

7th International Workshop on Decentralized Domestic Wastewater Treatment in Asia 1



Challenges for the Spread of Decentralized Wastewater Treatment System in Overseas and Hiyoshi's Related Experiences

Etsuko Kawasaki

24th September 2019





Established	1955
Employees	309
Head office	Omihachiman, Shiga
Branches	Tokyo, Yokohama, Osaka
Affiliate	Shonan Analytical Center, Hiyoshi India Ecological Services Pvt. Ltd (India)



Company Creed

Prosperity by serving the Society
Prosperity by technology



A company cannot continue to exist without serving society.
Service to society is possible
only through the underpinning of company technology.



【Hiyoshi】 Business field

Everything starts with “ANALYSIS”,
we provide ONE-STOP service such as infrastructure O&M,
industrial chemical, waste treatment, and consulting.

**Measurement
and Analysis**



**Infrastructure
Maintenance
and Operation**



60 years of experience

**TOTAL
ENVIRONMENTAL
SUPPORT**

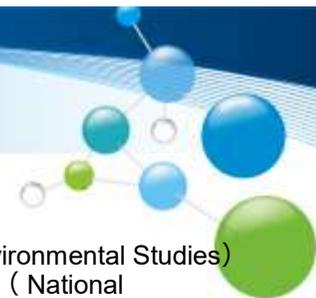
About 80 Business Accreditations

**Industrial
Chemicals**



**Urban
Management
and Conservation**





China

1989-Present Accepting technical trainees from National Environmental Analysis Testing Center, Hunan Province. Accepting interns from Peking University, Tsinghua University and Zhejiang University

2006-Present Import and sales of raw materials for industrial chemicals from China

2004-2015 Promotional activities and seminars of Dioxin Monitoring Technologies at Academic Conferences and Exhibitions

2015-Present Conducting business activities for the licensing of Calux Bioassay

Malaysia

2011-2014 Accepted interns from UKM University

India

1995-Present Annually speech contests are held
2004-Present Accepted interns from SRM University, IIT University, Anna University
 The internship program is being continued every year.

2007-Present Started Hiyoshi Awards (Environment related)

2011-Present Establishment of subsidiary company Hiyoshi India Ecological Services Private limited (Environmental Analysis and development of O&M)

2018 JICA Project in Chennai

Korea

2005 Workshop (National Institute for Environmental Studies)
 2006 Validation of environmental samples (National Institute for Environmental Studies)

Laos

2007-2008 World Bank Project for Dioxin and PCM monitoring

Taiwan

2005-2007 Introduced Calux Assay in Cheng Shiu University of Science and Technology

2008-2010 Research on Blood from Taiwan Institute of Health

2012-2014, 2017, 2019 Introduced Calux Bioassay in Taiwan Environmental Protection Department
 2012-2017 Introduced Calux Bioassay in Tajen University

Vietnam

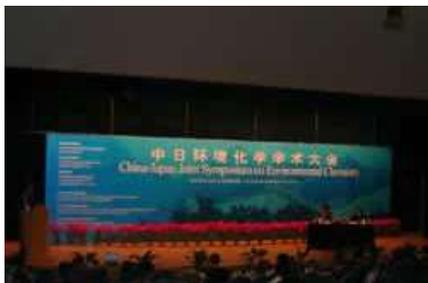
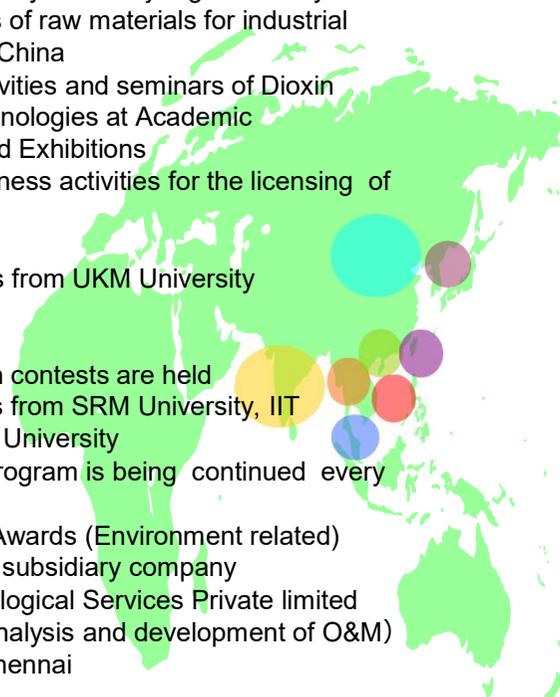
2002 Vietnam-USA Scientific Conference
 2005 Research on soil samples in Vietnam
 2005 Research on fish samples in Vietnam
 2011 JST-JICA Project(CEM-Soil Research)
 2012 METI global internship program
 2014-2016 The Model Project for improving Water Environment in Asia by the Ministry of Environment
 2015-2016 JICA grassroots technical cooperation project

Thailand

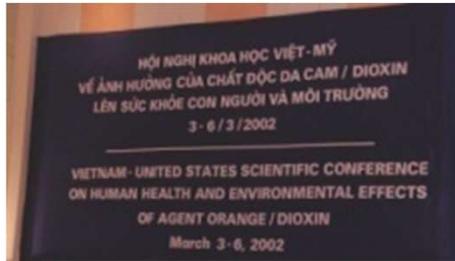
2007 Workshop (National Institute of Public Health)
 2015 Seminar (King Mongkut's University of Technology Thonburi, Kyoto University)

Myanmar

2018 JICA grassroots technical cooperation project (participation as a cooperative organization)



VIETNAM-USA DIOXIN CONFERENCE (2002)



JOINT RESEARCH WITH JICA-JST SATREP, CEM (2011)



JOINT RESEARCH AGREEMENT WITH IET (2014)



Aim to establish dioxin analysis as an official method in Vietnam and to start dioxin analysis using CALUX and O&M business of Wastewater facility in Vietnam in the future



➤ The Model Projects for Improving Water Environment in Asia by MOE(2014-2016)

Project for improving the water quality from the wastewater treatment facility and its operation in fishery processing factories

➤ JICA grassroots technical cooperation project (2014)

Collaborative support for organizing cooperation structure aiming at aquatic environment improvement in Cat Ba Island

In April 2019 Phase 2 was adopted and will be implemented in 2020



- Speech contest, since 1995
- Internship, since 2004
- Hiyoshi Award, since 2007
- Hiyoshi India Ecological Services Pvt. Ltd., since 2011



Talk your way to Japan
Speech contest



Internship



Hiyoshi India at TICEL Bio Park Chennai



Hiyoshi Award

'Talk your way to Japan' contest by ABK -AOTS DOSOKAI

Though global warming is a menace, a talk on it was an opportunity for four students from Tamil Nadu to fly to Japan. G. Mahalakshmi, L.M.R. Antony Britto, E.S. Atreya and Suraj Vivasathan, the winners of the 'Talk Your Way to Japan' - speech contest will be sent on a two-week study-cum-cultural exchange trip to Japan.

The annual contest is conducted by ABK -AOTS DOSOKAI Tamil Nadu centre for the past 13 years, with the support of Hiyoshi Corporation. The speech contest is held in three languages - Tamil, English and Japanese for students from corporation schools, other schools, colleges and ABK -AOTS DOSOKAI centres, on topics related to ecology and environmental issues. The first prize winners at the four levels are sent for an educational trip to Japan.

Mahalakshmi of Class XII from Corporation Girls Hr. Sec. School, Chennai, won the Tamil (level I) contest, while L.M.R. Antony Britto from St.Mary's School, Dindigul won the Tamil (level II). E.S. Atreya from Nibongo Gakko, Japanese Language School, and Suraj Vivasathan of School of Excellence from Law, will also be going to Japan, winning the Japanese and English speech contest, respectively. Suraj Vivasathan has won the contest in his fourth attempt. These four were selected among more than 200 participants. In the two-week programme, the winners will learn about the aspects of Japan's culture, society and people. A Tamil group in Japan will take them for sight-seeing.

Hiyoshi Corporation, an organisation working in the field of environmental, also gives 'Hiyoshi Environmental Awards' every year for researchers in the field of ecology. This year the awards were given to K. Babu Rajendran of Bharatidasan

Newspaper Article of Speech Contest



NABL certificate



Everything starts with "ANALYSIS"
We provide ONE-STOP service from Analysis
to the Maintenance and Operation of
Wastewater treatment plant

Measurement and Analysis

Infrastructure Maintenance and Operation





HIYOSHI TECHNICAL TRAINING IN JAPAN



Legal Inspection
Specified inspection agency will evaluate installation, Operation and Maintenance by appearance, water quality, and document inspection. (Neutral inspection by a third party organization)

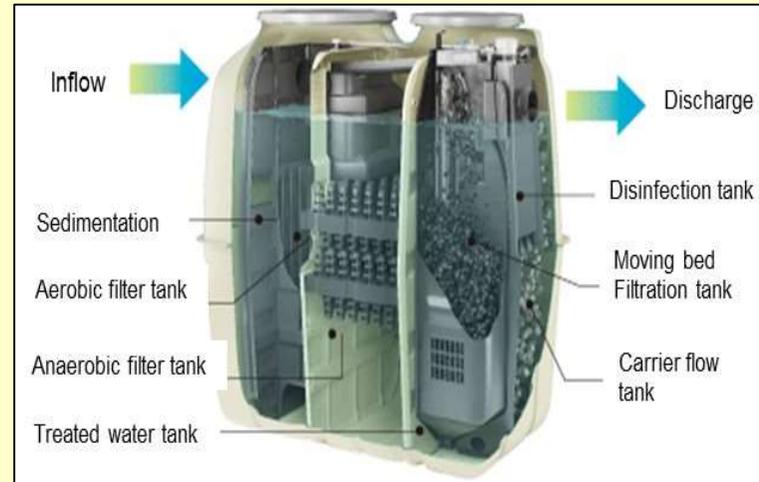
Visual Inspection
Measure water level in the tank, scum, accumulated sludge, aeration mixing condition, returned water



Machine Inspection
Check blowers and submersible pump



Night soil Treatment Plant



Desludging
Desludging of sludge and scum accumulated, and cleaning auxiliary equipment



Adjusting etc.
Adjust return water volume, air volume adjustment, backwashing, supplement of disinfectant etc.

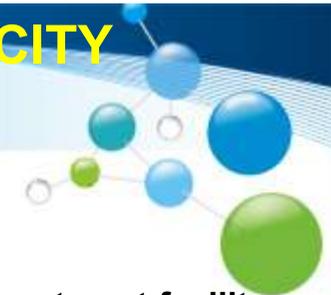


Water Quality Inspection
Treated water pH, transparency, water temperature, onsite water test kit, DO





- **From the economic point of view, the cost of installation of the facility and the Operation and Maintenance is expensive.**
- **It is necessary to develop regulatory standards such as Johkasou law.**
(In Japan, there are rules on regulatory management law such as Johkasou law and Waste Disposal and Public Cleansing Act)
- **It is necessary to establish an appropriate wastewater treatment facility according to local economical and environmental conditions.**
- **It is necessary to establish and find a facility for the treatment of Sludge**
- **It is necessary to train technicians with certain knowledge and skills.**



Response plan for appropriate maintenance management (From the Omihachiman City Records present at Hiyoshi)

Issue : From the economic point of view, high cost of installation of the domestic wastewater treatment facility

Period of High growth in population- The need for maintenance of domestic wastewater treatment was soon met in response to the urban requirements caused by the rural to urban transition due to the increase in population.

- Sewage maintenance is expensive and takes time.
- During that period the treatment of Johkasou was relatively expensive even for high-class residential areas.
- Omihachiman City did not allocate the financial budget for this purpose.



- * In 1974 it was obligatory for the residential development and construction companies to set up Johkasou in housing developments.
- Setting up of Common Johkasou for development area where the domestic wastewater volume generated is from more than 11 houses
- Setting up of Individual Johkasou if the domestic wastewater volume generated is from less than 10 houses



RESULT

- * Accomplished domestic wastewater treatment system by installing Common Johkasou for 25,000 people in 3 years (about 50% of the population of Omihachiman)
- * Did not use any financial resources from the city
- * Treatment is processed at an existing Night soil treatment facility and the collection and transportation of sewage and sludge from Johkasou is carried out by a Company
- * Operation and Maintenance cost borne by residents and Communities

Feasibility Survey for Holistic Management System of Sewage Treatment Plant with Remote Monitoring Technology in India

SMEs and Counterpart Organization

- Name of SME : Hiyoshi Corporation
- Location of SME : Shiga Prefecture, Japan
- Survey Site • Counterpart Organization : Chennai, India. CAIIUC



Concerned Development Issues

- Improvement of sewage treatment technology and management capacity
Because of lack of capacity and technology in the sewage treatment facilities, sewage that has not been treated properly has been discharged to the environment. It causes water pollution in the surrounding areas.

Products and Technologies of SMEs

- Introducing “Holistic Management System of Sewage Treatment Plant with Remote Sensing Monitoring Technology” by combining ICT, Internet, IoT and sensors.
- This technology enables to provide prompt and proper maintenance at site by real time monitoring in Japan and cooperation between subsidiary company in India and headquarters in Japan corresponding to the fluctuation of conditions of inflow and discharged water

Proposed ODA Projects and Expected Impact

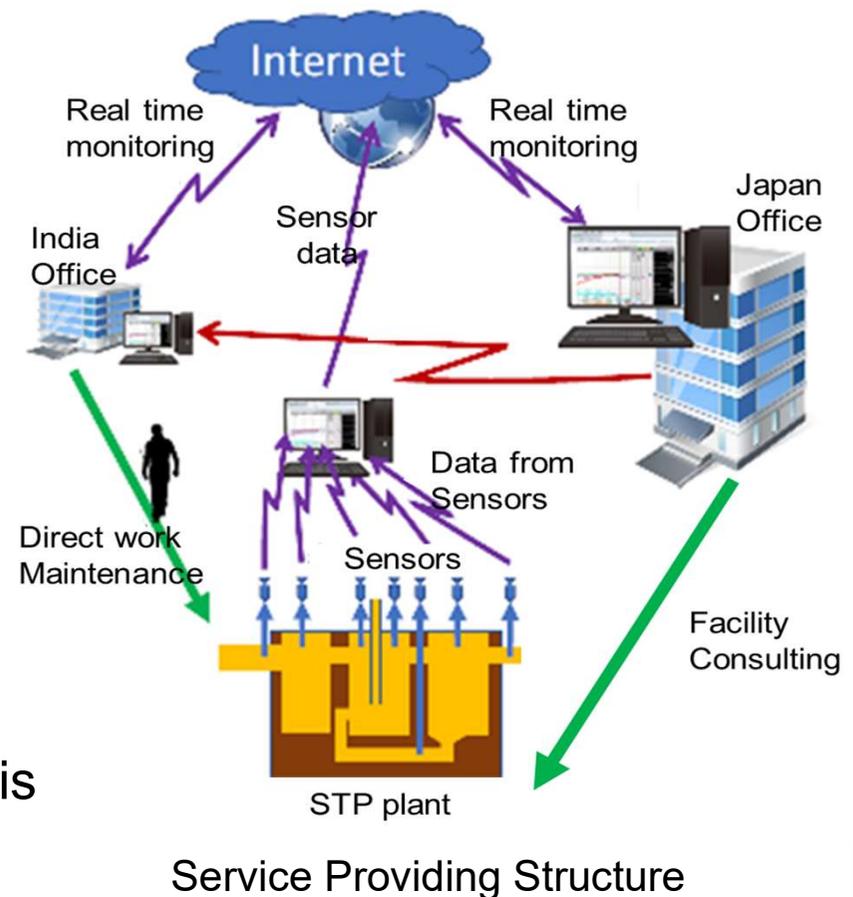
- After survey this project will be proposed as Promotion and Demonstration ODA project
By introducing maintenance technologies for sewage treatment plant to adjust facility capacity and continuous water quality management, the capacity of sewage treatment plant maintenance engineer will be improved. It will improve the public water quality surrounding area of the facility.

Established 2 of each Network Camera, pH meter, ORP meter, DO meters at 3MLD STP plant at CAIIUC and collected all devices operation logging data.

Establishment is not the goal but collecting and analyzing collected data is the main purpose.

Purpose and benefit

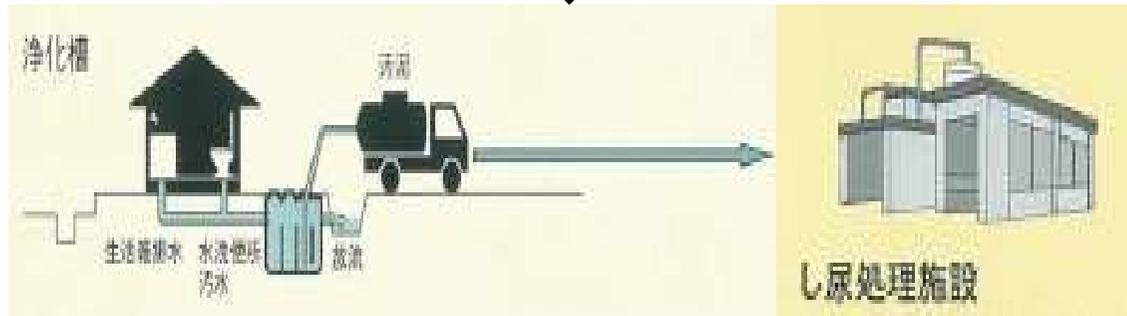
- Grasp raw water conditions
- Grasp treatment situation
- Cancelling transportation time
- Operational instructions from Japan
 - ❌ Solutions for the issues regarding the training and recruitment of engineers
- Obtain basic information for data analysis
- Monitor treatment conditions on time



- ◆ In Chennai, India, **about 1,000 MLD, which is 62% of the total sewage generated**, is left untreated in the rivers and waterways, causing serious problems.
- ◆ In addition, the septic tank sludge which is not treated **is illegally dumped into rivers and gutters by vacuum trucks**.
- ◆ In addition there are reports of deaths of workers entering the septic tank for cleaning work and the improvement of working conditions and education are also issues.
- ◆ Water pollution has become serious and so safe water can not be accessed, and this has led to problems with household sanitation.



Requirements

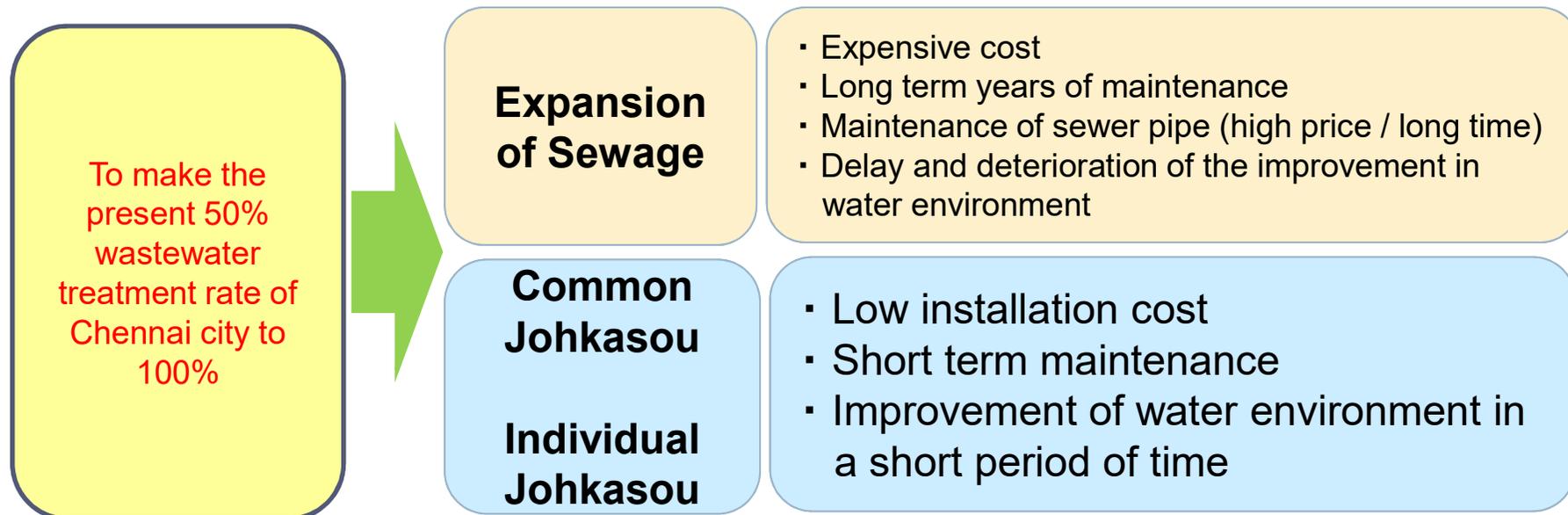


Night soil treatment facility

- ◆ Established in model districts for “Jhokasou” and “sewage treatment facilities” of Japan's decentralized wastewater treatment facilities in areas where sewage systems are not developed, to improve local sanitation, water environment, and living environment.

Proposal for the appropriate implementation of the maintenance
(50% Untreated rate of domestic wastewater treatment)

- Proposal : Not just Sewage Treatment plant but it is also necessary that Johkasou should be made a part of social infrastructure in the national domestic wastewater treatment plan.



MERITS OF JOHKASOU

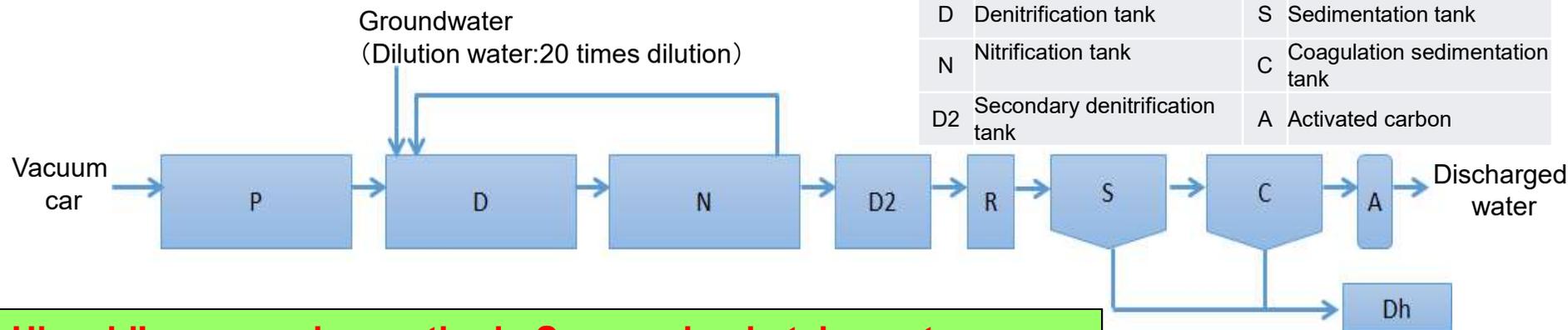
- * If Johkasou is installed then it is possible to take measures for domestic wastewater treatment at a low cost in a shorter period of time as compared to the installation of sewage facilities.
- * It is also possible to improve the water environment in a short period of time.
- * Furthermore, referring to Japanese Johkasou structure standards, India can establish its own **"Make in India"** Johkasou structure certification", realizing low cost + short term introduction improvement + early water environment improvement. It is also possible to train and maintain appropriate level of management engineers.



Design condition Capacity: 100m³/d
 Inflow water quality : BOD13500mg/L COD7000mg/L SS21000mg/L T-N5000mg/L T-P1000mg/L

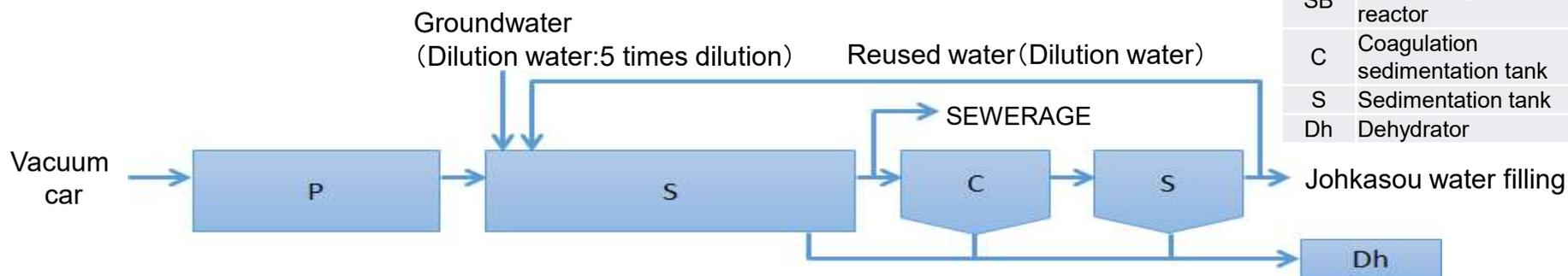
General processing method : Standard denitrification method

P	Pretreatment equipment	R	Re-aeration tank
D	Denitrification tank	S	Sedimentation tank
N	Nitrification tank	C	Coagulation sedimentation tank
D2	Secondary denitrification tank	A	Activated carbon



Hiyoshi's processing method : Sequencing batch reactor

SB	Sequencing batch reactor
C	Coagulation sedimentation tank
S	Sedimentation tank
Dh	Dehydrator



The suspended Omihachiman Night Soil Treatment Plant was designed and repaired so as to operate at a low cost. As compared with the standard treatment method, it uses less diluted water, is more compact, saves power and uses the SBR method which is superior in denitrification.

→It is highly likely that this method can be customized to suit local economic and environmental conditions.

Night soil Treatment by SBR Method (Sequencing batch reactor)

Company Name : Hiyoshi Corporation

Characteristics Outline of Wastewater Treatment Technology

Company Profile (Business Contents)

Since its inception in the year 1955, Hiyoshi has been providing Total Support in a wide range of Environmental Business from Chemical Analysis to sales of Industrial Chemicals, Facility Management and Waste Disposal.

1. Background Details:

Omiachiman City has been using the Night soil treatment facility until the fiscal year 2005, but due to the aging of the facility and due to non-functioning it came under the administrative association health and sanitation center which is adjacent to the city for about seven years from fiscal year 2006. In the meantime, the facility was abandoned for a long time and it was in ruins. Since the Great East Japan Great Earthquake occurred in 2011, Hiyoshi received a request of disaster relief from Shiga Prefecture and was involved in the transportation of Night soil and the like in the afflicted areas, as the drainage pipeline and processing facilities also collapsed in the afflicted areas. While doing this, we experienced inefficient transportation work from the Miyagi prefecture Osaka City to Sakata City, Yamagata prefecture, with no maintenance such as temporary "storage facility" of human waste due to congestion at the time of disaster caused because of snowy roads and bad traffic conditions.

Based on this experience, Hiyoshi presented the importance of securing a temporary "storage facility" in the evacuation shelter such as evacuation centers when it was asked for suggestions from "Omiachiman City" for "disaster-resistant town development". It was then decided to use the treatment tank (2000 m³) of the old Night Soil processing facility in Omiachiman City as a temporary storage reservoir for Night Soil, which had become a dormant ruin as it was not being used for many years.

However, the Ministry of Internal Affairs and Communications predicted that the East Nankai Trough will occur within 30 years. To be prepared for such a disaster the storage for the temporary collection of the Night soil should be constructed. The administrative association was entrusted with the maintenance and the construction of such a temporary storage facility. In view of the plan, Omiachiman City decided to change the "temporary storage" facility etc. to a facility that can also handle waste and so on. The city of Omiachiman adopted the remodeling renovation to "batch type denitrification / dephosphorization advanced activated sludge treatment method" that was proposed by Hiyoshi and also promoted the installation and renovation of the facility so that it could start functioning from the end of the fiscal year 2012. It was completed after some period of time, and in October of 2013 the full-scale treatment for receiving night soil was resumed.

2. Characteristic (specifications such as a discharge, the quality of the water) of the target drainage:

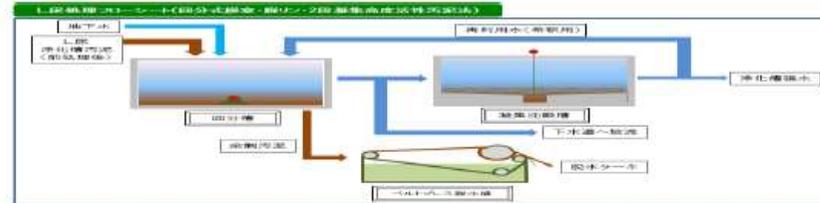
• The basic design throughput conforms to the basic design of the former Omiachiman City human waste treatment facility (100 m³ / day).

Raw water concentration designed for BOD: 13,500 mg / L, COD: 7,000 mg / L, SS: 21,000 mg / L, N: 5,000mg/L, P: 1,000mg/L

• The Water quality treatment (specifications) 1) the wastewater treatment waste water standard specified by the waste treatment method, 2) the input standard specified by the sewerage law, 3) the wastewater standard specified by the Water Pollution Control Act (Water Pollution Control Law), 4) Shiga Prefecture Design specifications that can adhere to sewer system implementation instructions, such as sewage, in sewers.

3. Outline of Processing Facility: (SBR Method: Sequencing Batch Reactor)

• The former standard denitrification treatment method was changed to Batch-style denitrification · Dephosphorization · And it was also changed to Two stage Coagulation Advanced Activated Sludge Method
 • Batch tanks are a total of 4 series -4 tanks - 4 batch system. First, after sedimentation in the charging tank it goes to a large rotating screen where the residue is removed by dehydration and then subjected to Bioenvironmental denitrification (SBR) in batch tank (SBR) · After dephosphorization treatment, a part of it is put into the public sewerage system (maximum 300 m³ / day), and the remaining treated water is subjected to advanced treatment by the two-step agglutination method 1) reuse as raw water for dilution etc. 2) It is reused for the second time treatment process of Jokaso thereby, reducing the discharge load to the outside of the batch tank system. · The Processing Facility is a Hybrid facility with truck scale · discharge flowmeter · An ORP sensor, an IoT remote monitoring facility such as a camera, and the like.



4. Introduction of the efficiency of the wastewater treatment technology (Emissions, Water quality, etc.)

The treated water quality is below the water pollution control release standard, sewerage law input standard value.

• Input to public sewer: Maximum 300 m³ / day

• In the earthquake occurring region, at the local evacuation shelter the night soil can be collected at one place in the temporary storage collection facility thereby avoiding the discharge of human excreta into water sources in those earthquake affected areas. By adding added value to the dismantled dormant facility, we were able to contribute to citizens in terms of convenience and economy.

5. Ingenuity Points:

• Lake Biwa is a source of drinking water for the entire Kinki region and so in the event of a disaster, if there is a damage to the infrastructure such as sewerage then there is a danger that the organic matter such as human excreta will be released directly into Lake Biwa. Also, if such contamination were to occur there would be a danger of Biohazard and thus it would be a health threat to about 15 million people which solely depend on Lake Biwa for its drinking water source. Hence to reduce such contamination the design was changed to a batch type (SBR) as it is easy to switch the facility as per the situation into a temporary storage facility whenever such a need occurs. Hiyoshi has had experience in the maintenance and management technology of the specific environmental preservation public sewer system (oxidation ditch process) and with such experience and application, the development and design period of this facility was greatly shortened

• Because of the restart of the dormant facilities, there was no subsidy from the administration and all the design and repair work was done by Hiyoshi.

• Since this facility is a multipurpose hybrid facility, it took time to submit application notification procedures (particularly consistency with existing standards for structuring of human waste treatment facilities and guidelines)

• The usage time of equipment that is used for each batch process is limited and distributed for each process, and so it has the advantage of being able to distribute the electric power load. We are currently studying the installation of a private generator during the time of a disaster.

Inquiries concerning this reference sheet

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Summary



- Decentralized wastewater treatment system is **not complimentary facility** to sewage system but should be considered as **permanent social capital**.
- In order for the decentralized waste water treatment system to appropriately function, **regulatory system is require** so that Johkasou's design and performance will be standardized, and there will be cycle for maintenance, cleaning, water quality testing, and sludge is treated at the treatment facility.
- In order for the decentralized wastewater treatment system to continue and operate in right way, **education for technical staffs is necessary** for each field, such as designing, construction, maintenance and operation, water testing and cleaning,

THANK YOU FOR YOUR KIND ATTENTION

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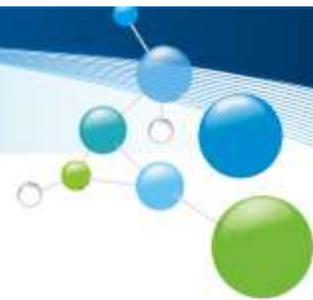
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Reference Introduction Material
**「Current Status of Johkasou Operation and
Maintenance Work done by Hiyoshi in Japan」**













Omihachiman City Night Soil Treatment Plant







