

Version 4

Project of the Environmental Technology Verification

Field of Organic Wastewater Treatment Technologies for
Small-scale Establishments
Protocol for Verification Tests

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Main Parts

I. Introduction

1. Target technologies

Under this Protocol for Verification Tests, wastewater treatment technology refers to technology, including equipment and plants, for appropriately treating organic wastewater from kitchens, dining rooms, food factories, and other facilities at small-scale establishments (daily discharging less than 50 m³ of wastewater). Among such technologies, this Protocol for Verification Tests covers compact technologies that are commercially available at lower cost and easily installable, including prefabricated systems. In addition to comprehensive wastewater treatment technologies, this Protocol also covers a wide range of other technologies, including sludge treatment technologies and wastewater treatment systems exclusively designed to remove specific pollutants.

Wastewater is largely processed either by biological treatment or by physiochemical treatment. The combination of the two methods is also used.

2. Definition of Terms

The definition of terms in this Protocol conforms to Japanese Industrial Standards (hereinafter referred to as “JIS”). Specifically, the terms used in this Protocol are closely associated with following JIS standards:

- JIS K 0094: Sampling methods for industrial water and industrial wastewater
- JIS K 0102: Testing methods for industrial wastewater
- JIS B 8530: Glossary of terms for pollution control equipment
- JIS B 9940: Testing methods of pH controlling equipments (The abbreviation “pH” stands for power of Hydrogen)
- JIS B 994: Testing methods of precipitation equipments
- JIS B 9942: Testing methods of filtration equipments for clarifying
- JIS B 9943: Testing methods of floatation equipments
- JIS B 9944: Testing methods of activated sludge process equipments

The terms defined by this Project are shown in Table 1.

Table 1 Definition of terms used in the Protocol for Verification Tests

Terms	Definition
Target verification technology	The mechanism of removing water quality pollutants or reducing sludge covered by verification tests. Target verification technologies must be based on clear scientific grounds.
Target verification device	Target verification technologies embodied in devices and equipment that are used in verification tests.
Verification items	Items used to measure the performance of the target verification device
Monitoring items	Items used to monitor operations and prevent adverse effects on the surrounding area.
Verification test site	An establishment where the target verification device is located and verification tests are implemented.
Verification applicant	Person who offers to receive technology verification (such as developers and distributors).
Operation and maintenance record	A record describing operation and maintenance activities at the verification test site.

3. Types and Outline of Verification Tests

(1) Types of verification tests

Verification tests are intended to verify the following items concerning the target verification device set on wastewater sources by implementing a series of actions on them, including startup , operation, and suspension.

- Effects on environmental conservation in an actual operating environment and within the scope of the technical specifications provided by the verification applicant.
- Energy, supplies, volume of waste, and expected costs required for operation.
- Appropriate operating environment.
- Labor consumed in operation and maintenance.

Verification tests at a single verification test site are not sufficient to determine the whole performance of target verification technologies. Nevertheless, satisfactory information may be obtained to determine the applicability of the target verification technologies to the same types of wastewater. An application filed by a verification applicant for multiple verification test sites may be accepted.

(2) Outline of verification tests

Verification tests are implemented by a verification organization typically in accordance with the following phases. As necessary, the verification organization may subcontract verification tests to external organizations.

(a) Formulation of a verification test plan

A verification test plan is formulated prior to implementation of a verification test. The verification test plan is prepared by the verification organization with cooperation of the verification applicant and owners of verification test sites.

The planning phase is typically composed of the following activities:

- Identifying parties and organizations associated with the verification test.
- Clarifying general and technical purpose of the verification test.
- Selecting verification test sites appropriate for verification of target verification technologies.
- Determining verification items and monitoring items.
- Determining the analytical method, the sample collection method, and the test period.
- Formulating a verification test plan that reflects the above requirements and setting forth the task details, the schedule, and the personnel involved.

(b) Implementation of a verification test

In this phase, actual verification tests are implemented in accordance with the verification test plan. Verification tests are intended to determine whether the target verification device is appropriate to its purpose.

(c) Data evaluation and reporting

In the final phase, all data are analyzed and verified, and a Report on Verification Test Results is prepared. Data evaluation and reporting is performed by the verification organization.

The Report on Verification Test Results is submitted to a verification management organization and reviewed by the Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments under the Study Committee on the Project of the Environmental Technology Verification (hereinafter referred to as “Working Group”), which determines whether the verification has been implemented appropriately. Then the verification management organization submits the report to the Ministry of the Environment, which approves the report on the basis of the review by the Working Group and delivers a verification number and a logo. The approved Report on Verification Test Results is made open to the public on the Ministry of the Environment’s Project of the Environmental Technology Verification website.

II. Implementation Scheme for Verification Tests

1. The Ministry of the Environment

- Manages the Project of the Environmental Technology Verification in a comprehensive manner.
- Reviews the verification system in a comprehensive manner.
- Sets up and manages the Study Committee on the Project of the Environmental Technology Verification.
- Selects a target technological field for verification tests.
- Selects a verification management organization.
- Subcontracts the implementation of verification tests to the verification management organization and pay relevant expenses.
- Approves the Protocol for Verification Test.
- Authorizes the verification organization.
- Approves Reports on Verification Test Results.
- Builds an environmental technology database for the purpose of promoting environmental technologies.
- Gives verification numbers and logos for verified technologies.

2. The Study Committee on the Project of the Environmental Technology Verification

- Provides recommendations for the management of the Project of the Environmental Technology Verification.
- Provides recommendations for selecting the verification management organization.
- Provides recommendations comprehensive evaluation of the verification test results.

3. Verification Management Organization

- Formulates the Protocol for Verification Tests and obtains the approval of the Ministry of the Environment.
- Selects the verification organization and obtains the approval of the Ministry of the Environment.
- Approves target verification technologies.
- Determines fee items related to verification tests and collects fees from the verification applicant.
- Subcontracts verification tests to the verification organization.
- Confirms Reports on Verification Test Results and obtains the approval of the Ministry of the Environment.

- Sets up and manages the Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments.

4. Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments

- Provides recommendations for the management of the Project of the Environmental Technology Verification for the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments.
- Provides recommendations for formulation of the Protocol for Verification Tests.
- Provides recommendations for selecting the verification organization.
- Provides recommendations for approving Reports on Verification Test Results.

5. Verification organization

- Manages verification tests under a subcontract with the Ministry of the Environment or the verification management organization.
- Constructs the quality management system as specified in Appendix 0.
- Collects and examines target verification technologies.
- Sets up and manages the Technology Verification Committee.
- Approves verification test sites.
- Formulates a verification test plan with cooperation of the verification applicant and the owner of verification test site.
- Calculates fees related to verification tests.
- Implements and manages verification tests in accordance with the verification test plan.
- Secures verification test sites for the sake of the health and safety of all people involved in verification tests.
- Prepares schedules and promotes coordination, as necessary, including collecting contact information on participants in all verification tests and providing transport and technical support.
- Ensures that the quality management system as required by the Protocol for Verification Tests is functioning properly at subcontractors.
- Conducts audits of procedures for verification tests.
- Manages data and information obtained from verification tests.
- Analyzes verification test data and prepares Reports on Verification Test Results.

6. Technology Verification Committee

- Provides recommendations for examining target verification technologies.

- Provides recommendations for selecting verification test sites.
- Provides recommendations for formulating the verification test plan.
- Provides necessary recommendations concerning problems arising during the course of verification tests.
- Provides recommendations for preparing Reports on Verification Test Results.
- Provides recommendations for promoting verified technologies.

7. Verification applicant

- Recommends establishments to the verification organization in selection of verification test sites and provide required information.
- Cooperates with the verification organization in formulating the verification test plan by, for example, providing information necessary for verification tests.
- Prepares the necessary number of the target verification device that could be used at verification test sites. Also provides operation and maintenance manuals for the verification organization.
- Transports, installs, and removes the target verification device, as necessary, at its own expense and on its own responsibility.
- Pays expenses incurred in connection with verification tests and operation and maintenance of the target verification device. Also pays expenses in connection with drugs, consumable supplies, electricity, and other additional expenses.
- Provides technical support to the verification organization during verification test, as necessary, including operation and measurement of verification devices.
- Provides necessary engineers for operation and maintenance of the target verification device. Such engineers must be sufficiently qualified or trained.
- Collects existing performance data relating to target verification technologies to be used in trial or operation at any other establishment.
- Cooperates with the verification organization in preparing Reports on Verification Test Results.

8. Owner of Verification Test Site

- Extends cooperation to the verification organization in formulating the verification test plan, by for example, providing information required for verification tests.
- Extends cooperation in verification tests in accordance with the verification test plan.
- Provides technical support in operation and maintenance in accordance with agreement between the support verification organization, the verification applicant, and the owner of verification test site.

- Reports, to the verification organization, any change or fluctuation in business activities that could affect the quality and quantity of wastewater from verification test sites.

III. Examination of Target Verification Technologies

1. Application

The verification applicant may apply to the verification organization for verification of technologies or products owned by them. The following information shall be given in the application to a verification organization together with specified documents as set forth in Appendix 1 “Application for Verification.”

- a. Company name and address, department and name of personnel in charge, etc.
- b. Outline of the technologies,
- c. Results of tests conducted by the applicant.
- d. Product data.
- e. Control items and control time and frequency required for operation and maintenance.
- f. Progress of development activities and past issuance records.
- g. Innovativeness of technologies.
- h. Other (special remarks)
- i. Technical specifications for the target verification device (the ground for design shall be identifiable).*
- j. Operation and maintenance manuals (the details of control shall be identifiable) *
- k. Location offer verification test site and documented approval of the owner for verification tests.*

(Note) The asterisk * refers to documents attached to the application form.

2. Examination of Target Technologies

The verification organization totally examine target technologies based on the information given in the application and opinions of the Technology Verification Committee in the following respects and obtain the approval of the verification management organization.

- a. Formal requirements
 - Is the applied technology fall compatible with a target technological field provided on page 1 “1. Target Technologies”?
 - Is the application complete and free of deficiencies?
 - Is the technology in the commercialization phase?
- b. Verifiability
 - Is the technology verifiable in terms of the budget and the implementation scheme?
 - Can a verification test plan be formulated appropriately?
 - Can the verification applicant pay fees related to verification tests?
- c. Effects on environmental conservation, etc.
 - Are the mechanism and mechanism of the technology scientifically describable?

- Is the technology free of any secondary environmental problems?
- Will the technology produce favorable effect on environmental conservation?

In the examination phase, the verification applicant may consult with the verification organization concerning the details of verification method, including the test period and timing. The examination results for individual technologies are not, as a rule, made public.

IV. Preparations for Verification Tests

1. Selection of Verification Test Sites

Verification test sites are approved by the verification organization at the request of the verification applicant. In this Project, the following may be verification test sites.

- Sites where operating the target verification device are already installed and are in operation.
- Sites where the target verification device will be installed for the purpose of verification tests.

(The target verification device may be installed by bifurcating raw water from existing wastewater treatment facilities.)

In selecting verification test sites, the verification organization shall consider the following:

(a) Compatibility with the technological field

Is the type of business appropriate to the technological field? Is water flowing into the target verification device compatible with the properties of wastewater listed in Table 2 and Table 3, without deviating significantly deviating from them?

(b) Compatibility with the target verification technology

Are the operating condition and influent water appropriate to the technical specifications and properties of the target verification technology?

(c) Compatibility with verification tests

Does the target verification technology meet the varying requirements specified in this Protocol for Verification Tests?

To install the target verification device, the verification applicant shall secure an environment appropriate for smooth implementation of verification tests, upon consultation with the owner of verification test site, to ensure harmony with the surrounding environment and minimize effect on operation of the devices. The verification applicant shall be held responsible for returning the verification test site to its original state upon termination of the verification test. If any modification is needed during the test period, consultation shall be held between the verification organization, the owner of verification test site, and the verification applicant.

The verification applicant shall provide the following information to the verification organization for enable it to deliberate on the abovementioned considerations:

- A detailed description of the location of the verification test site and the operating condition of the establishment (e.g., 20-seat fast food stores, dining rooms at 100-student schools)
- Procedures required if the verification test site is subject to any regulation.
- Information on work that could affect the quality and flow rate of influent water.
- A layout map showing the layout of existing facilities and the target verification device.

- A description of the method of installing the target verification device and the method of introducing influent water into the target verification device. (The temperature of wastewater can cause fluctuations in treatment by the target verification device. For this reason, the layout of the target verification device shall be described in detail so that such effects can be identified.)
- The presence/absence, types, and control conditions of wastewater treatment facilities, including disposers and traps (grease traps, etc.).
- The discharge destination of treated water and the waste treatment method (information on how waste is collected, reduced, or recycled)
- Appropriate locations of flow-rate monitoring and sample collection.
- Other characteristics of the verification test site.
- A description of processes that affect treatment of wastewater, including sanitation and safety measures involving the use of disinfectants or cleansers.

The verification applicant is recommended, to the extent possible, to present the following information to the verification organization.

- A system diagram of wastewater subject to the verification test (including the supply of raw materials and production of goods)
- Quantity and quality of water by system (water temperature) and wastewater discharge hours.
- The presence/absence, types, and control conditions of wastewater treatment facilities by indoor drainpipe, including disposers and traps (grease traps, etc.).

Table 2 Examples of properties of wastewater in the food processing industry¹

No. ²	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ³							Remark
			pH	BOD	COD	SS	n-Hex	T-N	T-P	
2	Facilities to be used by the livestock food processing industry	Sausage, ham, and bacon	About 7	300 - 600	200 - 400	100 - 300	---	50 - 80	10 - 15	If biologically treated, nutritive salts must be taken into account.
		Butter, cheese, casein, yogurt powdered milk, condensed milk, market milk, ice cream, and other dairy goods	6.5 - 11	50 - 350	50 - 200	70 - 150	---	30 - 40	5 - 8	Nutritive salts, residual chloric acid and pH must be taken into account.
3	Facilities to be used by the seafood processing industry	Canned, bottled or potted seafood, fish ham, fish sausage, and other processed seafoods	7 - 8.5	200 - 2000	200 - 1800	150 - 1000	---	100 - 200	30 - 80	Soluble protein, nutritive salts and odor must be taken into account.
4	Facilities to be used by the preservative food processing industry, using vegetables or fruits.	Canned, bottled or potted vegetables and fruits, vegetable pickles, jam, marmalade, jelly, peanut butter, frozen vegetables and fruits, etc.	1 - 12	200 - 600 (- 2500)	100 - 2500	120 - 200 (- 1000)	---	100	30	Soluble substance and pH must be taken into account. Cl(pickles) 2500 - 8000
5	Facilities to be used by the miso, soy sauce, edible amino acid, monosodium glutamate, sauce or vinegar processing industries	Miso, soy sauce, edible amino acid, monosodium glutamate, sauce, tomato ketchup, vegetable sauce, mayonnaise, vinegar, spices, curry powder, red pepper powder, wasabi powder, and pepper, etc.	6 - 8	40 - 300 (- 2000)	300 - 1500	200 - 300	---	100 - 150	15 - 60	Oil content must be taken into account.

¹ Source: "Technique and Legislation for Pollution Control Version 5: Water Quality" (supervised by METI Trade and Industrial Policy Bureau)

² Numbers provided in Schedule 1 of the Enforcement Ordinance for the Clean Water Act.

³ BOD refers to biochemical oxygen demand, COD to chemical oxygen demand, SS to suspended solids, n-Hex to normal-hexane extracts, T-N to total nitrogen, and T-P to total phosphorus.

No. ²	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ³							Remark
			pH	BOD	COD	SS	n-Hex	T-N	T-P	
6	Facilities to be used by the wheat flour manufacturing industry (including facilities to be used by animal based feeds or organic fertilizer processing industry).	Grain cleaning, rice cleaning, wheat cleaning flour milling, wheat flour, buckwheat flour, corn flour, pules flour, soy flour, sweet potato flour, potato flour, ilisilis flour, livestock feed, marine fertilizer, bone manure, sardines for fertilizer, dust and ash fertilizer, soybean cake fertilizer, etc.	6 - 8	20 - 400	---	400 - 600	---	---	---	Odor problems must betaken into account
7	Facilities to be used by the sugar preparation industry.	Sugar, lump sugar, granulated sugar, syrup, etc.	6 - 8	80 - 500	60 - 400	70 - 100	---	20 - 30	3 - 8	When washing filter cloth, beware of carbon outflow.
8	Crude bean jam settling tanks to be used by the bread or sweets manufacturing industry or bean jam preparing industry.	Variety of bread, Japanese and Western sweets, biscuits, rice crackers, dried confectionary, crackers, candies, chocolates, small rice crackers, food preserved in sugar, wafers, etc.	6 - 8	200 - 600 (- 1300)	200 - 800	100 - 150 (- 900)	---	20 - 40	10 - 20	Oil separation is needed. In case of activated sludge process, care must be taken for the balance of nutritive salts.
		Bean jam (raw).	6 - 8	500 - 4000	400 - 3000	250 - 500	---	60	15	Care must be taken for changes of nutritive salts.
9	Rice washers to be used by the rice confectionery industry or the koji production industry.	---	---	---	---	---	---	---	---	---
10	Facilities to be used by the beverage industry.	Beer.	8 - 11	500 - 2000	800 - 1200	250 - 1000	---	30 - 50	5 - 15	0.9 m ³ of rinse water will be needed for each 1m ³ of barley. Care must be taken for pH.

No. ²	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ³							Remark
			pH	BOD	COD	SS	n-Hex	T-N	T-P	
		Whisky, shochu, brandy, synthetic sake, sweet sake for seasoning, sweet fruit wine, condiment liquor, etc.	6 - 8	600 - 92000	300 - 50000	600 - 2000	---	20	10	Care must be taken for agricultural effluent.
		Sake.	8 - 11	500 - 2000	300 - 1800	250 - 1000	---	15 - 25	3 - 10	
		Soft drinks, taste-oriented beverages, cider, lemonade, soda water, juice, syrup, honey (excluding wine).	9 - 12	250 - 350	---	100 - 150	---	---	---	Care must be taken for the salt balance and types of detergent.
11	Facilities to be used by the animal based feeds or organic fertilizer processing industry (including facilities to be used by the wheat flour manufacturing industry).	Grain cleaning, rice cleaning, wheat cleaning flour milling, wheat flour, buckwheat flour, corn flour, pules flour, soy flour, sweet potato flour, potato flour, ilisilis flour, livestock feed, marine fertilizer, bone manure, sardines for fertilizer, dust and ash fertilizer, soybean cake fertilizer, etc.	6 - 8	20 - 400	---	400 - 600	---	---	---	Beware of odor problems.
12	Facilities to be used by the animal and vegetable oil processing industry.	Animal oil, vegetable oil.	4 - 9	100 - 2000	100 - 1500	400 - 600 (- 1000)	---	20 - 30	40 - 80	Care must be taken when separating emulsified oil. Also, anti-odor measures are needed.
		Cooking oil, salad oil, margarine, and refined edible oils.	1 - 7	150 - 1100	---	100 - 300	---	---	---	Care must be taken when separating emulsified oil.
13	Facilities to be used by yeast makers.	Yeast, yeast synthetic agent, etc.	6 - 9	300 - 1200 (- 7000)	1000 - 8000	100 - 300 (- 1500)	---	300 - 600	20 - 50	Nutritive salts must be taken into account.

No. ²	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ³							Remark
			pH	BOD	COD	SS	n-Hex	T-N	T-P	
14	Facilities to be used by the starch or chemically modified starch preparing industry.	Starch, sweet potato starch, potato starch, cornstarch.	6 - 8	500 - 3000	1000 - 1500	3000	---	100 - 200	30 - 40	Pay attention to changes of pH due to decomposition.
15	Facilities to be used by the grape sugar or starch syrup manufacturing industry.	Grape sugar, glucose, starch syrup, maltose.	6 - 8	1500 - 2000	1000 - 1500	1000 - 2250	---	40 - 50	30 - 40	
16	Boiling facilities to be used by the noodle-making industry.	Noodle-making, udon, fine noodles, buckwheat noodles, macaroni, hand-made noodles.	6 - 8	250 - 600	---	200 - 500	---	---	---	
17	Boiling facilities to be used by the soybean curd or boiled beans manufacturing industry.	Tofu, deep-fried tofu, dehydrofrozen tofu, etc.	5.1 - 7.3	200 - 1400	100 - 1100	80 - 460	6 - 80	10 - 50	1.3 - 7.4	Sizes of facilities in urban areas vary widely, from retail shops to co-processing shops and manufacturers for volume sellers. Dehydrofrozen tofu is manufactured by large plants.
18	Facilities to be used by the frozen foods manufacturing industry.	---	---	---	---	---	---	---	---	---
18-2	Facilities to be used by the frozen foods manufacturing industry.	Partially cooked products such as fried fish, fried meat, croquettes, cutlets, sticks, hamburger steaks, shao-mai, gyoza, balls and meatballs, and frozen foods.	6 - 8	200 - 1000 (- 4000)	150 - 2000	100 - 500 (- 1000)	(oil) 30 - 200	30	6	

Table 3 Examples of properties of wastewater at kitchens facilities⁴

No. ⁵	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ⁶						Remark	
			pH	BOD	COD	SS	n-Hex	T-N		T-P
66-3	Kitchen facilities located in joint cooking sites.	---	---	---	---	---	---	---	---	---
66-4	Kitchen facilities to be used by food catering businesses or lunchbox preparing industry.	Lunchbox with cooked rice, sushi lunchbox, sandwiches, pre-boiled buckwheat noodles, rice balls, etc.	6 - 10	40 - 1700	20 - 850	20 - 500	10 - 1200	4.5 - 44	1 - 13	Sizes of facilities vary widely. Includes food catering businesses, mass feeding facilities, and centers for school meals.
66-5	Kitchen facilities located in restaurants.	Bistros, and Japanese, Western, Chinese, or Oriental restaurants that provide staple foods (bread, rice, cooked meals, etc)	6 - 8	30 - 3400	40 - 1700	20 - 2200	12 - 2200	3 - 42	1 - 12	Effluent from Western and Chinese restaurants are high in BOD, oil contents, etc.
66-6	Besides buckwheat noodles, udon, and sushi restaurants, restaurants that do not provide meals which are usually regarded as staple food (e.g. coffee shops).	Sushi, buckwheat noodles, beverages (coffee, tea, milk, etc.)	6 - 8	210 - 1200	150 - 1000	40 - 90	10 - 250	3 - 40	1 - 13	Effluents from coffee shops that provide light meals are high in BOD, oil contents, etc. Significant difference in density is considered to be due to alcoholic beverages.

⁴ Source: "Technique and Legislation for Pollution Control Version 5: Water Quality" (supervised by METI Trade and Industrial Policy Bureau)

⁵ Numbers provided in Schedule 1 of the Enforcement Ordinance for the Clean Water Act.

⁶ BOD refers to biochemical oxygen demand, COD to chemical oxygen demand, SS to suspended solids, n-Hex to normal-hexane extracts, T-N to total nitrogen, and T-P to total phosphorus.

No.5	Facilities	Product	Wastewater quality (unit: mg/l except for pH) ⁶							Remark
			pH	BOD	COD	SS	n-Hex	T-N	T-P	
66-7	Kitchen facilities located in traditional Japanese restaurants, pubs, cabarets, nightclubs, etc.	Meals, staple foods, alcoholic beverages.	6 - 8	50 - 2600	30 - 700	30 - 900	5 - 780	4 - 39	1 - 13	Applicable only to those entertainment restaurants such as traditional Japanese restaurants, pubs, cabarets, bars, and beer halls. Widely varied in size. Also fluctuate widely during the day, or from day to day. Located more in areas with sewage service.

2. Determination of Verification Items

(1) Verification items, including water quality

Verification items, including water quality, are used typically to verify the wastewater treatment performance of the target verification device. They are also used to verify operational stability and identify secondary effects on the environment (reference items). For example, in treatment of oils (n-Hex) using microbial agents, water quality could decline as seen in changes in SS and BOD. In such cases, n-Hex should be a main water quality verification item and SS, BOD, and other parameters may be used as reference items.

To appropriately verify the properties of target verification technologies, the verification organization determines verification items, such as water quality, by taking into consideration opinions of the verification applicant, technical specifications for the target verification device, and properties of influent water at verification test sites. Verification items thus determined, including water quality, are described in the verification test plan. Major verification items are shown Table 4. The verification organization may exclude certain items from verification tests, depending on the purpose of the technology. Items not listed in Table 4, such as transparency, may be added.

If the technology is designed to reduce the amount of sludge produced, then the amount of sludge produced may be added as a verification item.

Table 4 Examples of verification items, such as water quality

Example of verification items (water quality , etc.)	
Water quality	pH (hydrogen-ion concentration)
	BOD (biochemical oxygen demand)
	COD (chemical oxygen demand)
	SS (suspended solids)
	n-Hex (n-hexane extract content)
	Coliform bacteria count
	T-N (nitrogen content)
	T-P (phosphorus content)
Sludge	Amount of sludge produced

(2) Operation and maintenance of verification items

Table 5 shows suggested quantitative and qualitative verification items required to evaluate operation and maintenance performance and assess expenses involved in such evaluation.

The verification organization deliberates on these other verification items and describes all operation and maintenance verification items determined, in the verification test plan.

To conduct measurement of sludge, noise, odor, and other items, the measuring methods are also described in the verification test plan.

Table 5 Operation and maintenance verification items

Item category	Operation and maintenance verification item	Description and measurement method	Associated expenses
Effects on environment	Amount of sludge produced (applied when using water quality as a verification item)	Dry weight (kg/day) sludge Wet weight (kg/day) and moisture content of sludge	Treatment expenses
	Types and amount of waste produced (excluding surplus sludge)	Weight (kg/day) of waste produced Also types of waste treated (industrial / municipal waste) to be recorded.	Treatment expenses
	Noise	Noise levels to be recorded (noise meters to be used as necessary)	---
	Odor	Odor levels to be recorded (odor concentration to be measured as necessary by the three-point bag method or three-point flask method)	---
	Qualitative evaluation, including assessment of sludge, waste, and odor for treatability	Test for easiness of secondary treatment and for utilization	(As necessary)
Resources used	Consumption of electricity and other energy sources	Measurement to be made using integrating wattmeter on all the target verification device (kWh/day)	Electricity
	Types and consumption of wastewater treatment agents	Measurement to be made using indicating instrument on constant-flow pump or tank wall	Agents
	Types and consumption of microbial agents	As necessary	Agents
	Other consumable supplies	As necessary	Consumable supplies
Operation and maintenance performance	Water quality parameters	Color, turbidity, bubble, solids produced, etc.	---
	Time needed to activate the target verification device Time needed to discontinue the target verification device	Time (necessary unit of time to be used)	---
	The number and skill of personnel target required to operate maintain verification devices	Maximum number of personnel and working time (man-day) by task. Professional skill and difficulty in control to be recorded.	---
	Reliability the target verification device	Cause of trouble	---
	Method of recovering from trouble	Easiness and problems with recovery operation	---
	Evaluation of operation and maintenance manuals	Readability, understandability, problems	---

3. Determination of Monitoring Items

Monitoring items required for appropriate operation and maintenance are determined and described in the verification test plan, although the monitoring items are not subject to verification.

Monitoring items shall include flow rates of influent water or treated water. Based on measured flow rates, the verification organization calculates daily fluctuations flow rates, weekly fluctuations of daily flow rates, and polluting loads.

The verification organization may add monitoring items that it deems necessary, in addition to reviewing monitoring items in accordance with the operation and maintenance manual provided by the verification applicant.

If the amount of sludge produced is included among verification items (to reduce the amount of sludge produced), the amount of sludge produced is measured to determine the SS balance.

4. Determination of Test Period

(1) Flow treatment technologies

The required test period is determined based on the properties of the verification test site, the properties of influent water, the target verification device, and verification items, and is described in the verification test plan.

With respect to target verification technologies for biological treatment, it is desirable that tests are conducted for 6 months consecutively after biological activity has sufficiently been established. In locations where water temperature significantly falls (e.g. outdoor in cold regions), the test period may be shortened to a minimum of three consecutive months under the assumption that winter environmental conditions are applied to the tests.

With respect to target verification technologies for physiochemical treatment, the test period should be a minimum consecutive 3 months or otherwise determined so that all patterns of influent water can be verified within the period.

The test period may be extended at the request of the verification applicant or depending on the properties of the verification test site or influent water. The period of malfunction or suspension of operation shall not exceed 10% of the total test period. However, the test period may be shortened if it is confirmed that all polluting load fluctuations are stabilized at the verification test site (for example, daily or weekly fluctuations occur in predictable patterns).

Table 6 Precautions relating to test periods

Biological and hybrid treatment	<ul style="list-style-type: none">● It is desirable that tests are conducted for 6 months consecutively after biological activity has sufficiently spread. In locations where water temperature significantly falls (e.g. outdoor in cold regions), the test period may be shortened to a minimum of 3 consecutive months under the assumption that winter environmental conditions are applied to the tests.
Physiochemical treatment	<ul style="list-style-type: none">● It is desirable that tests are conducted for a minimum of 3 consecutive months at a minimum after startup or for a period during which all patterns can be tested.

(In this Protocol, one month is equivalent to 4 weeks.)

(2) Batch treatment technologies

As with (1) above, the required test period is determined in consideration of the properties of the verification test site, the properties of influent water, the target verification device, and verification items, and described in the verification test plan.

5. Formulation of a Verification Test Plan

The verification organization shall formulate a verification test plan in consideration of such factors as the properties verification test site, the properties of influent water, and technical specifications for the target verification technology.

The verification organization formulates a verification test plan based on information provided by the verification applicant and the owner of verification test site and recommendations of the Technology Verification Committee.

Items to be set forth in the verification test plan are shown in Appendix 2.

V. Method of Verification Tests

1. Startup of Target Verification Device

- The verification organization starts up the target verification device in accordance with the operation and maintenance manuals provided by the verification applicant. If any existing wastewater treatment facility is to be verified, the facility does not need starting up.
- The verification organization implements a startup during the period specified by the verification applicant. After this period, the verification organization confirms whether the target verification device has been stabilized to enable the conduct of the verification test as shown in the operation and maintenance manual. If the target verification device is judged to be unstable, the verification organization continues startup work for a period twice the length of the predetermined period. If the target verification device still remains unstable, then verification test plan is revised and modified as necessary.
- Recording of monitoring items is started.
- If one month or more is required to startup the target verification device, influent water and treated water are sampled and analyzed. Samples are collected using the method in JIS K 0094 3 times a day once a month and measured in a composite status. If the startup requires less than one month, sample collection is not required.
- The verification applicant provides information clearly describing the equipment, maintenance activities, and operations to ensure that the target verification device functions effectively and stably throughout all processes, including pre-treatment and post-treatment.
- The verification organization records the startup status, opinions, and results concerning the target verification device throughout the startup period, including the pre-treatment and post-treatment processes, in the Report on Verification Test Results.
- The verification applicant shall attach a data plate to a conspicuous site on each component of the target verification device. Such data plate shall contain the following information:
 - Name of device/equipment,
 - Model number,
 - Production number,
 - Corporate name and address of the verification applicant, contact information in an emergency,
 - Source voltage, number of phases, electric current, frequency,
 - Precautions for transport and handling,
 - Written cautions and warnings (to be readable and conspicuous), and
 - Capacity or discharge rate (to the extent possible).

Table 7 Recording of monitoring items and precautions for sample collection at startup

Monitoring item	● Start of recording flow rates and other measurements
Quality of influent water /treated water	● If the startup period exceeds one month, composite samples shall be collected once a month in accordance with JIS K 0094.

2. Operation and Maintenance

The target verification device need periodical monitoring and maintenance throughout the test period to ensure consistent, appropriate, and efficient operation. Although verification organization or other organizations are responsible for maintenance, all monitoring and maintenance activities shall be coordinated in advance by the verification organization, recorded in the verification test plan, and confirmed by concerned parties.

Maintenance should be conducted by personnel fully acquainted with wastewater treatment and similar maintenance work.

(1) Ordinary operation and maintenance

- During the test period, the target verification device shall be maintained in accordance with the operation and maintenance manual to ensure appropriate operation.
- Calibration shall be conducted in accordance with the operation and maintenance manual. Calibration shall be conducted at least at the frequency specified in the operation and maintenance manual. Calibration records shall be retained in the operation and maintenance records at the verification test site.
- Monitoring items shall be maintained to a certain extent to ensure appropriate operation.
- These operation and maintenance activities shall be recorded. Individual operation and maintenance records shall contain the site, date, and time of operation and maintenance, names of personnel, work details, remarks on verification test site/the target verification device, and work results. These reports shall be included in the operation and maintenance records at the verification test site and the Report on Verification Test Results.
- With respect to operation and maintenance verification items, consideration shall be given to problems anticipated if users lack operation and maintenance skill.
- To ensure stable operation of the target verification device, the aforementioned operation and maintenance may be performed more frequently at higher levels than set forth in the operation and maintenance manual. In such cases, the verification organization shall distinguish operation and maintenance activities necessary and sufficient for target verification technologies from maintenance activities actually performed in preparing a Report on Verification Test Results.

(2) Response to abnormal circumstances

The verification organization immediately report to the verification applicant in any abnormal circumstance. The verification organization shall take action to restore normal operation specified by the verification applicant. In any unexpected event, the verification organization shall respond to problems in cooperation with the verification applicant.

Samples collected in any abnormal circumstances are not used in statistical analysis under the Report on Verification Test Results. However, the samples collected shall be discussed in the Report on Verification Test Results. Alternative samples shall be collected immediately upon restoration to normal operation.

With respect to abnormal circumstances, its status, cause, consequences, and recovery method shall be documented in the Report on Verification Test Results. If no cause is identified, or if the occurrence of the actual abnormal circumstances is not confirmed, then samples collected during the relevant period shall be used in the statistical analysis under the Report on Verification Test Results.

(3) Evaluation of expenses

The verification organization collect information required to assess expenses involved in operation and maintenance, to the extent possible, with cooperation of the verification applicant and the owner of verification test site, including those related to sludge and waste treatment, electricity used at the verification test site, wastewater treatment agents used, and other consumable supplies.

3. Monitoring of Flow Rates, etc.

(1) Flow rate monitoring

During the verification test period, the verification organization shall periodically monitor influent water and treated water for their flow rates. If the flow rates for influent and treated water are largely the same, either of them may be monitored.

It is recommended that flow rates for influent and treated water be measured in accordance with the following standards:

- JIS K 0094 Sampling methods for industrial water and industrial wastewater, 8. Measurement of flow rates,
- JIS Z 8762 Method of flow measurement by aperture mechanisms,
- JIS Z 8765 Method of flow measurement by turbine meters, and
- JIS Z 8766 Methods of flow measurement by vortex flowmeters.

If these methods cannot be used, the verification organization may adopt other methods upon consultation with the Technology Verification Committee.

JIS K 0094 8.6 Labeling of measurement conditions and measurements for flow rates wastewater (Excerpt)

Investigation unit: Flow rate investigations of wastewater shall be conducted on such days as are free from abnormalities in operating hours, amounts of wastewater treated, or operating status during a period of operation of factories or establishments or during a period of operation of wastewater treatment equipment. One day of operation is deemed to be one unit.

Investigation intervals: In investigations, the volume of water discharged is measured continually at 10-minute or 15-minute intervals from the startup of operation of the factory or the wastewater treatment equipment till the termination of the day's operation or the startup of the following day's operation or till the termination of discharge of wastewater. If little change is seen in the amount of wastewater discharged, the aforementioned measurement intervals may be lengthened.

(2) SS balance

If the amount of sludge produced is used as a verification item (to reduce the amount of sludge produced), influent water and treated water shall be monitored periodically for their flow rates during the verification test period. Simultaneously, SS shall be monitored for its balance. The SS balance is calculated by measuring the SS levels in influent water and treated water, the amount of sludge produced (solids and the water content ratio), and other factors. Samples shall be collected and analyzed in accordance with Sections 4 and 5.

4. Collection of Samples

(1) Flow treatment technologies

Samples to be used for analysis are collected in accordance with associated JIS standards as shown in Table 9. A procedure for field analysis for pH, temperature, and other parameters shall be determined on the basis of "JIS K 0094 7.2 Water temperature" and other JIS standards. Devices used for sample collection shall be defined in the verification test plan.

The verification organization determines the positions, period, and frequency of sample collection in accordance with JIS K 0094 "Sampling methods for industrial water and industrial wastewater" and upon consultation with the Technology Verification Committee. In determining the timing and frequency of sample collection, operation stability shall be evaluated on the basis of any information of operational patterns of the verification test site. In such determination, if any frequency below values set forth in Table 8 is to be used, the reason shall be stated. For example, if it is confirmed that polluting load fluctuations are stable at the verification test site (as seen in weekly fluctuations in a predictable pattern), then periodical tests or weekly tests may be omitted (or the test

period may be shortened).

If the amount of sludge produced is used as a verification item (to reduction the amount of sludge produced), the verification organization determine a sample collection procedure upon consultation with the Technology Verification Committee. For example, the type of test and the frequency of sample collection may be determined on the basis of the amount of sludge transferred and the frequency of transfer.

Table 8 Minimum collection frequency for water quality

Test type	Purpose	Collection frequency		Collection frequency
		Biological treatment	Physiochemical treatment	
Periodical test	Comprehensive treatment performance investigation throughout the whole test period	10 times periodically (10 days)	5 times periodically (5 days)	Collect 3 times during daily operation to obtain mixed samples
Daily water quality test	Investigation of daily fluctuations	Once (1 day)	Once (1 day)	Collect every 1 to 2 hours (every 1 hour if water flows in unsteadily in physiochemical treatment)
Weekly water quality test	Investigation of weekly fluctuations	Once (1 week)	Once (1 week)	Collect samples 3 times a day for 6 consecutive days (the weekly number of days of operation if the factory operates for 5 days or fewer)

JIS K 0094 “5. Test items and the amount of samples collected” (Excerpt)

Test items and the amount of samples collected vary depending on the number of items tested, the concentration of ingredients tested, and the type of sample preservation treatment. As a rule, 0.5 to 1 liter of sample is collected for each item, which makes 2 to 10 liters of samples combined. To preserve samples for some time prior to tests, it is recommended to determine the total number of sample containers and the amount of samples to be collected.

JIS K 0094 “6. Items recorded during sample collection” (Excerpt)

Items recorded during sample collection: The following items are recorded during sample collection:

- a) Name and sample number of samples,
- b) Name and position of collection site (water surface, collection depth, etc.),
- c) Date and time of collection,
- d) Name of collector,
- e) Condition of collection site (sketch map of collection sites and other materials associated with the water quality of samples),

- f) Water temperature at the time of collection, and
- g) Other reference information, including the appearance of samples (color of samples, turbidity, etc.), odor, etc.

JIS K 0094 “10. Sample collection of industrial wastewater” (Excerpt)

Water sampling point: Water samples shall be collected at inlets and outlets on the premises of the factory or establishment. Otherwise, any other point may be selected if the same quality of water is obtainable.

Timing and frequency of sample collection: The timing of sample collection is selected in consideration of ordinary operating hours of the factory and the wastewater treatment equipment. The frequency of sample collection is determined to match the purpose of the test.

Remark 1 . The timing and frequency of sample collection depends on fluctuations in water quality. As a rule, in daily water quality tests, sample should be collected 3 times or more (at 2- or 3-hour intervals) during the daily operating hours. If fluctuations in water quality are minor, the frequency of sample collection may be reduced.

In weekly water quality tests, daily water quality is measured for 2 or 3 days in a week. This measurement is conducted for 4 or more weeks.

In monthly water quality tests, daily water quality is measured for 2 or 3 days a week. This measurement is conducted every 2 months. Otherwise, samples may be collected once a day at 1- or 2-day intervals.

To obtain daily average water quality, mixed samples (composite samples) may be used. As a simplified method, samples are collected 3 times or more a day during operation hours (for example, at 2- or 3-hour intervals) and blended to make mixed samples. The blend ratio should reflect flow rate fluctuations in wastewater. Mixed samples should not be used if they could affect the test.

(2) Batch treatment technologies

The verification organization determine the position, timing, and frequency of sample collection in accordance with Table 8 and based on recommendations of the Technology Verification Committee.

5. Water Quality Analysis, etc.

Analytical methods for main verification items are shown in Table 9. Other verification items than listed in the table shall also follow the analytical methods set forth in relevant JIS standards. With respect to verification items intended to confirm secondary effects on the environment, simplified approaches may be used. In such cases, the simplified measurement approach taken shall be described in the verification test plan, its accuracy shall be confirmed by the verification organization, and the precision control results shall be described in the Report on Verification Test Results.

Table 9 Analysis methods for main verification items

Items		Method
Water quality	pH	JIS K 0102 12.1
	BOD	JIS K 0102 21
	COD	JIS K 0102 17
	SS	1971 MOE Notification No.59 concerning the Environmental Standard for Water Quality Pollution, Schedule 7
	n-Hex	1974 MOE Notification No. 64 “Verification Method Related to the Wastewater Standard Set forth by the Minister of the Environment Based on Provisions of the Ministerial Ordinance on Water Emissions Standard,” Schedule 4
	Coliform count	1962 MHW/MOW Ministerial Ordinance No.1 “Ministerial Ordinance Concerning Verification Method, etc. for Water Quality of Sewage,” Appendix 1
	T-N	JIS K 0102 45.1 or 45.2
	T-P	JIS K 0102 46.3
Sludge	Solids sludge and the water content ratio of sludge (Note)	1973 MOE Notification No.13 “Verification Method for Metals, etc. Contained in Industrial Waste”

(Note) May be described as “insoluble ingredients” because, in some cases, insoluble ingredients are used as a measurement method under waste landfill standards. Measurement of solids covers soluble substances such as salts in water. For this reason, insoluble ingredients should be measured for high-salinity sludge. The following shows examples of such measurements:

- Use grams of sample (sludge) as it is. Filtrate with 1- μ m pore glass-fiber filter paper (GFP). If the sample that cannot be filtrated as it is, make a 10 w/v% sample solution and filtrate with GFP after shaking.
- Dry the GFP filtration residue and determine its precise weight (in gram). Use the measurement as the weight of insoluble ingredients.
- Calculate using the formula “insoluble ingredients (%) = $e/a \times 100$.”

6. Other

The number of personnel permitted to enter the test site shall be limited to eliminate unnecessary destabilizing factors from verification tests. The verification organization shall establish and implement measures for the purpose. As shown in Table 10, JIS tests may be applied to several types of waste water treatment equipment. These standards may be referred to where necessary.

Table 10 JIS testing methods for waste water treatment equipment (for reference)

No. (JIS B 8530)	Term	JIS prescribing testing methods
2201	pH controlling equipment	JIS B 9940 (Testing methods of pH controlling equipments)
2102	Precipitation equipment	JIS B 9941 (Testing methods of precipitation equipments)
2104	Filtration equipment for clarifying	JIS B 9942 (Testing methods of filtration equipment for clarifying)
2103	Floatation equipment	JIS B 9943 (Testing methods of floatation equipments)
2301	Activated sludge treatment equipment	JIS B 9944 (Testing methods of activated sludge process equipments)

VI. Preparation of Report on Verification Test Results

The verification organization shall report verification tests results in a Report on Verification Test Results. The Report on Verification Test Results shall include the following information:

- Outline of the test (see Appendix 3)
- Introduction and background
- Outline of the target verification technology and the target verification device
 - Mechanism and device configuration of the target verification technology
 - Specifications and treatment performance of the target verification technology
- Outline of the verification test site
 - Business condition
 - Condition of wastewater
 - Layout of the target verification technology
- Verification test method and implementation condition
 - Implementation schedule for the verification test
 - Monitoring items (method and date of implementation)
 - Verification items, such as water quality (state the method and date of implementation of sample collection, analysis, and device calibration)
 - Operation and maintenance items (method and date of implementation)
- Verification tests results and review (use tables and graphs to show the measurement and analytic results)
 - Monitoring items
 - Verification items, such as water quality
 - Operation and maintenance items
 - Reports on abnormal values
 - Summary of the results
- Appendix
 - Quality control of data
 - Audit of the quality management system.

As fundamental materials for the Report on Verification Test Results, the verification organization shall prepare relevant operation and maintenance manuals, operation and maintenance records, implementation and confirmation records on sample collection and analysis, and audit records of the quality management system, and submit such materials to the Ministry of the Environment together with the Report on Verification Test Results.

The verification organization shall prepare a draft of the Report on Verification Test Results, have it checked by the verification applicant for any descriptive error, and have it reviewed by the

Technology Verification Committee. Then the verification organization shall finalize the Report on Verification Test Results. After being submitted to a verification management organization, the Report on Verification Test Results is reviewed by the Working Group and submitted for approval to the Ministry of the Environment.

VII. Issuance of Logo

Upon approval of the Report on Verification Test Results, the Ministry of the Environment immediately issues logos and a verification number to the applicant as set forth in Chapter 11 of the Implementation Procedure for the Project of the Environmental Technology Verification, Volume 2.

The logos consist of a “common logo,” which contains information common to all technologies, and an “individual logo,” which provides on the common logo information specific to the relevant target technology. Individual logos are reviewed by working groups by field and determined by the Ministry of the Environment.

The following shows the logos for the field of Organic Wastewater Treatment Technologies for Small-scale Establishments, determined in FY2010. Individual logos must indicate the field name, verification number, verification year, and a statement to the effect that the results of third-party verification are open to the public.

As shown in Appendix 3, individual logos may be used in a summary version of the Report on Verification Test Results and on the front cover of the detailed version of the same report.

(Vertical form)

(Horizontal form)

Other information on the use and display of logos is provided in Chapter 11 of the Implementation Procedure for the Project of the Environmental Technology Verification, Volume 2.

VIII. Precautions for Implementation of Verification Tests

1. Quality Control of Data

(1) Data quality indicators

Data relating to verification items shall be accurate and reliable.

Such data are prone to errors and variances depending on the measurer, sample preservation status, reagent, analytic environment, and other varying factors. To ensure the accuracy of data, all processes for data shall be strictly controlled, from sample collection to data analysis to result compilation.

Quantitative data quality indicators (DQI) include the following:

- Precision (standard deviations or ranges obtained by segmenting the same sample and measuring individual pieces of sample), and
- Integrity (percentages obtained by dividing the appropriate number of samples by the total number of samples).

Any data, including measurements of microchemical content, that require quality control by DQI shall be identified, and acceptance criteria and evaluation procedures shall be established and documented in the verification test plan.

Some water quality verification items are not compatible with quality control by DQI due to its nature associated with analytic procedures. For this reason, it is required to implement accuracy control as shown in Table 11, in addition to complying with the standard work procedures.

This precision control shall be conducted without fail in handling data used in description of test results in the Report on Verification Test Results and data used in calculation.

Table 11 Major precision control methods

Example of water quality verification item	Accuracy control method
BOD	Confirmation of measurements by using standard solutions (glucose, glutamic acid)
COD	Double or triple measurement of 10% of all samples
SS	
n-Hex	

(2) Measurement and data acquisition

The following precautions should be taken in measurement and data acquisition to ensure data quality:

- All assumptions, points of sample collection, and samples to be collected, which should be the basis of the verification test plan, shall be reported for approval to Technology

Verification Committee upon formulation of the verification test plan,

- Each time samples are collection and analyzed records shall be produced concerning the implementation and confirmation,
- If nonstandardized sample collection approaches or devices are used or if the analytical method or analysis device used can affect the representation of data, then they shall be validated and the validation shall be clearly described,
- Requirements for sample handling, storage sites, and transport shall be described. Such description shall include storage records of samples labels, storage labels, and samples,
- The analytical method and analysis devices used shall be documented,
- With respect to all analysis devices, the approach including calibration requirements and calibration standards shall be set forth in the verification test plan, and
- All data obtained by any other means than measurement, such as interviews, shall be reviewed for their restriction of use.

2. Control, analysis, and display of data

Data obtained from verification tests consist of quantitative data concerning with such matters as verification items, volumes of water, consumption of wastewater treatment agents, and amounts of sludge produced, and qualitative data concerning such matters as reliability and operability of the target verification device and demand for personnel. These data shall be controlled, analyzed, and displayed in the following manner:

(1) Data control

Data shall be controlled strictly and securely as set forth in “Appendix 03. Quality management system, (3) Control of Documents and Records.”

The verification organization shall designate one data quality manager.

(2) Analysis and display of data

Data obtained from verification tests shall be statistically analyzed and displayed. All equations used in the statistical analysis shall be recorded in the Report on Verification Test Results. Data not used in the statistical analysis (including data collected in abnormal circumstances) shall be reported in an abnormal value report under the Report on Verification Test Results.

(a) Analysis and display of flow rates

- A table showing all flow-rate monitoring data,
- A graph showing daily fluctuations in flow rates,
- A graph showing weekly fluctuations in daily flow rates,
- A graph showing daily changes in daily flow rates during the verification test period, and

- A box diagram showing daily flow rates during the verification test period.

(b) Analysis and display of data concerning water quality verification items

- A table showing analytic results for all samples,
- A graph showing daily fluctuations in pollutant concentrations,
- A graph showing weekly fluctuations in pollutant concentrations,
- A graph showing daily changes in pollutant concentrations during the verification test period,
- A box diagram showing pollutant concentrations during the verification test period, and
- Removal efficiency of the target verification device (calculated in accordance with Table 12 by using polluting load).

(c) Analysis and display of the amount of sludge produced (applicable if the amount of sludge produced is used as a verification item (to reduce the amount of sludge produced))

- A table showing analytic results for all samples,
- A table or graph showing the SS balance,
- The following graphs if verifiable:
 - A graph showing daily fluctuations
 - A graph showing weekly fluctuations
 - A graph showing daily changes, and
- A box diagram showing the amount of sludge produced during the verification test period.

Table 12 Calculation of removal efficiency

Removal efficiency	$\frac{(\sum C_{inf,i} \times V_i - \sum C_{eff,i} \times V_i)}{\sum C_{inf,i} \times V_i} \times 100\%$	$C_{inf,i}$: influent water concentration on measurement day i $C_{eff,i}$: treated water concentration on measurement day i V_i : daily water volume on measurement day i
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(d) Analysis and display of operation and maintenance verification items

- A summary of the results,
- A summary on the operability and reliability of the target verification device (showing fluctuations in operation and maintenance verification tests items and monitoring items under normal operation and under abnormal circumstances),
- A summary on the usability of operation and maintenance manual,
- A summary on required operation and maintenance skill (including operability),
- Average monthly maintenance time,
- A table or graph showing the amount of sludge produced,
- A table or graph showing the amount of waste (excluding sludge) produced,
- A table or graph showing the amount of wastewater treatment agents consumed,

- A table or graph showing the amount of microbial agents consumed,
- A table or graph showing electricity consumption, and
- A table or graph showing the amount other consumable supplies used.

3. Environment, Sanitation, and Safety

The verification organization shall strictly implement environmental, sanitation, and safety measures associated with verification tests. In formulating the verification test plan, it shall identify associated environment problems and potential risks relating to the verification tests and the verification test sites, and clearly define measures to prevent such problems and risks. The verification organization shall communicate such risks and measures to personnel at the verification test site, including employers and workers not participating in the verification tests. The following matters shall be considered and discussed in the verification test plan:

- Precautions relating to operation of the target verification device, discharge of treated water, and generation of waste,
- Biological, chemical, and electrical risks,
- Handling, storage, and disposal of chemical substances relating to verification tests,
- Handling and disposal of residue and waste relating to verification tests,
- Compliance with local electricity and piping regulations,
- exhaust and ventilating equipment if gas arises in the target verification device,
- Fire prevention,
- Establishment of an emergency communication network (in accidents, fires, etc.),
- Assurance of labor safety, and
- Other.

Phone numbers of emergency contacts and the addresses and phone numbers of the nearest hospitals shall be listed on a single sheet of paper and placed in a plastic cover at required locations.

4. Utilization of Existing Data

The verification organization may have the verification applicant, while preparing a verification test plan, submit part or all of the data concerning the verification test needed for technological verification. If the following requirements are judged to be met based on the data and recommendations of the Technology Verification Committee, then such data may replace the verification test. If part or all of verification tests are replaced with existing data, such existing data shall be reflected in the verification test plan.

(1) All data already obtained the verification applicant meeting the verification test plan

Data already obtained by the verification applicant may replace the verification test if the verification organization has validated the data by examining whether such data have been collected in compliance with the Protocol for Verification Tests and laws and regulations, whether the results obtained are compatible with the verification test plan, or whether the data acquisition organization has in place a system based on the quality management system required by the verification organization to perform appropriate quality control. In such validation, the verification organization shall provide the Technology Verification Committee with a report discussing information presented by the verification applicant together with the verification test plan.

(2) Not all data already obtained by the verification applicant meeting the verification test plan (because of some data missing)

If data already obtained by the verification applicant are judged to be insufficient as data required by the verification test plan (because of some data missing), then a test shall be conducted to cover the data necessary but not supplied. Expenses needed for such test shall be paid by the verification applicant.

5. Fees

(1) Determination and collection of fees

The verification applicant shall pay fees for “measurement and analysis,” “consumable supplies used in the test,” and “travel by verification organization personnel” as expenses related to verification tests.

In soliciting target technologies from the public, the verification organization shall estimate the amounts of the three fee items, register them with the verification management organization, and publish such items in public solicitation. Major fees items, as shown in (2) below, shall be determined as necessary through consultation with the verification management organization. The estimated amount of a fee may vary within a predetermined range, depending on assumptions and reservations, but the amount shall be made specific to the extent possible.

Upon finalization of the verification test plan but prior to initiation of verification tests, the verification organization shall, in coordination with the verification management organization, determine the amounts of fees related to verification tests and payment dates, and notify the verification applicant thereof. Where necessary, the amounts of fees shall be determined through consultation with the verification management organization and the verification applicant. The payment dates shall take place prior to the startup of the verification test. Upon receiving a payment notice, the verification applicant shall pay fees to the verification management organization by the payment date.

In finalizing the amounts of fees, the verification organization shall notify the verification applicant that new verification items may be added during the verification test and that the amounts of fees might be increased due to such additions. Such additions shall be subject to consultation with the verification management organization and the verification applicant.

If verification tests fail to be completed for whatever reason, the verification organization shall report the situation to the Ministry of the Environment and the verification management organization, and upon obtaining approval, shall consult with the verification applicant, calculate expenses incurred in the test, and finalize the amount of fees to be paid by the verification applicant.

(2) Fees items

- Measurement, analysis, etc.

Expenses related to measurement and analysis as part of on-site work and investigation of operation and maintenance verification items, including the following expenses:

- Personnel expenses (including on-site work planning, sample collection, investigation of operation and maintenance verification items, and investigation of monitoring items),
- Wages for support personnel (including on-site work planning, sample collection, investigation of operation and maintenance verification items, and investigation of monitoring items), and

- Lease payment for devices (sample collection tools, etc.).

Equipment required to measure power consumption, flow rates, and other values includes wattmeters, flow meters, and loggers. Such equipment, if already in place, may be used for measurement. Otherwise, the verification applicant shall arrange for such equipment (without the need to include the costs in fees).

- Outsourcing (for analysis).

- Consumable supplies used in the test

Expenses of consumable supplies incurred in the implementation of verification tests, including the following items. Some of the following consumable supplies, including sample collection containers, may be included in outsourcing expenses:

- Consumable supplies (including sample collection containers), and
- Electricity, city water, and other utilities consumed by measuring instruments.

Consumable supplies related to operation and maintenance of equipment generally include the following items. These are specific to target verification technologies or verification test sites. They shall be arranged and paid for by the verification applicant (without the need to include the costs in fees).

- Agents (including wastewater treatment agents),
- Formulations (including microbial agents),
- Electricity, city water, and other utilities consumed by equipment, and
- Treatment of waste produced.

- Business traveling expenses (the verification organization)

Expenses incurred by verification organization in their personnel traveling to verification test sites, typically including the following:

- Travel by transport system (including fares, express fares),
- Automobile, etc. (including rents, fuels, and expressway toll),
- Daily allowance, and
- Accommodation.

Travel by transport system involves transport expenses for samples, etc. (including door-to-door delivery).

- Other

The verification organization may include general administrative costs, as necessary.

Table 13 Major fee items (examples related to water quality verification items)

Measurement, analysis, etc.			
Item	Details		Remark
Personnel expense (on-site work)	Total Water quality verification items Operation and maintenance verification items Monitoring items	Investigation for formulation of an on-site work plan Sample collection On-site investigation Sample collection Flow rate investigation	Periodical test Daily test Weekly test Environmental effects Resources used Operation and maintenance performance Sludge Odor Noise Periodical test Daily test Weekly test
Wage to support personnel (on-site work)	Total Water quality verification items Operation and maintenance verification items Monitoring items	Investigation for formulation of an on-site work plan Sample collection On-site investigation Sample collection Flow rate investigation	Periodical test Daily test Weekly test Environmental effects Resources used Operation and maintenance performance Sludge Odor Noise Periodical test Daily test Weekly test
Lease on devices (on-site work)	Water quality verification items Operation and maintenance verification items Monitoring items	Collection tools Other Sludge collection Odor collection Noise measurement Investigation of resources etc. for use Flow rate investigation	Water sampling device Water thermometer, etc. Shovels, etc. Other Pump Wind gauge Thermo-hygrometer Other Noise meter Data processor Other Wattmeter Clamp logger Other Flow monitor Data logger Other
			If no wattmeter, flow monitor, or other device is in place, the applicant shall arrange for them.
Outsourcing (Analysis work)	Water quality verification items Operation and maintenance verification items	Water quality Sludge Odor Noise	pH BOD COD SS n-Hex Coliform count T-N T-P Moisture content Ignition loss n-Hex Odor index Odor intensity Noise level
Consumable supplies used in test			
Item	Details		Remark
Consumable supplies (on-site work)	Water quality verification items Operation and maintenance verification items Monitoring items	Sample container Other Sludge container Odor containers Noise measurement tools Other Flow rate investigation	Polyethylene bottle Glass bottle Sterile bottle Piping, etc. Glass bottle Tetra bags Battery, etc. Piping, etc. Piping, etc.
			Sample containers, measurement tools, and some other devices may be included on outsourcing expenses (analysis expenses).
Consumable supplies (operation, maintenance)	Consumable supplies	Treatment agents Microbial agents	To be paid by the applicant

	Electricity City water Waste treatment expenses Other	Other Electricity charge City water Waste treatment expenses Tools , etc.	
Business travel expenses			
Item	Details		Remark
Travel expenses	On-site work and travel by verification organization personnel	Travel expenses Vehicle use, etc. Daily allowance Accommodation	Fares Expressway charges Use of vehicles Fuels Expressway charges Travel by transport systems or automobiles. Travel by transport systems may involve sample transport expenses and other costs (including door-to-door delivery).

(Note) The verification organization may include general administrative costs where necessary.

6. Change to or Discontinuance of Verification Tests

(1) Addition of verification items at the request of the verification applicant

If the verification applicant requests addition of verification items during the course of the verification test, the verification organization shall determine based on opinions, etc. of the Technology Verification Committee whether such addition is appropriate to the purpose of the Verification, which claims objective third-party verification, and shall change the verification test plan upon consultation with the verification management organization and the verification applicant.

If such change causes any change to the amount of fees, the verification organization shall revise the amount of fees charged to the verification applicant upon consultation with the verification management organization and the verification applicant. Upon revision of the amount of fees, the verification management organization shall immediately initiate the process of increasing the amount of fees.

(2) Discontinuance (withdrawal) at the request of the verification applicant

If the verification applicant requests discontinuance (withdrawal) of the verification test during the course thereof, the verification organization shall report to that effect to the Ministry of the Environment and the verification management organization and, upon their approval, discontinue the verification test (*).

If such discontinuance causes any change to the amount of fees, the verification organization shall revise the amount of fees charged to the verification applicant upon consultation with the verification management organization and the verification applicant. Upon revision of the amount of fees, the verification management organization shall immediately initiate the process of returning relevant fees already received from the applicant.

(*) The verification applicant shall pay expenses incurred until the discontinuance. The verification organization shall determine upon consultation with the verification management organization and the verification applicant whether any part of fees already paid but not used should be returned or whether such part should be used for research or other activities, instead of being returned to the verification applicant. The verification organization shall provide any data obtained to the verification applicant to the extent that such data have been covered by fees from the verification applicant.

(3) Addition of verification items at the discretion of the verification organization

If the verification organization judges it necessary to add verification items during the course of the verification test in order to meet the purpose of this Project, which claims objective third-party verification, then the verification organization shall change the verification test plan upon consultation with the verification management organization and the verification applicant (*2).

If such change causes any change to the amount of fees, the verification organization shall

revise the amount of fees charged to the verification applicant upon consultation with the verification management organization and the verification applicant. Upon revision of the amount of fees, the verification management organization shall immediately initiate the process of increasing the amount of fees.

(*) For example, a case in which the target verification technology shows unpredicted secondary effects that could require additional verification items.

(*2) If the verification applicant disagrees to any change, its consent shall be obtained with respect to the inclusion of a statement in the Report on Verification Test Results to the effect that no data are available concerning part of the verification items that are deemed necessary by the verification organization.

Appendix 0: Quality Management System Required of The verification organization

Preface

It is desirable that the verification organization under the Project of the Environmental Technology Verification build a quality management system conforming to JIS Q 9001(ISO 9001) “Quality management system requirements” and JIS Q 17025 (ISO/IEC 17025) “General requirements for the competence of testing calibration laboratories.” This Appendix provides elements of the quality management system required to be built by the verification organization if they lack a system conforming to the above mentioned standards.

1. Scope

Such quality management system shall apply to all sectors and operations of the verification organization that are related to verification tests. If part of verification tests is outsourced to external organizations, the quality management system shall also apply to such organizations.

If an organization is certified for the following requirements and its quality management system is applied to all its departments associated with verification tests, then the organization is deemed to meet the requirements of this Appendix:

JIS Q 17025 (General requirements for the competence of testing calibration laboratories), and JIS Q 9001 (Quality management system requirements).

2. References

JIS Q 17025: 2005 (ISO/IEC17025: 2005) General requirements for the competence of testing calibration laboratories

JIS Q 9001: 2008(ISO9001: 2008) Quality management system requirements

3. Quality Management System

(1) Organizational system and responsibilities

The organization shall be capable of maintaining legal responsibilities.

The responsibilities of main personnel engaged in verification tests shall be clearly defined.

Irrespective of any other duties and responsibilities, one person shall be appointed as quality manager (whatever the name) and given clearly defined responsibilities and authority to ensure that the quality system is always in place and followed.

(2) Quality system

The organization shall build, implement, and maintain an appropriate quality management system for verification tests.

Under the quality management system, quality policies relating to verification tests and procedures for the quality management system shall be documented. These documents shall be communicated to and understood by all relevant personnel:

The policies shall include the following:

- a) A commitment of the organization to ensure the quality of verification tests,
- b) A representation of the organization concerning the quality level of verification tests,
- c) The purpose of the quality system, and
- d) A description stating that a quality management system will be established and implemented.

Also, the implementation system for verification tests and the roles, responsibilities, and authority of each person shall be documented.

(3) Control of documents and records

The organization shall control standards relating to verification tests (Protocol for Verification Tests and associated standards), the verification test plan, and documents, including drawings, software, specifications, written instructions, and manuals.

In the control of documents, the following shall be ensured:

- a) Documents are verified and approved for use by authorized personnel prior to issuance,
- b) The composition of related documents is defined and relevant documents are made accessible at all times at all verification test sites,
- c) Invalid documents or obsolete documents are immediately removed or prevented from misuse,
- d) The control method for documented data is established, and
- e) Forms of records, the layout of documents, and a document inspection procedure are established.

Records associated with verification tests shall be identified, appropriately collected, captioned, and filed. The procedure for using such records and the retention period shall be determined. Such records shall be maintained and appropriately disposed of. Specifically, original records of test data, data and information traceable by audit, calibration records, personnel records, and copies of issued reports and calibration certificates shall be retained for determined retention periods.

(4) Outsourcing of tests

If the organization outsources verification tests to external subcontractors, such subcontractors shall be appropriately qualified and shall be required to internally implement the same level of quality control as by the organization.

(5) Purchase of goods and services

If any goods or services externally purchased can affect the quality of verification tests, the organization shall verify by inspection or by other appropriate method that such goods or services meet the requirements of the Protocol for Verification Tests and shall not use the same until such verification is completed.

Suppliers of goods and services shall be evaluated, and a list of approved suppliers shall be documented.

(6) Control of complaints and nonconforming tests

A system and a procedure shall be established to handle deviations of the performance or results of verification tests from the Protocol for Verification Tests or any other rules. Also a system and a procedure shall be established to handle unpredicted events, including complaints from the verification applicant, violation of test neutrality, and information leaks. Such systems shall involve responsible managers and personnel needed.

(7) Corrective and preventive actions

If the performance or the results of the verification test deviates from the Protocol for Verification Tests or any other rules, the organization shall investigate such deviations for their cause and take corrective and preventive actions.

(8) Audit

The organization shall conduct audits to ensure that verification tests are being implemented appropriately. If verification tests are outsourced to external subcontractors, such subcontractors shall be subject to such audits.

An audit shall be conducted at least once during the test period. If the verification test continues for 2 or more years, periodical audits shall be conducted, and it is desirable that an audit is conducted within one year.

Such audits shall be conducted by personnel who are independent, to the extent possible, of the performance of verification tests.

The audit results shall be reported to the top management of the organization.

4. Technical Requirements

(1) Personnel

The organization shall ensure that all personnel who operate equipment used, implement verification tests, evaluate the test results, or sign reports are sufficiently qualified. Personnel who conduct specific operations shall not be qualified until they receive appropriate training and/or demonstrate appropriate skill.

(2) Facilities and environmental conditions

Facilities, including energy, lighting, and environmental conditions, used to conduct verification tests shall be made to facilitate appropriate implementation of tests to ensure that the environment conditions do not adversely affect test results. Special care shall be taken when conducting verification tests at any other place than permanent sites.

Environmental conditions for tests shall be monitored, controlled, and recorded in accordance with the Protocol for Verification Tests, the verification test plan, and other standard. If the environmental conditions can disturb the test results, the test shall be discontinued.

(3) Testing methods and validation of testing methods

The organization shall set forth a testing method based on Protocol for Verification Tests to use appropriate method and procedures for all tests within the limits of the operations.

If the Protocol for Verification Tests does not specify any method to be used, this organization shall select either an appropriate method published in international standards, local standards, or national standards, or in scientific literature, or a method designated by the manufacturer. If any method not prescribed in any standard is to be used, such use shall be subject to the consent of the verification applicant and validation prior to use. Validation is the act of confirming by investigation that the requirements for specific intended use are satisfied. Validation may be conducted by the Technology Verification Committee by means of review and approval.

If this organization uses computers or automated equipment in controlling data, it shall appropriately maintain and control such computer or automated equipment and establish required environmental and operational conditions to prevent data loss and erroneous conversion.

(4) Equipment

The organization shall own (including loans) all items of equipment required for implementation of verification tests. This organization shall appropriately identify any equipment operable only by authorized personnel. Any equipment that has excess load, has been handled incorrectly, can produce dubious results, contains defects, or deviates from the standard shall be kept out of use until it is repaired and proves to be properly functional.

(5) Measurement traceability

The organization shall ensure that equipment that can seriously affect the accuracy or validity of verification tests is appropriately calibrated prior to use.

(6) Sample collection

The organization shall collect or acquire specimens, raw materials, or product samples in accordance with the Protocol for Verification Tests.

(7) Handling of test/calibration items

The organization shall transport, receive, handle, protect, store, retain and/or dispose of test items, as necessary, in accordance with the Protocol for Verification Tests.

(8) Verification of data and guarantee of the quality of test results

It is desirable that data from verification test results shall be recorded in such a way that any trends can be identified and that a statistical approach is taken in examining the data. This verification shall be conducted by other personnel than those who have implemented the verification test.

(9) Reporting of test results

The organization shall report the results of tests implemented accurately and objectively in accordance with the Protocol for Verification Tests.

Appendix 1: Application for Verification

The applicant shall submit the following application. Be sure to fill in the box marked with “*”, which is important in the selection of target verification technologies.

[Applicant]

Company name *	(seal)
Address *	
Dept. and name of contact *	
Contact information*	TEL: FAX:
	e-mail:
Name of technology/ product*	

1. Outline of technology

Device configuration and treatment flowchart*
Mechanism *
Characteristics, merits, selling points

2. Results of Self-tests

Measurement manager*	(seal)
Measurement date*	mm/dd/yy

Quality and volume of water: *

Provide measurement results for volume of water, quality of inflow water, and quality of treated water. Specifically, records for the verification test site are desirable. If detailed test results are available, provide them in a separate sheet.

Environmental effects and resources *

Items	Unit	Measurements, etc.
Amount of sludge produced	kg/day	
Amount of waste produced	kg/day	
Possible emission of odor or noise		
Consumption of electricity, etc.	kWh/day	
Consumption of () treatment agents* ()	kg/day	
Give chemical's name in the parentheses ()	kg/day	
Amount of microbial agents, etc. used ()	kg/day	
Identify consumable supplies in the parentheses ()	kg/day	
Amount of consumable supplies consumed ()	kg/day	
Identify consumable supplies in the parentheses ()	kg/day	

Operation and maintenance*

Control item Enter "replenishment of wastewater treatment agents" "sludge/waste treatment" "periodical inspection," etc.	Control time per operation	Control frequency Circle "month," "week," or "day." Enter frequency in the parentheses
	() minutes	() times per (month, week, day)
	() minutes	() times per (month, week, day)
	() minutes	() times per (month, week, day)
	() minutes	() times per (month, week, day)

3. Product data (Describe devices installed at the verification test site)

Item		Description			
Name target verification device*					
Model No.					
Name of manufacturer*					
Contact*	TEL	()	-		
	Web address	http: //			
	E-mail	@			
	FAX	()	-		
Size*	W(mm)				
	D(mm)				
	H(mm)				
Weight (kg) *					
Necessity of pre-treatment and post-treatment*		Not necessary Necessary Description: ()			
Ancillary equipment*		Not necessary Necessary Description: ()			
Useful life of target verification device*					
<p>Estimated costs</p> <p>Initial cost items (example): civil engineering construction, equipment, etc.</p> <p>Running cost items (example): wastewater treatment agents, consumable supplies, sludge/waste treatment, electricity, etc.</p>		Cost item	Unit price	Volume	Total
		Initial cost			
		Running cost (monthly)			
		yen/ volume of treated water of 1m ³			

4. Development condition, delivery record*

Circle the number best describing your product.

- 1 . Test models can be fabricated but they are still to be commercialized.
- 2 . Already commercialized and available as a product.
- 3 . Have delivery records.

Description:

5. Innovativeness of technology

Describe the innovativeness of the technology, the status of patent/utility design applications filed or acquired, study reports published, awards received, etc.

6. Verification test site*

7. Other (Special notes)

[Documents accompanying this application]

- Technical specifications for technologies and products
- Results of self-tests
- Written approval of verification tests by the owner of verification test site
- Operation and maintenance manual

Appendix 2: Verification Test Plan

The verification test plan shall describe the purpose of and work under a verification test, including the design of and procedures for the verification test.

The content of the verification test plan may depend on circumstances but it shall include at least the following:

1. Front cover/ approval of participants in the verification test/the table of contents

The front cover shall be provided for the verification test plan. The table of contents and a list of the names of participants in the verification project who have approved the verification test plan shall be provided (including the manager of the verification organization, verification applicant, and owner of verification test site).

2. Roles of the organizations participating in verification tests and responsibilities of participants in verification tests

The responsibilities of organizations and their managers participating in the verification test shall be described.

3. Outline of the verification test site

- Name, location, address, and owner of the verification test site,
- Information relating to business condition of the verification test site (type of business (restaurant, coffee shop, etc.), scale of business (number of seats, etc.), number of employers, monthly number of visitors, etc.),
- Current flow rates, water quality, and treatment condition of wastewater, and
- Layout of the target verification device, the method of introducing wastewater to the target verification device, and a diagram of the wastewater system at the establishment.

4. Outline of the target verification technology and the target verification device

- System configuration, including mechanism of the target verification technology and the pre-treatment/post-treatment processes,
- Flow rates, load capacity, size, and weight of the target verification device,
- Main consumable supplies, consumable materials, power consumption, etc.,
- Work items required for the operation and maintenance of the target verification device,
- Control of conditions needed by the target verification device (addition of nutrient salts, pH control, dissolved oxygen level, biomass concentrations, etc.),

- Physiochemical properties of sludge and waste and the frequency of their production, and precautions for handling,
- Operation and maintenance skill of users of the target verification device, and
- Measures against noise/ odor and necessity of a building.

5. Verification test method

(1) Test period

- Test period and the test schedule.

(2) Startup of the target verification device (only to install a new target verification device)

- Startup schedule for the target verification device, and
- Precautions for startup (flow rates, types and concentrations of additives, calibration and coordination of components, etc.).

(3) Monitoring items

- Monitoring points, monitoring method, monitoring equipment, and monitoring schedule for flow rates, and
- Measuring and monitoring methods and a work schedule for each of the other monitoring items.

(4) Water quality analysis

- Water quality verification items,
- Sample collection method, devices used for sample collection, sample collection schedule (frequency), preservation method, and preservation period,
- Analytical method, analysis devices, and the analysis schedule, and
- Calibration method and the calibration schedule.

(5) Operation and maintenance

- Operation and maintenance verification items,
- Measurement method, measurement equipment, and measurement schedule for amount of sludge produced,
- Measurement method, measurement equipment, and measurement schedule for power consumption, etc.,
- Measurement method and measurement schedule for wastewater treatment agents and consumption of consumable supplies,
- Measurement method and measurement schedule for consumption of microbial agents, etc., and

- Evaluation method, measurement equipment, and information collection schedule for other verification items.

6. Data quality control

- Types and processing method of data using data quality indicators (DQI), such as accuracy and integrity, etc., and
- Necessity of collecting additional quality control information, including information on calibration of devices used in sample collection and analysis devices and associated materials (any unprocessed data shall be recorded in an appendix to the Report on Verification Test Results).

7. Control, analysis, and display of data

(1) Data control

Data and its forms produced during the course of the verification test that require control shall be identified.

(2) Analysis and display

The analytical method and format for data shall be specified.

8. Audit

The verification test plan shall provide information on the audit schedule, audit procedures, and audit group.

9. Appendix

The following shall be provided in appendices to the verification test plan:

- Operation and maintenance manual provided by the verification applicant,
- Past data concerning influent water, water volume, and water quality, and
- other documents and data for reference purposes.

3. Results of verification tests

o Water quality verification items

Item	Unit	Verification results (lower proximate values to higher proximate values, median values)		
		Influent water	Treated water	Removal ratio
pH	-	to	to	
BOD	mg/l	to	to	to
COD	mg/l	to	to	to
SS	mg/l	to	to	to
n-Hex	mg/l	to	to	to
T-N	mg/l	to	to	to
T-P	mg/l	to	to	to

(Calculate the removal ratio for each day of measurement.)

(Draw and attach a boxplot for the quality of inflow water and treated water corresponding to each water quality verification item.)

○ Items related to environmental effects

Item	Verification results	
Amount of sludge produced		
Amount of waste produced		
Noise		
Odor		

○ Items related to resources consumption

Item	Verification results	
Power consumption		
Consumption of wastewater treatment agents, etc.		

○ Items related to operation and maintenance performance

Control item	Control time in each control and control frequency	Number of personnel and skill required for maintenance

○ Qualitative results

Item	Results
Remarks on water quality	
Period needed for startup	
Period needed to discontinue operation	
Reliability of the target verification device	
Method of recovery from trouble	
Evaluation of operation and maintenance manual	
Other	

(Reference information)

Notes: The information on this page has been provided by the verification applicant for the purpose of technical publicity on its own responsibility. The information will not be used in verification.

○products data

Item		Description by the verification applicant			
Name / model					
Name of manufacturer or distributor					
Contact	TEL/FAX	TEL() - / FAX() -			
	Web address	http: //			
	E-mail	@			
Size, weight					
Necessity of pre-treatment or post-treatment		Necessary/Not necessary (Details:)			
Ancillary equipment		Necessary/Not necessary (Details:)			
Useful life of the target verification device					
Startup period					
Estimated cost		Cost item	Unit price	Amount	Total
		Initial cost			
		Running cost (monthly)			
		Per 1 m ³ of treated water			

○ Information from other manufacturers

Technically applicable fields (applicable factories, establishments, etc.), special features of treatment technologies (treatment methods) (for example, ease of maintenance, size equipment and ease of installation, low costs, efficient reduction in wastes produced, and reduction in odor produced), description of other models based on the same mechanism, potential improvement, future expansivity, etc.

Materials

I. Outline of the Project of the Environmental Technology Verification

1. Purpose

Some practicable and useful advanced environmental technologies are not used widely because they have yet to be evaluated for their environmental effects and thus because they are not accepted as reliable by end-users, such as local governments and agencies, private businesses, or consumers.

This Project is intended for third-party organizations to verify advanced but less common environmental technologies on a trial basis and in an objective manner, for their effects on environmental conservation.

This Project is expected to promote the spread of environmental technologies developed by venture businesses or other enterprises and simultaneously invigorate local economies in line with development of the local environment industry and enhancement in environmental conservation.

2. Meaning of “verification”

Under this Project, “verification” is conducted on data concerning such matters as the effects of environmental technologies on environmental conservation to determine whether such data are objective. “Verification” is compared with “certification,” which determines whether environmental technologies conform to a predetermined standard. This Project is not intended to give such certification.

3. Project implementation scheme

This Project is implemented through coordination between the Ministry of the Environment, verification management organizations, which prepare the Protocol for Verification Tests, select verification organizations, and determine and collect fees, and verification organizations, which perform verification.

4. Procedures for the project

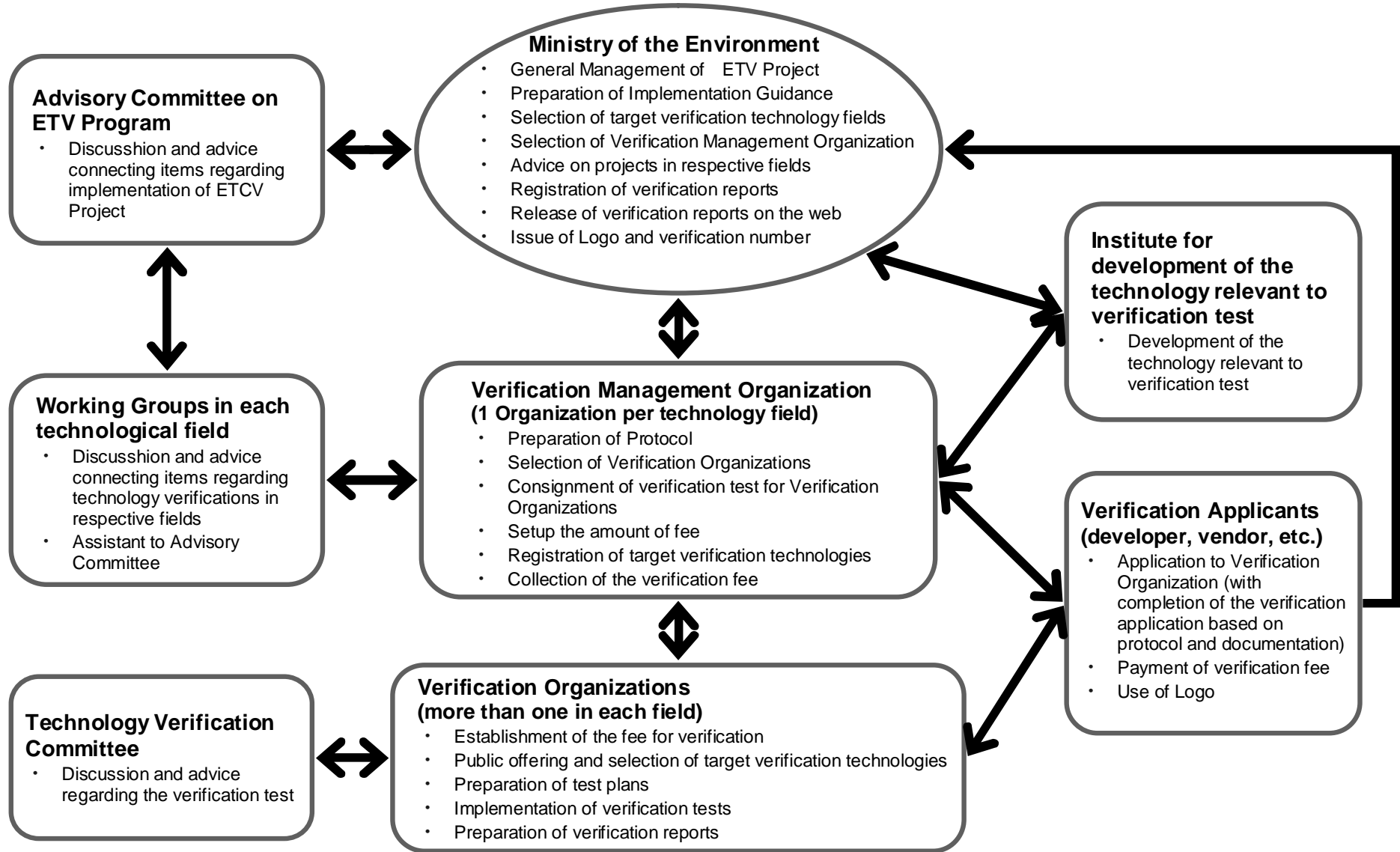
This Project is carried out generally in accordance with the following procedures:

- (1) The Ministry of the Environment evaluates developers and distributors of technologies and the needs of users by conducting questionnaire surveys and other studies.
- (2) The Ministry of the Environment selects target technological fields based on reviews at the Study Committee.
- (3) The Ministry of the Environment selects “verification management organizations,” which

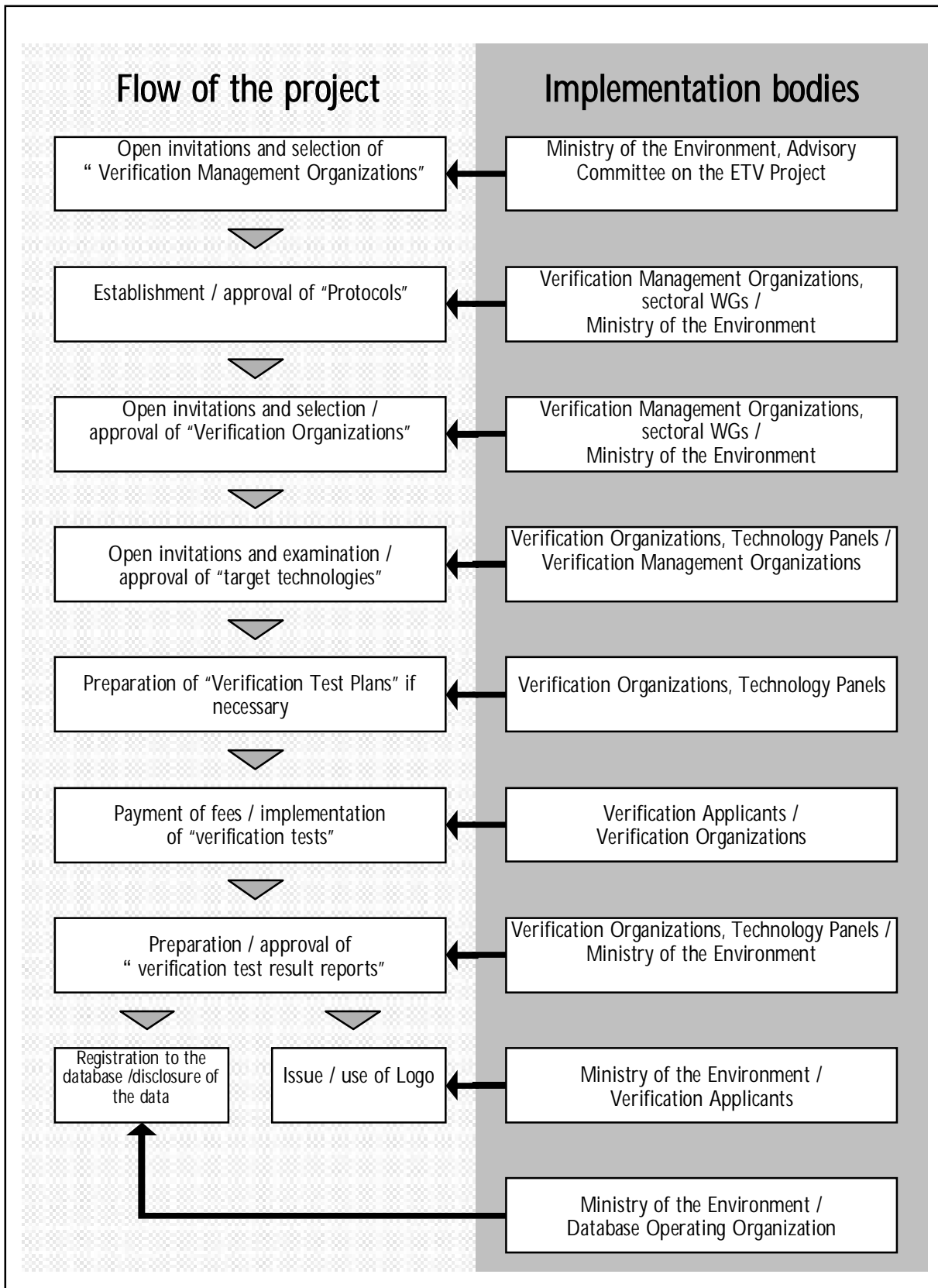
compile the Protocol for Verification Tests, invite for participation and select verification organizations, and set up and collect fees.

- (4) Verification management organizations compile the Protocol for Verification Tests, which sets forth detailed procedures for technological verification in each selected field of technology.
- (5) Verification management organizations select “verification organizations,” third-party bodies that conduct verification tests.
- (6) Verification organizations publicly invite companies to have their technologies verified.
- (7) Verification organizations, at a professional committee, select verification technologies from technologies presented in public invitation.
- (8) Verification organizations conduct verification tests on selected technologies in accordance with the Protocol for Verification Tests.
- (9) Verification organizations document the verification tests results and report them to the Ministry of the Environment by way of verification management organizations. Such reports are registered in an Internet database and made open to the public.
- (10) The Ministry of the Environment issues logos for verified technologies.

II. Implementation Scheme for the Project of the Environmental Technology Verification



III. Flow of the Project of the Environmental Technology Verification



IV. The Study Committee on the FY2011 Project of the Environmental Technology Verification: Outline of the Establishment of the Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments

1. Purpose of the Working Group

In implementation of the Project of the Environmental Technology Verification, the Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments (hereinafter referred to as “Working Group”) is established to make professional reviews and help facilitate efficient implementation of the project with respect to the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments, which is to be subject to technological verification in FY2011.

2. Subjects of the investigation

- (1) Field of Organic Wastewater Treatment Technologies for Small-scale Establishments
 - (a) Formulation of the Protocol for Verification Tests,
 - (b) Selection of verification organizations,
 - (c) Confirmation of verification tests reports, and
 - (d) Other matters relating to implementation of the Project.
- (2) Future verification tests of organic wastewater treatment technologies for small-scale establishments and technological field candidates for review.

3. Organization, etc.

- (1) The Working Group will consist of up to 10 review members.
- (2) The Working Group will have a chairman.
- (3) The chairman will lead the Working Group.
- (4) Review members are selected and commissioned by the Japan Environmental Sanitation Center from among academic experts and learned individuals who are associated with verification tests of organic wastewater treatment technologies for small-scale establishments, subject to the consent of the Environmental Management Bureau.
- (5) The commission period for review members will start at the date of commission by the Japan Environmental Sanitation Center to the end of the fiscal year in which such commission has started.
- (6) As necessary, an extended Working Group meeting (stakeholder’s conference) will

be set up to make specific individual reviews.

- (7) As necessary, Working Group meetings may be attended by participants in the Project of the Environmental Technology Verification or other stakeholders as observers.

4. Open discussion at meetings

Discussion at Working Group meetings are made open to the public. However, the chairman may carry out discussions in private if the open meeting can seriously interfere with fair and neutral review or cause special advantage or disadvantage to certain parties.

5. General affairs

General affairs related to the Working Group will be handled by the Japan Environmental Sanitation Center upon the consent of Environmental Management Bureau.

The Study Committee on the FY2011 Project of the Environmental Technology Verification

Working Group on the Field of Organic Wastewater Treatment Technologies for
Small-scale Establishments

List of Review Members

FUJITA, Masanori, professor emeritus, Osaka University

OKADA, Mitsumasa, professor, the Open University of Japan,

JO, Kaikin, section chief, National Institute for Environmental Studies, Center of
Material Cycles and Waste Management Research, Environmental Restoration and
Conservation Technology Section

KATO, Kazutaka, vice president, Japan Foodservice Association

NATORI, Makoto, advisor, Japan Foodservice Association, International
Environmental Technology Cooperation Center

MIYAKOSHI, Tomohiro, managing director & Project Department manager, LMS
Co., Ltd.

< Secretariat (Ministry of the Environment) >

IWATA, Takekazu, office chief, Environmental Management Bureau, Policy and
Coordination Division, Environmental Control Technology Office

TAKANO, Atsushi, assistant office chief, same as above

SHIGEMATSU, Akiyuki, Planning Section chief, same as above

SAKUMA, Uyo, section member, same as above

YOSHIOKA, Kenichi, section chief, Environmental Policy Bureau, Policy and
Coordination Division, Office of Environmental Technology and Research,
Coordination Section

KANEKO, otoo, section member, same as above

MIZUHARA, Kensuke, assistant division chief, Environmental Management Bureau,
Water Environment Management Division

AIYA, Hideyuki, assistant division chief, same as above

ISOBE, Ryota, section chief, same as above

< Secretariat (Japan Environmental Sanitation Center) >

NAMIKI, Akira, East Branch Office, Environment Science Department

NISHIO, Takayoshi, East Branch Office, Environment Science Department,
Metrology Engineering Section

KIHIRA, Azusa, same as above

HATA, Yasushi, Administration Department, Accounting Division

* The titles, names, etc. are effective as of April 2011.

V. Reviews at the Working Group on the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments

(FY2003)

Meeting 1: June 26, 2003, 10: 00 to 12: 00

Pilot Project of the Environmental Technology Verification
Organic wastewater treatment technologies for small-scale establishments
Protocol for Verification Tests (draft)

Meeting 2: July 16, 2003, 13: 00 to 17: 00

Presentation of opinions concerning the Protocol for Verification Tests (draft)

- Environmental Management and Technology Center in KANSAI
- Sanyo Electric Co., Ltd.
- Daito Giken, Inc.
- TT Technoplace, Ltd.
- Nishihara Environment Co., Ltd.

Protocol for Verification Tests (draft)

Meeting 3: July 30, 2003, 13: 30 to 15: 30

Protocol for Verification Tests (second draft)
Solicitation and selection of verification organizations

Meeting 4: August 26, 2003, 10: 00 to 12: 00

Protocol for Verification Tests
Invitation of verification organizations
Hearings with applicants for verification organization
Selection of verification organizations

Meeting 5: March 11, 2004, 15: 30 to 17: 30

Pilot Project of Environmental Technology Verification
Implementation conditions for verification tests
Future improvements to the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments, etc.

(FY2004)

Meeting 1: April 19, 2004, 9: 30 to 12: 00

A review on the Report on Verification Test Results
A revision of the Protocol for Verification Tests
Solicitation and selection of verification organizations

Meeting 2: June 1, 2004, 13: 00 to 15: 30

Protocol for Verification Tests
Invitation of verification organizations
Hearings with applicants for verification organization
Selection of verification organizations

Meeting 3: March 31, 2005, 10: 00 to 12: 00

A review on the Report on Verification Test Results
Recommendations from verification organizations concerning the Protocol for Verification Tests
Implementation scheme for FY2005

(FY2005)

Meeting 1: October 6, 2005, 14: 00 to 16: 00

Establishment of a WG
Review of drafted fee items and revision of the Protocol for Verification Tests

Meeting 2: December 7, 2005, 15: 00 to 17: 00

Revision of the Protocol for Verification Tests and fee items

Meeting 3: February 20, 2006, 10: 00 to 12: 00

Protocol for Verification Tests (Version 3)
Solicitation of verification organizations

(FY2006)

Meeting 1: July 19, 2006, 10: 00 to 12: 00

Establishment of a WG
Results of selection of verification organizations (reports)
How to proceed future discussion and activities (hearings with verification organizations)

Meeting 2: March 19, 2007, 16: 00 to 18:00

Review of the Report on Verification Test Results
Protocol for Verification Tests
Solicitation and selection of verification organizations

(FY2007)

Meeting 1: June 28, 2007, 14: 00 to 16: 00

Solicitation of verification organizations
Hearings with applicants for verification organization
Selection of verification organizations
How to proceed future discussion and activities (holding of extended Working Group meetings)

Extended **WG** meeting: December 5, 2007, 14: 00 to 16: 00

Outline of Pilot Project of Environmental Technology Verification (Field of Organic Wastewater Treatment Technology)
Demands and opinions concerning the project and target technological fields

- Demands and opinions concerning the operation of target technologies and the project
- Demands and opinions concerning improvements, including benefits of verification

Meeting: March 10, 2008, 15: 00 to 17: 00

Review of the Report on Verification Test Results
Protocol for Verification Tests

(FY2008)

Meeting 1: June 2, 2008, 14: 00 to 16: 00

Establishment of a **WG**
Revision of the Protocol for Verification Tests
Solicitation and selection of verification organizations

Extended **WG** meeting: December 3, 2008, 10: 00 to 12: 00

Outline of the Pilot Project of Environmental Technology Verification (Field of Organic Wastewater Treatment Technologies)
Demands and opinions concerning the project and target technological fields

- Demands and opinions concerning the operation of target technologies and the project
- Demands and opinions concerning improvements by verification, including benefits of verification

Meeting 2: March 10, 2009, 15: 00 to 17: 00

Establishment of a WG

Revision of the Protocol for Verification Tests

Improvements by verification, including benefits of verification

(FY2009)

Meeting 1: April 20, 2009, 10: 00 to 12: 00

Establishment of a WG

Revision of the Protocol for Verification Tests

Solicitation and selection of verification organizations

Extended **WG** meeting: November 20, 2009, 10:00 to 12:00

Outline of the Project of the Environmental technology Verification (the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments)

Demands and opinions concerning the project and target technological fields

- Demands and opinions concerning target technologies and operation of the project
- Demands and opinions concerning improvements by verification, including its benefits.

Meeting 2: March 12, 2010, 10: 00 to 12: 00

Review of the Report on Verification Test Results

Protocol for Verification Tests

(FY2010)

Meeting 1: April 28, 2010, 10: 00 to 12: 00

Establishment of a WG

Revision of the Protocol for Verification Tests

Solicitation and selection of verification organizations Solicitation and selection of verification organizations

Extended **WG** meeting: November 30, 2010, 14: 00 to 16: 00

Outline of the Project of the Environmental technology Verification (the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments)

Demands and opinions concerning the project and target technological fields

- Demands and opinions concerning target technologies and operation of the project
- Results of questionnaire survey

Meeting 2: March 24, 2011, 14: 00 to 16: 00

Review of the Report on Verification Test Results

Logos

Protocol for Verification Tests

(FY2011)

Meeting 1: April 25, 2011, 10: 00 to 12: 00

Establishment of a WG

Revision of the Protocol for Verification Tests

Solicitation and selection of verification organizations Solicitation and selection of verification organizations

Pilot Project of the Environmental Technology Verification
Revision Record of Protocol for Verification Tests

for

Organic Wastewater Treatment Technologies for Small-scale Establishments
(kitchens, dining rooms, food factories)

Initial version: published August 7, 2003

Version 2: published April 28, 2004

< Main revisions made to the initial version >

Corrected project system relating to nonconformities. Reorganized duplicate descriptions.

Deleted the description of property evaluation of influent water and corrected associated descriptions.

Established the minimum sample collection frequency in connection with water quality.

Deleted description of “environment, sanitation, and safety plan” because it should be reflected in the verification test plan.

Reorganized descriptions of the Report on Verification Test Results and the verification test plan.

Revised the provision of application for verification.

Revised the Form (provisional) of Summary of the Report of Verification Test Results.

Version 3: published March 3, 2006

< Main revisions made to Version 2 >

Revised the verification test implementation scheme (established the verification management organization).

Revised the description of water quality verification items relating to collection frequency and the frequency.

Added fee items.

Added a description of change or discontinuance of verification tests.

Revised the Form (provisional) of Summary of the Report of Verification Test Results.

Project of the Environmental Technology Verification
Revision Record of Protocol for Verification Tests
for
the Field of Organic Wastewater Treatment Technologies for Small-scale Establishments

Version 1: published June 13, 2008

< Main revisions made to Version 3 (Pilot Project of Environmental Technology Verification) >

Revised the description of the implementation scheme for the verification project.

Revised the scope of the target technologies.

Added verification items.

Reorganized the description of the test period and sample collection by treatment technology.

Version 2: published April 27, 2009

< Main revisions made to Version 1 >

Revised the verification tests methods for the amount of sludge produced (to reduce the amount).

Added a description of the omission of weekly tests or decrease in the number of test days.

Version 3: published May 14, 2010

< Main revisions made to Version 2 >

Added a description of the omission or shortening of verification test periods and periodical tests.

Added a description of utilization of existing data.

Version 4: published May 10, 2011

< Main revisions made to Version 3 >

Added a description of the issuance of logos.