



ABSTRACT

MAKE IT GREENER
MAKE IT BIOCLEANER

“THE WATER WAS BROWNISH WITH A FOUL ODOUR COMING FROM IT. AFTER TWO WEEKS WITH THE BIOCLEANER SYSTEM, THIS HAS BEEN ELIMINATED ALONG WITH THE OIL RESIDUE ON SURFACE – NAGA RIVER IS BETTER OFF WITH BIOCLEANER!”.

Engineer Joel P. Martin - Head of Solid Waste & Pollution Management Division, Naga City

ABSTRACT

The **BioCleaner** system is a revolutionary, pre-engineered breakthrough technology that harnesses the power of nature to treat all types of organic waste, including that from the residential, commercial, industrial and municipal sectors. The technology was developed years of research in the United States. It can also be used to clean open waterways such as rivers, lakes and bays effectively.

BioCleaner has a rating for *Green Patent A*, and strives to be the best biological treatment technology. Unlike other biological treatment systems which require regular application of microbes, **BioCleaner** constantly produces its own microbes, eliminating the need to add new microbes every day.

A standard **BioCleaner** system can be pre-engineered to **BOD 5mg/L** and **COD 20mg/L** or even to non-detect, depending on how it is designed.

No sludge handling is required. This means that sludge handling or desludging will no longer be needed, saving a significant amount of time and money. Sludge-related costs typically average 90% of STP expenses.

Each **BioCleaner Unit** is powered by a small **2.0 HP blower** depending on unit size, smaller than other existing technology. No expensive transfer pumps are needed. Furthermore, the effectiveness of our patented system enables you to **recycle 100% of the wastewater**. The recycled water can be suitable for flushing, washing, irrigation on air-conditioning cooling towers saving money. Excess water can be used to recharge the groundwater as well. Coupled with a Reverse Osmosis (RO) unit you can treat it to drinking standard.

For new systems, the footprint area required is much smaller than other technology such as sequencing batch reactors (SBR), saving on capital costs. Typically, the **BioCleaner** system needs only half the area of an SBR system. The area saved can be used for other purposes. Without the need for a pump room, extra space is gained.

This is an environmentally-friendly technology because methane production is negligible, and because the electricity consumption is very low. Another benefit of **BioCleaner** is that odours are significantly minimised and isolated. Places where odour control is important will benefit greatly from the technology.

BioCleaner can be retrofitted to existing sewage treatment plants (**STPs**) or wastewater treatment plants (**WWTPs**). The compact nature and easy assembly of **BioCleaner** enables almost all existing systems to benefit from its advantages.

The microbes used are all-natural and have not been genetically modified. Only microbes classified by the **American Type Culture Collection (ATCC)** as **Biosafety Level 1** are used in **BioCleaner**. Biosafety Level 1 means that if a person ingests the microbes, it will not cause any harm to them. **BioCleaner** uses different kinds of microbes for the different types of waste.

FREQUENTLY ASKED QUESTIONS

Are the microbes safe?

Yes. According to the **American Type Culture Collection (ATCC)**, the microbes we use are **Biosafety Level 1**, meaning if a healthy human ingests them, they will not do any harm. In fact, some microbes are beneficial for humans. The microbes used are indigenous to the country and will not cause any harmful outbreaks. The microbes will not consume any living cell - only dead cells.

Have the microbes been modified?

No. The microbes are all-natural and are not genetically modified. There is no risk of the microbes mutating from their original form.

What happens to the waste? Where does it go?

The microbes digest the waste and turn it into carbon dioxide and water. This is a very clean and green technology. The reaction that occurs (aerobic): $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

If its byproduct is carbon dioxide, is it still considered green?

No - in anaerobic systems, CO₂ will also be produced. However, the big difference is that with aerobic systems, no methane (CH₄) is produced. Methane is 21 times more damaging than carbon dioxide as a greenhouse gas. Reaction (anaerobic): $C_6H_{12}O_6 \rightarrow 3CO_2 + 3CH_4$

How is BioCleaner different from other systems that use microbes?

BioCleaner is much more efficient than other biological systems; it is an entire treatment system. Other microbes such as **efficient microorganisms (EM)** are in the form of powder or liquid. This needs to be applied regularly, and microbes need to be bought regularly. EMs are not as efficient because the microbes are washed out, which is why new microbes need to be used. Furthermore, other microbes such as EM do not digest sludge waste. With **BioCleaner**, microbes are constantly being produced and oxygen being injected, to ensure the microbes are given the right conditions to flourish: this makes the system more efficient.



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How much sludge can BioCleaner digest?

BioCleaner can digest all biodegradable organic sludge. This includes items such as tissue - however, breaking down tissue is a slow process.

Can the water be used for recycling?

Yes. **BioCleaner** can achieve water to levels for reuse in toilets, urinals, clothes washing, washing cars and irrigation of plants.

Can the wastewater be treated to become potable water?

Yes. The entire system can be engineered to treat water to potable levels. Besides the **BioCleaner**, UV would be needed to kill all pathogens.

Why is hydraulic retention time (HRT) important?

The microbes cannot instantly digest the waste; the system needs time to treat the water.

What if there is not enough retention time in the tanks?

If there is limited retention time, then more **BioCleaner** units can be used in the same tank to speed up the process. If there is no time for the microbes to treat the water, more units are put in.

What if I already have an existing STP?

In most cases, **BioCleaner** can be retrofitted to existing systems. Furthermore, no or minimal modification is needed for the **BioCleaner** system to work. If an existing system is failing to pass regulatory standards, **BioCleaner** can be used to treat the waste.

Can BioCleaner eliminate foul odours?

Yes. Odour will be eliminated from the system because of the breakdown of hydrogen sulphide (**H₂S**). Hydrogen sulphide is responsible for the foul rotten egg smell from faeces. The microbes will break the bond between the hydrogen and sulphide, and will digest the sulphide leaving no odour.

BioCleaner claims to have the lowest carbon footprint in the industry?

This is because **BioCleaner**'s power consumption is low. Furthermore, no methane is produced.

Is BioCleaner cost-effective?

Yes. Typically, the capital expenses are low. Furthermore, operation and maintenance costs are also low.

How long will the media last?

The media can last for over 10 years. However due to the currents in the water, the media will gradually erode.

What are the optimal conditions for the microbes?

- **pH** between 4 and 9. If the pH of the wastewater is too high or low, the microbes will die. The pH of the wastewater



needs to be neutralized.

- **Temperature** - while the optimum for the flourishing of the microbes is between 25°C (86°F) and 32°C (95°F), **BioCleaner** addresses the natural slowing of microbial action with decreasing temperature by installing at the outset additional mixing / mixing units to increase microbial density, increasing the temperature a few degrees, and prescribing different microbial consortia within the **Biotubes**.

Is there maintenance to be performed?

Yes - solely for the main blower, and to wash the aerogrids every couple of months

What parameters can BioCleaner treat?

BioCleaner can decrease the **biological oxygen demand (BOD)**, **chemical oxygen demand (COD)**, **total suspended solids (TSS)**, **oil and grease**, **surfactants** etc. Also, it will increase the **dissolved oxygen (DO)** in the wastewater.

What are the benefits of using micro-bubbles?

Micro-bubbles increase the oxygen exchange to the wastewater, and are much more efficient than regular aeration. This is because all the micro-bubbles combine to have a higher surface area, enabling more oxygen transfer to the wastewater.

Why is the bioreactor beneath the aeration and not above it?

To preserve the media from breaking. If the media were placed above the aeration grids, the water flow through the bioreactor would be more violent, causing the media to break apart more quickly. The aeration of **BioCleaner** creates a vacuum from water below it, and at the same time sucks up microbes that are created. This way, the media is not disturbed as much and will have a longer life.

Can the blower be separated from the BioCleaner frame?

Yes. The decision to place the blower above **BioCleaner's** frame was logical, so that it would follow it with changes in the inflow. However, the blower can be positioned away from the structure.

How much headspace is needed for the BioCleaner in the tank?

1m headspace would be sufficient for regular use.

How should the BioCleaner be placed in the tank or lagoon?

BioCleaner runs more efficiently if it sits level in the water of the tank or lagoon. More oxygen exchange and mixing can thus be done.

What is the footprint requirement for one (1) BioCleaner?

Different waste streams need different sets of microbes. For calculations and quotations we prefer you to send your information to: info@biocleaner.com



How deep does the tank have to be for the BioCleaner to be effective?

BioCleaner works best with wastewater depths of 3 - 5m. The minimum is 1.5m; beneath 5m, the efficiency drops.

What is the assembly time for one BioCleaner Unit?

About one to two hours.

What are the different kinds of tanks that a conventional system uses?

An **equalisation** or **contact tank** is usually the first tank used. It is used to regulate surges in the inflow, as well as acting to start the anaerobic treatment process. It is just an empty tank.

The **aeration tank** is where the wastewater has air added to it. Diffusers usually blow air into the wastewater. This uses microbes as well - however, it is not efficient because it may not contain the right microbes, or enough microbes.

The **clarifying** or **settling tank** is used to let the sludge accumulate at the bottom of the tank.

Can the BioCleaner treat coliform?

Yes. The microbes do not eat coliform itself, but the food source of the coliform. The microbes outcompete the coliform so that the coliform bacterium dies. After the coliform dies, the microbes eat the coliform.

Do the microbes eat living cells?

No. **BioCleaner** microbes only eat dead cells

How much does BioCleaner weigh?

150kg (A4 Unit)

How much media is in one (1) BioCleaner unit?

20.41kg (B4 Unit)

What kind of blower is used?

A low-maintenance, high-efficiency blower which comes in 115, 220 or 440v, single-phase or 3-phase; and a 50W air pump for the **Biotube**.

Where is the BioCleaner manufactured?

It is made in the USA.

Can the BioCleaner treat algae?

Yes, in the same way it treats coliform. The **BioCleaner** microbes and the algae have the same food sources. The microbes outcompete the algae and the algae die off. It is when they die that the BioCleaner microbes eat the algae.

Can BioCleaner treat septage waste?

Yes, with the same process. Septage is much more concentrated with BOD of 3000 - 9000.



Can the BioCleaner be turned off to save electricity?

It is highly **NOT** recommended, but the microbes can survive for 1 to 2 hours without aeration.

BIOCLEANER MICROBIAL CONSORTIA

Biosix Consortia Specifications	Chem 5 Consortia Specifications
<p>Optimal Temperature: 25-32 C (While the optimum for the flourishing of the microbes is between 25°C and 33°C, BioCleaner addresses the natural slowing of microbial action with decreasing temperature by installing at the outset additional mixing / mixing units to increase microbial density, increasing the temperature a few degrees, and prescribing different microbial consortia within the Biotubes.)</p>	<p>Optimal Temperature: 25-32C (While the optimum for the flourishing of the microbes is between 25°C and 33°C, BioCleaner addresses the natural slowing of microbial action with decreasing temperature by installing at the outset additional mixing / mixing units to increase microbial density, increasing the temperature a few degrees, and prescribing different microbial consortia within the Biotubes.)</p>
<p>Optimal pH: 6 - 8 For every pH below or above the optimal range the efficiency drops by 50%</p>	<p>Optimal pH: 6 - 8 For every pH below or above the optimal range the efficiency drops by 50%</p>
<p>Break down BOD, TSS, FOG and nutrients Degrades Ammonia</p>	<p>Break down phenols, hydrocarbons, pesticides, surfactants and colour Degrades Ammonia</p>
<p>Commissioning required to propagate the microbes to stabilise treatment and prevent shock-loading</p>	<p>Commissioning required to propagate the microbes to stabilise treatment and prevent shock-loading NPK (nutrients) required during commissioning</p>
<p>Survives in salinity only up to brackish water</p>	<p>Survives in salt water up to 80,000ppm salinity</p>
<p>Respiration Rates up to 300ppm COD/hr in high strength biological wastewater</p>	<p>Respiration Rates up to 300ppm COD/hr in high strength wastewater</p>



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MATERIAL SAFETY DATA SHEET

Biocleaner Inocula

The product consists of [liquid inocula in minimal salts media](#):

MSDS: Biocleaner Inocula

WET APPLICATION: Liquid inocula is poured over solid matrix to be inoculated, and allowed to stand for 1-3 hours.

Toxicity Hazards: None

First Aid: *Skin Contact:* Microorganisms are non-pathogenic; wash with disinfecting soap and warm water after use. *Inhalation:* Consult a doctor.
Eyes: Contamination of the eyes should be treated by immediate and prolonged irrigation with copious amounts of water. *Ingestion:* Consult a doctor.

Appearance and Odour: Clear to light brown with a smell of microbial growth

Extinguishing Media: Water

Special Firefighting Procedures: None

Incompatibilities: None

Hazardous Combustion or Decomposition: None

Products: None

Waste Disposal: Add liquid chlorine bleach to dispose of culture

Spill or Leak Procedures: Inert cellulosic material; wash to sewer or till into soil



PERFORMANCE

The BioCleaner System operates as a portable modular bioreactor. There are several variables to consider in the maximum performance ranges of the unit.

EVALUATION AND VALIDATION OF THE PROCESS FOR TREATMENT OF WASTEWATER AND BIOLOGICAL SLUDGE WITH BIOREMEDIATION TECHNOLOGY BASED ON IMMOBILIZED BIORECTOR SYSTEM (IBS)
(Patented by **M/s BioCleaner Inc**, US Patent No. US 8,066,873 B2)

BACKGROUND:

M/s BioCleaner Inc have patented a waste water treatment process based on Immobilized Bioreactor System (IBS) vide US Patent No. US 8,066,873 B2 dated November 29, 2011 titled "Floating Bioreactor System."

The patented technology involves use of immobilized non-genetically modified organisms (Non GMO) classified by the US Center for Disease Control and Prevention (CDC) as Biosafety Level 1.

The **BioCleaner** Bioreactor consists of following components:

- **Aerogrid:** made of injection molded HDPE plastic and comes with 66 feet of Aerotube aeration tubing attached using stainless steel clamps. The size of this grid is 1m x 1.2m.
- **Biotubes:** microbial bioreactor made from perforated stainless steel pipes. They are 3 meters in length and 4 inches in diameter. This Biotubes are filled with "media" that are immobilized microbes.
- **Fiberglass angle bars:** these are light weight and heavy duty bars that can be submerge in to almost any contaminant water.
- **HPDE plastic walls:** these are composed of four sheets and are used to cover about 3/4th of the lift. This is to provide water direction and suction.
- **Floaters:** made of PE plastic which provide buoyancy to the biocleaner, making it mobile with less power.
- **Air Blower:** A single-phase 2 hp blower that uses 1.6kW of power. This motor transfers 145m3 air/hr. Approximately 3.65 kg O2/hr are transferred in to the surrounding water.



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BIOCLEANER BIOREACTOR UNIT



The immobilised microbes paired with an aeration grid containing 20m patented tubing with micro-pores creates significantly higher surface area, resulting in much higher oxygen transfer and increasing efficiency of the system. The increased volume of fine bubbles can help in effective vertical mixing, and the design helps in strong directional flow.

M/s BioCleaner has replicated this technology for the treatment of both industrial and domestic wastewater globally, including **Secondary Sludge Treatment at Kuantum Papers Ltd, Saila Khurd, Punjab, India**, an integrated Pulp & Paper operation. In view of the successful implementation of the technology for pulp and paper mill secondary sludge, **BioCleaner Inc** has proposed to replicate and widen the scope of this technology in India, in other sectors including starch, food, and distilleries, besides domestic and sewage treatment, to contribute towards environmental protection with cost-effective treatment.

In view of the above, **M/s BioCleaner** approached the Department of Biotechnology, **Himachal Pradesh University** to seek third-party independent validation of the patented process/technology, with respect to evaluation of the performance and operational reliability under varying environmental conditions prevailing in different industries and parts of India.



EVALUATION OF THE TECHNOLOGY:

The following documentation/data was provided by **M/s BioCleaner Inc** to the **Department of Biotechnology, Himachal Pradesh University**, for the evaluation and validation of the patented technology:

- United States Patent No. US 8,066,873 B2 dated November 29, 2011
- **BioCleaner** Technology Details implemented at M/s Kuantum Papers Ltd.
- Technical Specifications of **BioCleaner** Bioreactor
- Mass Balance details of the process along with operating parameters
- Fish Bioassay test as evidence of non-pathogenicity of the microbes used in the technology
- Biotubes with immobilized microbes for Laboratory and bench scale evaluation

The technology was evaluated on laboratory scale (1L), bench scale (20L) and industrial scale (1000m³). The industrial scale technology was evaluated over a period of 8 months at M/s Kuantum Papers Ltd, whereas laboratory and bench scale evaluation was done over a period of three months.

The following globally accepted protocols were used for evaluation and validation of the data and performance of the technology:

a) USEPA (United States Environmental Protection Agency) Protocols:

- Protocol for the *Verification of Residential Wastewater Treatment Technologies for Nutrient Reduction*, ETV program, November 2000
- Verification Protocol for *Secondary Effluent and Water Reuse Disinfection Applications*, ETV program, October 2002

b) ISO (International Organization for Standardization) Protocols:

- ISO/IEC 17025: *General Requirements for the Competence of Testing and Calibration Laboratories*
- ISO 5667-10: 1992 *Water Quality - Sampling - Part 10: Guidance on Sampling of Wastewaters*

c) BNQ (Bureau de Normalisation du Québec) Protocols:

- CAN/BNQ 3680-600/2009: *Onsite Residential Wastewater Treatment Technologies* (National Standard of Canada for Conformity Assessment Program)

d) Canadian ETV Program - General Verification Protocols

e) Standard Methods for the Examination of Water and Wastewater, APHA (American Public Health Association)



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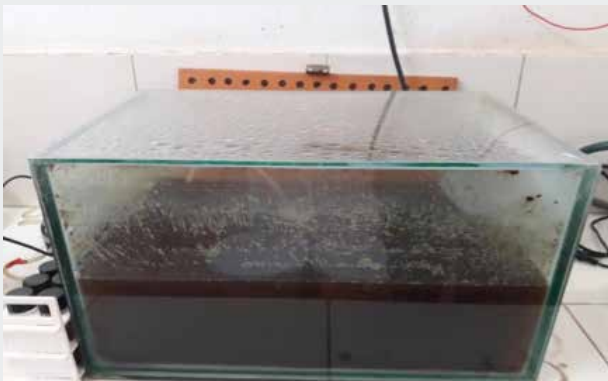
f) Standard Methods for Isolation of Microbes and Optimisation of Culture Conditions

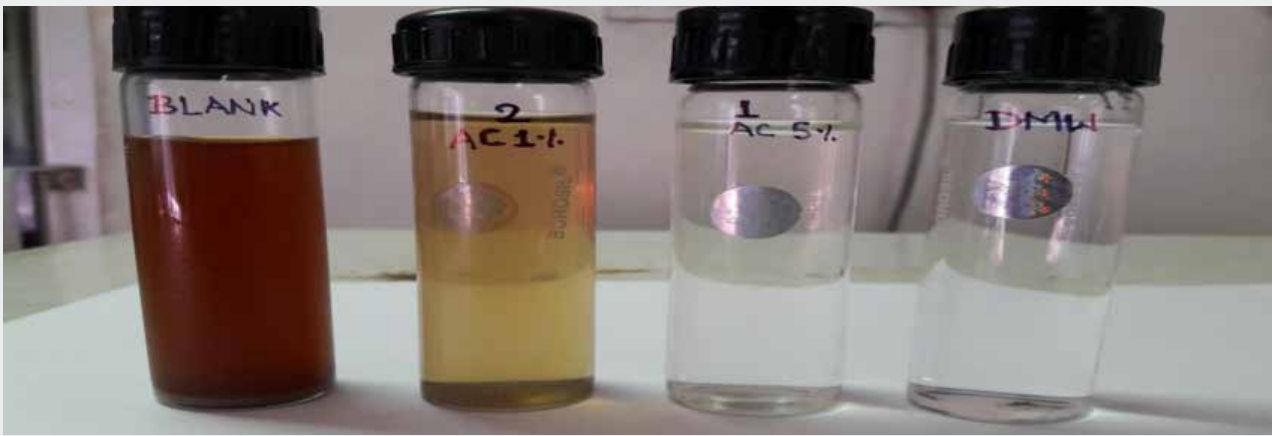
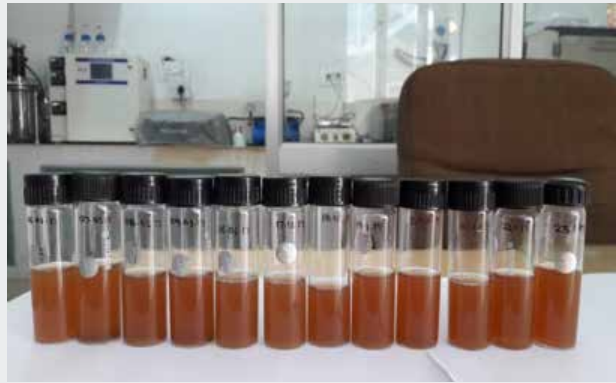
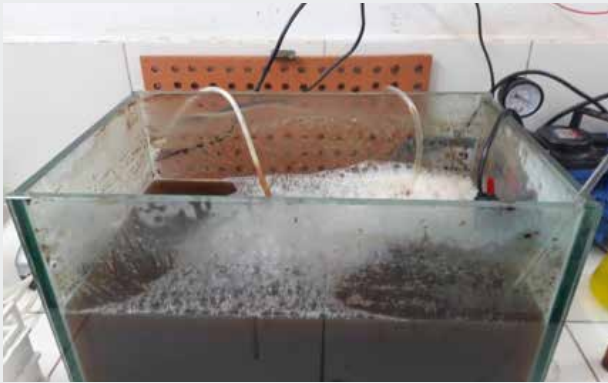
- Industrial Scale Evaluation involved flow measurement, sampling, recording sample data and sampling log, monitoring all operating parameters and recording the conditions. Analysis was followed by preparation of test reports, analysis & interpretation of results w.r.t operating parameters and impact of the same on water quality and mass balance of the parameters viz. *COD, BOD, TSS, Nitrogen, MLSS, MLVSS, sludge generation and decomposition* etc.



BioCleaner Industrial Scale Installation at Kuantum Papers Ltd, Salla Khurd, Punjab, India

- Laboratory and Bench Scale evaluation involved used of aquariums of different capacity with controls for various parameters, to simulate various conditions prevailing in different types of process industries. Samples were drawn at different intervals followed by analysis, data recording and evaluation and process optimisation to achieve desired results.





Laboratory and bench scale set-up for BioCleaner technology evaluation showing different stages of treatment process

The microbes survived under optimum conditions in laboratory/bench scale and industrial scale set-ups were isolated in the microbiological lab, followed by maintenance of pure cultures. These isolated pure cultures were subjected to varying conditions of nutrients, pH, temperature, retention time and different substrates for evaluation of their capability to survive under diverse conditions so as to validate the suitability of the patented technology for various types of wastewaters.



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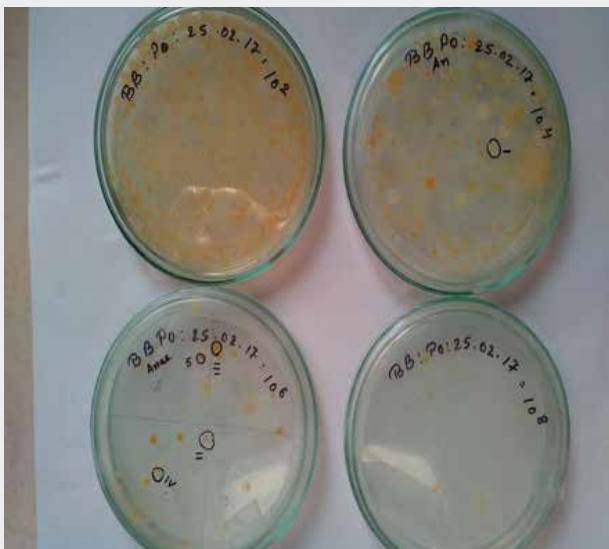


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Microbiological Evaluation of BioCleaner Technology



SUMMARY OF THE EVALUATION & CONCLUSION:

With the Laboratory & Bench-Scale trials and Industrial scale implementation & evaluation of the Bioremediation Technology based on Immobilized Bioreactor System (IBS) developed and patented by **M/s BioCleaner Inc** vide US Patent No. US 8,066,873 B2 namely "Floating Bioreactor System", it is summarized as follows:

- The **BioCleaner** technology is making use of natural, facultative, anaerobic, non-pathogenic micro-flora capable of performing well under both aerobic and anaerobic conditions.
- This technology makes use of a combination of anaerobic and aerobic stages thereby reducing the aeration demand by more than 50% when compared to a conventional treatment system, without the need for installation of anaerobic reactors, with special reference to the effluents with low degradability and very low potential of biogas generation, thereby reducing the capital cost substantially.
- The evaluation of the industrial-scale installation on secondary sludge have shown that the microbes used in the **BioCleaner** technology are capable of liquefying the bacterial sludge, leading to conversion to simpler components, thus facilitating decomposition during the treatment process and hence eliminating the need of sludge wasting up to 90%
- Further, since the microbes being used in the **BioCleaner** technology are capable of liquefaction of microbial sludge generated as part of the treatment process, the nitrogen concentration in the system goes up, thus eliminating the need of adding nitrogen as a nutrient for microbes, making it an economically-attractive solution, especially for the industrial effluents where nitrogen content in the effluent stream is negligible.
- The combination of anaerobic-aerobic treatment with immobilised microbes has demonstrated the reduction of biologically degradable COD and BOD, in the region of more than 90% and 95% respectively, under varying operating conditions with different substrates, thereby making this technology suitable for a wide spectrum of effluents generated from different types of process industries.
- Since this technology is capable of liquefaction of sludge within the system, odour from the effluent treatment plants and the treated effluents is completely eliminated.
- The laboratory and bench-scale evaluation has also demonstrated the application of this technology for nutrient removal (N & P) from the effluent, for safe discharge to natural streams.
- Since the microbes used in this technology are immobilized, they are capable of regeneration and restabilizing the process, in case any unfavorable condition leads to temporary destabilisation.

Therefore, in conclusion, I am of the considered opinion that that the BioCleaner technology can be safely applied to a wide variety of biologically degradable effluents and sludge for removal of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), recalcitrant organic compounds and nutrients for compliance of environmental norms.

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CASE STUDIES

Wellpack



Wellpack Incorporated is an Industrial Services and Equipment business specialised in printing. Its main problems were odour, and the colour of water due to the inks used.

The sewage treatment plant (STP) was retrofitted with a one grid **BioCleaner**. Due to the STP's small area, the biotube and motor were detached from the **BioCleaner**. It becomes even easier to clean and maintain the biotube when it is separated from the **BioCleaner** - lift up, wash, and bring it down again.

The design flow was for 500 m³/d. Previously, 20kg of flocculant and coagulant chemicals in three days was used. Now, only 0.3g of flocculant in 3 - 4 months is used, and 1kg of coagulant in 1 - 4 months.

Parameters	Result	Standard
pH	7.22	6.5 - 9.0
Colour (PCU)	65	150
TSS (mg/l)	44	70
FOG (mg/l)	2.87	5
BOD (mg/l)	22	50
COD (mg/l)	56	100



Tagaytay Highlands



Tagaytay Highlands is home to three growing residential communities – The Highlands, The Midlands and The Greenlands, a network of exclusive, themed residential communities. Situated just 60km away from Metro Manila, The Highlands is a world-class recreational and residential complex nestled amid the natural splendour and cool, unpolluted atmosphere of the Tagaytay Ridge.

Tagaytay Highlands is the longest-running operation plant with **BioCleaner** technology, since 2008

With a flowrate of 200m³ per day, their Sewage Treatment Plant (STP) has been retrofitted with one **Sewer Buddy** and one **Aerolift**, and instead of using two chambers, they now use one. Previously, Tagaytay Highlands used an air-blower of 40HP, which they replaced it with **BioCleaner's Aerolift** that uses only 2HP.

Parameters	Before	After
BOD	380mg/l	13mg/l
COD		20mg/l
TSS	8mg/l	<2mg/l

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Lianhe Pond



The **LianHe** community of **XinDian Town** has a population of more than 2,400 people. Located at the centre of the community is a sewage pond - due to poor management and maintenance, its effectiveness decreased and led to the accumulation of pollutants. Concentration became higher, the water colour became darker and it emitted foul odor. With the whole village discarding about 100-150 tons of sewage and wastewater into the each day, the water became polluted.

The pond's surface water area is about 2500m². The depth of the water is 2-3m (7500m³). The organic sludge thickness is about 1.2 to 1.5m (3000m³).

BioCleaner removed ammonia-nitrogen, and also had a highly positive effect on nitrogen and phosphorus levels. Even at times of power failure, the system was still operational and removed pollutants due to the continuity of the biological catabolisms.

ITEMS (mg/l)	BEFORE	AFTER	REDUCTION RATE
55	41	24	41%
N	85.8	14.7	82%
NH3-N	73.5	12.9	83%
P	7.74	4.13	46%
COD	103	53.2	48%
BOD	58.3	17.3	70%



DMCI HOMES - Ohana Place Property



DMCI Homes is a developer of resort-inspired communities that redefine urban living. Its portfolio boasts high rise developments, mid-rise condo communities and exclusive subdivisions. **Ohana Place** is one of their many mid-rise projects, with lush tropical greenery and modern Polynesian architecture it creates a home in the spirit of Hawaii. Named after the Hawaiian word for family, Ohana Place consists of seven medium-rise condominiums spread across three hectares of tropical terrain. It is located along the highly accessible Alabang-Zapote Road in Las Piñas City.

BioCleaner has installed two units of two-grid **BioCleaners** with an additional **Sewer Buddy**. The main problem for DMCI Homes was odour. With the use of the **BioCleaner** system this was easily eliminated - just a few days after installation.

The design was based on the following parameters:

- **Flow Rate** 200 - 350 m³/day
- **BOD influent** 300 ppm
- **HRT (2 tank system)** 13 hours
- **Influent Biological Oxygen Demand:** 300 to 700+ ppm
- **Effluent Biological Oxygen Demand:** we have not attained results lower than 100

At the time of installation, new aerogrids were not available so temporary, used grids were installed to eliminate odour. Now, all the grids have been replaced with new ones, and with the installation of a bar screen, exceptional results were evident.

FIND OUT MORE!

If you would like to meet discharge standards, reduce opex and energy costs, and eliminate sludge, get in touch to find out how **BioCleaner** can transform your wastewater operation.

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