery cost	20,000 yen~	1 set	20,000 yen~	
		Installation work	0 yen~	1 set	0 yen~	
		Running cost (monthly)				
		Electric power consumption	22.8 yen/kW	40W/h	657 yen/month <sup>*1</sup>	
		Per 1 m <sup>3</sup> of treated wastewater (Actual verified quantity 50.7 m <sup>3</sup> /month: 1.69 m <sup>3</sup> x operation for 30 days)				13.0 yen/m <sup>3</sup>
Note: The cost for disposing of the residues is not included. Regular maintenance and inspection can be voluntarily performed by the users.						
*1: This cost is calculated based on the condition that the device is operated 24 hours a day for 30 days.						

○ Other information from the manufacturer

- This device is most suited for a ramen restaurant that uses large amounts of lard and pork fat in long opening hours.
- The elimination of drainpipe clogging and similar problems will result in improved relations with the property owner or management company.
- Ideal for a business in a multi-tenant building. The device can treat the soup residue of 5,000 ramen dishes a day without a decline in performance.
- The device uses no biochemicals, enzymes or adsorbents.
- The collected fat is reused as a recyclable resource. We can introduce collection traders.
- The device can be effectively used in a building where a grease trap cannot be installed. It is also very useful when a ramen restaurant is built where a convenience store or similar business was previously located.
- Since the device prevents wastewater problems, renting a restaurant space is easier.
- This device has already been used for three years by a ramen restaurant near the place where the verification test was conducted. Another restaurant in the same group has been using this device for over ten years.
- This device provided the proper measures for treating wastewater in the “Project for Constructing a System for Collecting Fat in Wastewater and Recycling It”.