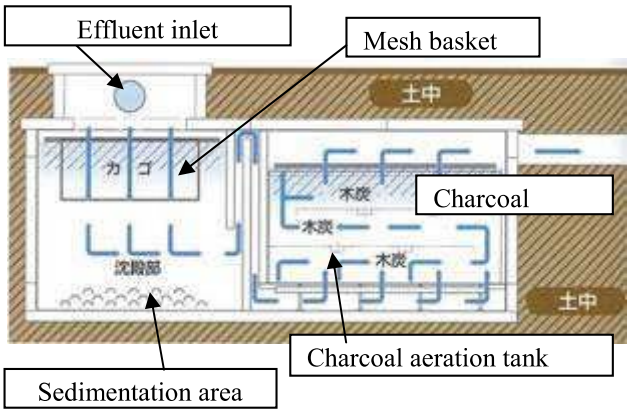
○ Overview

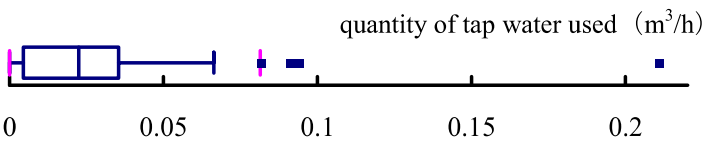
Technology intended for verification/ verification applicants	Home non-excrement waste water treatment equipment, which uses charcoal (The new purifying facility for non-excrement waste water, type SG-500)/Seiwa Denko Co., Ltd.
Demonstration institution	Saitama-prefectural Environmental Analysis & Research Association
Period of the experiment for verification	August 10, 2012 ~ January 28, 2013
Purepose of this technology	This technology is designed to clean domestic wastewater (domestic non-fecal wastewater) containing no human excrement by solid-liquid separation based on physical sedimentation and physicochemical cleaning such as adsorption by charcoal.

1. Outline of the technology intended for verification

Flow diagram (Same flow of waste water as the verification experiment)	Principle
	This cleaning technology is designed to clean domestic wastewater (domestic non-fecal wastewater) containing no human excrement. The principle involves solid-liquid separation based on physical sedimentation, physicochemical cleaning such as adsorption by charcoal, and biological cleaning whereby organic substances are decomposed by biofilms. The features of this technology include an upward water passage for ensuring a long contact time with charcoal and an aeration system in which oxygen necessary for biological treatment is supplied throughout the water passage. By performing these operations comprehensively, organic contaminants such as BOD and nutrient salts such as T-N and T-P can be eliminated simultaneously.

2. Outline of the verification experiment

2.1 Outline of the location for performing the verification experiment

Project type	Residential house
Operation hours	24 hours (Used as residence)
Address	Asahikawa-shi,Hokkaido
Influent quantity into the equipment intended for verification *1 (Box plot*2)	

*1 : Quantity of influent into the verification equipment

*2 : For the box plot, see “How to Read the Box Plot” (for Reference) (Page 17 of the main section in the detailed part).

*3 : Data was deleted because there was no inflow into the verification equipment when water was not used.

*4 : The lower adjacent value was defined as 0 because there were hours when no water was used.

2.2 Specification and performance of the equipment used verification

Category	Item	Specifications and water treatment capacity
Outline of the facility	Model	Type SG-500
	Size and weight	Outside dimensions W710mm×D1,930mm×H940mm Internal capacity: 500 L (when filled with 60 kg of bincho charcoal) Weight of main unit: 150 to 180 kg (excluding charcoal)
	The verification equipment was installed in October 2011, and the charcoal packed in the equipment was used successively after having been used for 10 months before the verification experiment was started.	
Design conditons	Object Treatment object	Biochemical oxygen demand (BOD) Concentration: 20 mg/L or lower Total nitrogen (T-N) Concentration: 10 mg/L or lower Total phosphor (T-P) Concentration: 1 mg/L or lower Attaining the same water quality as water treated by advanced wastewater treatment tank
	Capacity	Miscellaneous drainage from standard households with five to eight people (from product data) The number of residents during the verification experiment period was two at all times (except for one day per week when there were six people).

3. Results of the verification experiment

3.1 Water quality verification experiment

Verification experiments were conducted three times, in August, December, and January. Figure 1 shows the transition of water quality (concentration). Water was sampled three times a day, and the three samples were mixed to prepare a specimen. The concentrations were found to increase on the second day of each month because the usage increased (the number of residents increased on weekends).

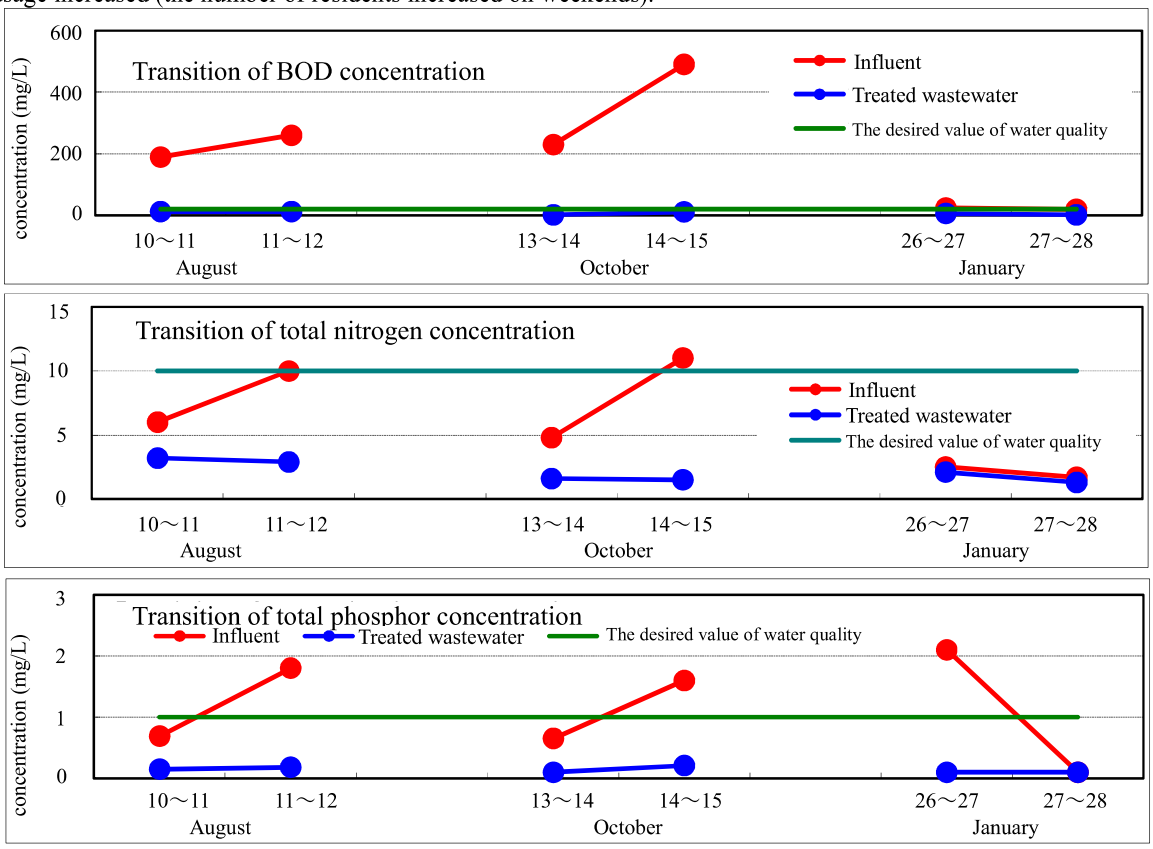


Figure1 Transition of water quality (concentration) per verification item

※Multiple days are listed on the date axis because sampling was conducted at 18:00, 22:00, and 7:00 of the next day to prepare a sample mixture.

Table 1 lists the concentrations of treated water measured during the verification period. The target value of

treated water was achieved, the average BOD being 7.4 mg/L. Total nitrogen was 2.1 mg/L, achieving the target value, but the average inflow concentration was lower than the intended concentration. The total phosphor was 0.14 mg/L, achieving the target value, but the average inflow concentration was approximately the same as the intended concentration. The removal efficiency expressed as pollution load was as follows: BOD: 94.9%, total nitrogen: 55.2%, total phosphor: 84.2%.

The average drainage volume was 0.396 m^3. Since the capacity of the equipment was 0.306 m^3, the retention time in the verification equipment was approximately one day.

Table 1　Concentration and pollution load of the influent and the treated water

Pollutant quantity	Category	Influent		Treated wastewater		Removal ratio (%)
		Minimum to maximum value	Average value	Minimum to maximum value	Average value	
Concentration of water quality (mg/L)	BOD	19.4～490	202	1.8～12	7.4	–
	Total nitrogen	1.7～11	6.0	1.5～3.2	2.1	
	Total phosphor	Under 0.20～2.1	1.16	Under 0.20～2.1	0.14	
Pollution load (g)	BOD	2.67～93.8	32.8	0.15～5.92	1.68	94.9
	Total nitrogen	0.23～2.96	1.05	0.10～1.58	0.47	55.2
	Total phosphor	0.01～0.37	0.19	0.01～0.07	0.03	84.2

3.2 Operation and maintenance item

(1) Environmental impact item

Amount of wastes	Waste substances such as deposits generated in the wastewater treatment process were not found during the verification experiment period. However, it is necessary to remove food residues from the mesh basket of the verification equipment.
Noise	The verification equipment did not produce significant noise during operation compared with the surrounding noise.
Odor	No abnormalities were found during normal use (with the lid of the verification equipment closed).

(2) Used resources index

Consumables	No consumables were used during the verification experiment period.
Power consumption	The air pump only consumed electric power, and its power consumption was 0.25 kWh/day (measured by an integrated wattmeter).

(3) Operation and maintenance performance item

Maintenance item	Maintenance time per operation and maintenance frequency	Number of people and skill required for maintenance
Daily inspection	Clean the mesh basket in the verification equipment approximately once every three months.	One person without any special skills is required.
Periodic inspection	In the case of a power failure, check the operation of the air pump as well as the timer setting against the display on the control panel. The technology developer should cope with failures.	The sedimentation area was cleaned twice a month when water quality was checked. The work was simple and could be performed by residents. Charcoal was not replaced during the verification period.

(4) Qualitative remark

Remark on water quality	The average BOD of the treated water at the verification site was 7.4 mg/L, whereas that of the inflow was 202 mg/L. The inflow was slightly cloudy, yet the treated water was transparent. Even when load was applied by discharging water from a bathtub (0.235 m^3) at once, the SS concentration of the treated water remained 3 to 4 mg/L, which was very close to the value in normal use (2 to 3 mg/L), meaning that no SS outflowed.   Left：Influent、Right：Treated wastewater Start of verification test: 18:00 on August10 Left：Influent、Right：Treated wastewater End of verification test: 16:00 on January 28
Time required to start the equipment	(1) Set the power of the control panel to ON, and check that the equipment is in auto mode. (2) Set the timer, and check the operation of the air pump.
Time required to stop the equipment	Set the power of the control panel to OFF, and the equipment stops immediately.
Reliability of the equipment intended for verification	The pipe for aeration came off in December, but was reconnected immediately.
How to solve the problems	Contact the technology developer in case of trouble.
Evaluation of the instruction manual of operation and maintenance	No special improvement is necessary.
Others	The number of residents during the verification experiment period was two at all times (except for one day per week when there were six people), and the average drainage volume was 0.396 m^3. The pollutant removal efficiency fell within the range of 55% to 95%. From the above, this verification equipment is likely to help conserve public water bodies by treating miscellaneous drainage. However, if the number of users is more than that confirmed when the verification test was performed, it is necessary to check whether large quantities of biofilms have attached to the charcoal cleaning carrier, and whether they can be retained within the equipment.

4. Reference information

The information shown on this page 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 on this page.

4.1 Product date（reference information）

Items		Description given by the environmental-technology developer
Product name/type		Home non-excrement waste water treatment equipment, which uses charcoal Bio-Lux Water(The new purifying facility for non-excrement waste water, type SG-500)
Manufacturer (distributor)		Seiwa Denko Co., Ltd.
Contact address	TEL/FAX	TEL 0166（39）7611 / FAX 0166（39）7612
	Web address	http://www.seiwa-denko.co.jp/
	E-mail	seiwa@seiwa-denko.co.jp
Necessity for pre-treatment and post-treatment		None
Supplementary facility		Control panel (air pump integrating a 24-hour timer)
Life of the equipment		Stainless steel main unit: 20 years, Pump: 15,000 hours (Approximately three years and six months when the equipment is operated intermittently) Bincho charcoal need not be replaced, but must be washed once every two years.
Time for initiation		Usable immediately after installation.

Approximate cost

Expense item	Unit price	Quantity	Total
Initial cost			Total 1,170,000 yen
Price of main unit (including control panel)	750,000 yen	1 set	750,000 yen
Transportation cost: Price within Hokkaido when a truck crane is used (Separate prices are applicable to remote islands.)	about 120,000 yen	1 set	about 120,000 yen
Installation work (1 to 2 days) (including installation, water discharge, and electrical work)	about 300,000 yen	1 set	about 300,000 yen
Note: The cost for transportation and installation work will be quoted case by case, depending on the site.			
Running cost (monthly)			Total 184 yen
Electric power consumption (0.255kw × 30 days)	24 yen/kw	7.65kw	184 yen
Note: The only cost for treating miscellaneous drainage is the monthly electricity cost.			
Per 1 m^3 of treated wastewater ［ 0.44 m^3 × operation for 30 days ］			13.9 yen

4.2 reference information

●Features of this cleaning equipment

(1) The equipment cleans domestic non-fecal wastewater discharged from kitchens, bathrooms, washing machines, etc. (other than toilets) by passing it through bincho charcoal layers.

(2) All kinds of drainage can be treated, with human excrement treated using the “Bio-Lux” bio-toilet and miscellaneous drainage treated using this cleaning equipment (Bio-Lux Water).

● Types and prices of the “Bio-Lux Water” cleaning equipment

① Type SG-500 ￥750,000 ② Type SG-653 ￥780,000 ③ Type SG-1340 ￥980,000

● Principle of the cleaning equipment

This cleaning equipment is designed for domestic wastewater (domestic non-fecal wastewater) not containing human excrement. The equipment has a simple structure to avoid failures caused by complicated structures. The stainless steel main unit reinforced by a wooden frame is installed underground. Solid-liquid separation is performed in the sedimentation area by trapping solids such as food residues in a mesh basket. In the aeration unit, carriers containing high-durability bincho charcoal pick up nutrient salts, and the decomposition of organic substances by biofilms that have attached to the bincho charcoal is accelerated by the supplied oxygen. To ensure a long contact time between wastewater and charcoal, a stainless steel partition plate is provided to form an upward