

# WASTEWATER

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## INDUSTRY PROFILE



# REPORT

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## BIOLOGICAL STIMULANT



**BIOCELERATOR**  
BIOLOGICAL MEDIUM STIMULANT

## ABOUT US

We deliver client success by maximising biological performance that is free of enzymes, bacterias, chemicals, oxidisers or any minerals.

40+

Government  
sites

Non Toxic

Aquaculture tested  
& potable

40ML / day

Currently largest  
STP customer

## OUR TECHNOLOGY

Our water conditioners are produced via cutting-edge molecular processing technology which naturally stimulates the microbiological activity of the environment in which they are applied.

With a chemical composition similar to that of drinking water, our water conditioners consists of an aqueous solution of inorganic nanoparticles, which change the speed at which substances dispersed in the aqueous medium (oxygen, nutrients, organic material, etc.) pass through the cell and intracellular walls, resulting in greater energy and metabolic conversion in bacteria.

Containing no dangerous chemicals or hormones such as HGP, our formula is colourless and odourless. Easy to use across a broad range of applications and requiring no capital expenditure, our technology is effective in aerobic, anaerobic, high temperature and varied pH environments.

H<sub>2</sub>S Reduction

& other  
combustible gases

F.O.G. Remedy

Industrial waste,  
dairy, meatworks

Sludge

Rapid  
breakdown &  
cost savings

Removes Odour

STPs, sewer pipes  
& lift stations



# PRODUCT

Biocelerator wastewater product is a liquid water conditioner.

Appearance:	Colourless liquid
Colour:	Clear
Odour:	Odourless
pH:	7.5 – 8.5
Conductivity:	100 – 120 $\mu\text{S}/\text{cm}$
Combustion point:	Inexistent
Density:	1.000 $\text{kg}/\text{m}^3$
Molecular mass:	18,01528 $\text{g}/\text{mol}$
Boiling temp @ 1 atm:	96.2° C
Freezing temp @ 1 atm:	0.4° C
Product name:	Biocelerator BC-500

## APPLICATION & DOSAGE

Biocelerator is added upstream at a dose of 2.5ppm to 50ppm depending on severity of conditions via a dosing pump or by hand.

Reduces COD,  
BOD, TSS & FOG

100% SAFE  
Tests nearly  
identical to  
drinking water.

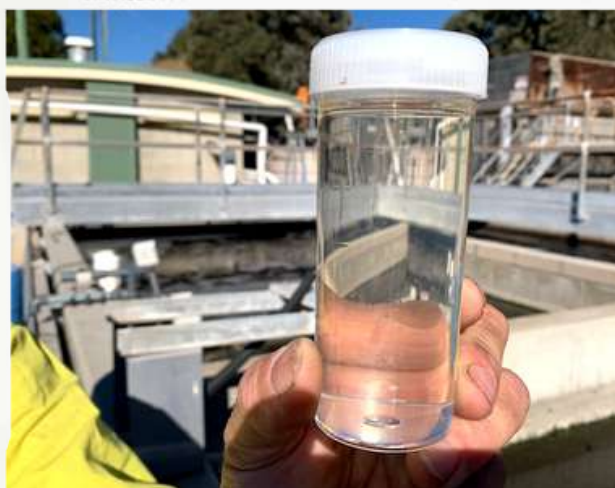
WWTPs  
Improved  
efficiency & increased  
water quality

Sewer Lines  
Reduced  
maintenance costs  
& Fatberg remedy

On-site dosing



Water quality





## WASTEWATER PLANT - BALI , INDONESIA

Currently servicing 25 million litres per day the Suwung wastewater plant comprises of two large Aeration Lagoons and two large sedimentation lagoons with the final output being discharged into swamp land and then into the nearby Benoa Bay Harbour.

High electricity consumption due to expensive costs (\$20,000 USD monthly) of operating 16-18 Aerators daily and the maintenance issues and costs that encompass operating this many Aerators.

The wastewater plant had been under pressure by government environmental policy goals to achieve below 100mg/L of COD readings (tested at the outlet of the plant) as pollution of the surrounding environment and harbour area was at a critical level. Odour from the plant scored a 10/10 (with 10 being the worst)



Biocelerator applied by two tanks by dribble feed over 24 hours at inlet

Odour  
totally eliminated  
in 7 days

80%  
electrical  
saving from  
aerators

Sludge  
reduction  
within  
30 days

Reduced  
BOD, COD levels  
to goal set  
below 100mg/L

## RESULTS

**ODOUR OBJECTIVE ACHIEVED in 7 DAYS:** Within 4 days the odour of the entire plant had significantly been reduced and within 3 more days there was no odour at all.

Biocelerator successfully proved that with the use of only 4 aerators operating that COD levels of below 100mg/L were consistently achieved (A figure which had not been achieved before with the historical data provided by Suwung WWTP).. Biocelerator is confident that only 2-3 aerators would be required for ongoing use in the near future (as opposed to the 12-16 aerator operating before). A 70%-80% reduction of electricity consumption from aerator use was achieved successfully.



BIOCELERATOR



# CASE STUDIES

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1. Odour & Gas Removal Government
2. Odour & Sludge Control - Long Term
3. Brewery Trade Waste
4. TSS Reduction



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# CASE STUDY

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WASTEWATER



## ODOUR & GAS REMOVAL

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GOVERNMENT SEWER PIPELINE  
STATE WATER & SEWAGE COMPANY



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# DANGEROUS GASES

The client had dangerous gases and ongoing odour complaints from CBD sewer pipes. They gave us 48 hours to access a section of sewer to show our results.

## H2S

100ppm +  
starting point

## Odour

Community  
complaints

## 48 Hours

to prove  
results

# MAJOR GOVERNMENT CLIENT

The client is a state government water company responsible for sewer and clean drinking water for almost 10 million people across 314 locations in 151 local government regions. A live in-system demonstration was run. The success of various trials resulted in supply contracts across numerous sites.

## 10M

People our  
client services

## 314

Locations

## 4.02M

Population in  
our test city

## 100%

safe and easy  
to apply



23

CANVA STORIES



23

CANVA STORIES



# CBD MANHOLE TEST SITE

The test site was a sewer manhole situated in the CBD where odour surveys and gas data could be collected at regular intervals by the ww operators.



180L/S

Daily flow of  
sewer section

3KM

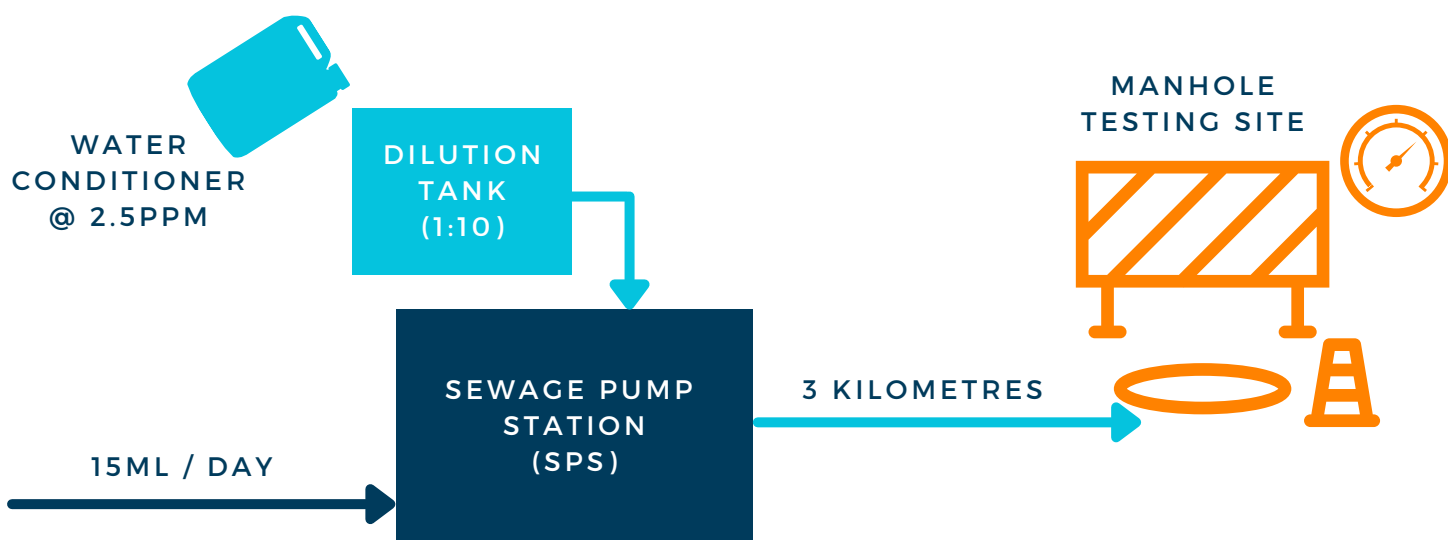
Distance dose  
site to manhole

2.5ppm

Dose rate

## SEWAGE PUMP STATION DOSING

The manhole test site is located 3kms downstream of a 15ML /day Sewage Pump Station. Water conditioner was dosed at 2.5ppm via a 1:10 dilution tank. Gas measurements and odour surveys were collected twice daily (am & pm) for 5 x 1-minute intervals. Closed (0.2m above cover) and open (1.0m high & 1.5m horizontal distance from the cover) manhole data was collected.



## AMAZING RESULTS IN ONLY 24 HOURS!

After 24 hours Hydrogen Sulphide and Odour had a rapid reduction





## 48-HOUR RESULTS

Data was collected over a 4-day period including 48 hours prior to and then 48-hours during dosing. The trial demonstrated the short retention time required.



92%

H<sub>2</sub>S reduction  
(closed lid)

Extended

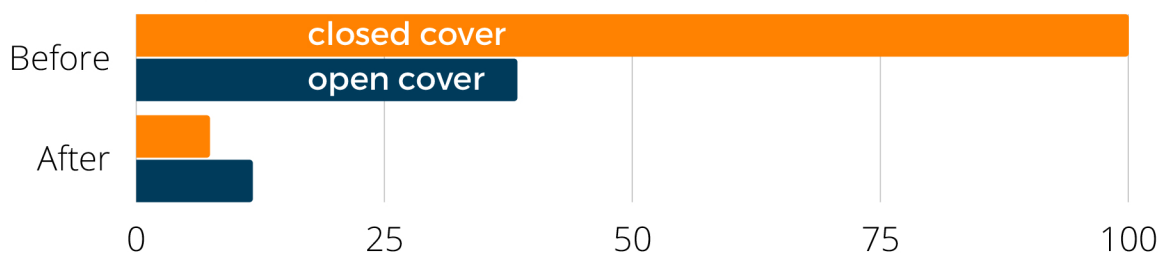
lifespan of  
infrastructure

Weak/ None

Odour survey  
results

## H<sub>2</sub>S - Hydrogen Sulphide

PPM readings before and after dosing.



## ODOUR

Odour survey results.



With a reduction in Odour and Hydrogen Sulphide the customer was extremely satisfied with the results and expected that infrastructure lifespan was expected to be increased due to near elimination of H<sub>2</sub>S damage

# CASE STUDY

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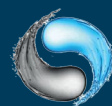
WASTEWATER



## ODOUR & SLUDGE CONTROL - LONG TERM

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NATIONAL PARK ECO-RESORT  
75kL WWTP & POLISHING POND



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# ODOUR COMPLAINTS

A 75kL/ day WWTP (trickle filter) at a QLD tourism resort began using Biocelerator. Key issues were clarifier sludge, a stagnant 'dead' finishing pond and odour complaints from resort customers.

## SLUDGE

Problems with thick sludge

## NO FROGS

Stagnant polishing pond

## SMELL

Customer complaints



## THICK CLARIFIER SLUDGE

Before



45 days



75kL

WWTP  
capacity

75%

Sludge  
reduction

500mL

per day

ZERO

Odour after  
14 days

# LONG TERM RESULTS

This client had an immediate and serious odour problem. They achieved odour results in 14 days.



2018

Started

3+ years

Ongoing  
results

500mL

Maintenance  
dosing per day

## ODOUR

Odour survey results.



## FROG LIFE RETURNS

90 days



90 days







## INCREASED BIOGAS CAPTURE

In 2020 a pig farm in South America were eager to trial Biocelerator for improvement in Biogas capture for their covered pig waste ponds and odour. Situated 3000 metres above sea level at night the temperature gets low and Biogas capture during this night time was usually extremely minimal. When Biocelerator was dosed at 10ppm (parts per million) the operator woke the next morning to burst covers over the lagoons which he had never seen before.

Biocelerator increases biological activity and when introduced to an aqueous environment a substantial increase of activity occurs. Since then Biocelerator is exploring this market as an affordable way for Biogas operators to maximise performance by allowing the existing biology to achieve its full metabolic rate and increase biogas capture.



**Increased  
Biogas  
Performance**

**Eliminates  
Hydrogen  
Sulphide**

**Increases  
Metabolic  
Biology rate**

**Easy  
application  
and 100% safe**

## RESULTS

Due to the variables in Biogas capture as fuel (substrate) sources change regularly it is difficult thus far to pin point the exact increase Biocelerator provides. In a recent trial completed in Croatia the results demonstrated a rapid increase in performance with corn silage being the main fuel source. Biocelerator is confident that with detailed lab results isolating each substrate that our technology will soon be able to measure the actual percentage improvement of performance and biogas capture.

Biocelerator technology is one of a kind and 100% safe, Zero VOC, No chemicals, bacteria, oxidisers or enzymes. We welcome future partners to work in collaboration with us to explore the full benefits of this exciting product. (Please contact Biocelerator for trial results)

# CASE STUDY

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WASTEWATER

## BREWERY TRADE WASTE

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ODOUR, BOD, SLUDGE & FOAM CONTROL  
MAJOR AUSTRALIAN BREWING FACILITY



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# NON-COMPLIANCE ISSUES

The client was exceeding liquid trade waste limits (BOD, TSS, COD) due to increased production. Odour, Sludge and Foaming were also major issues. We were given 60 days to prove results.

200mg/L

BOD  
average before

1,000mg/L

COD  
average before

600mg/L

TSS  
average before

## MAJOR BREWING COMPANY

The client is an Australian brewing company which produces more than 10ML of beer annually. They had completed upgrades but were still exceeding limits and facing further operational and capex costs.

10ML +

Annual beer  
production

FOAMING

Excessive  
events

SLUDGE

Daily pump  
trucks

ODOUR

Strong  
& intense

Day 6: Aeration tank (dark colour)



Day 58: Aeration tank (less TSS)





# 60-DAY RESULTS

Trade waste data was analysed along with foam observations, odour surveys and settleability testing.



90% less

BOD  
down to 20mg/L

75% less

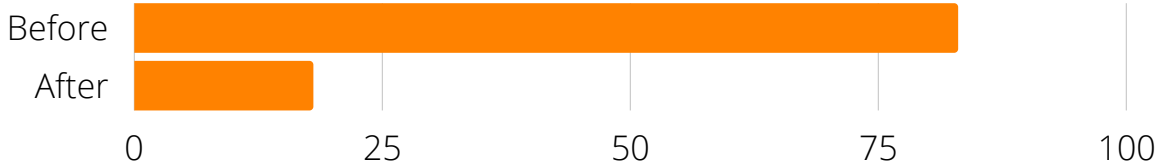
COD  
down to 250mg/L

85% less

TSS  
down to 70mg/L

## TOTAL NITROGEN

Total nitrogen (TKN) average mg/L.



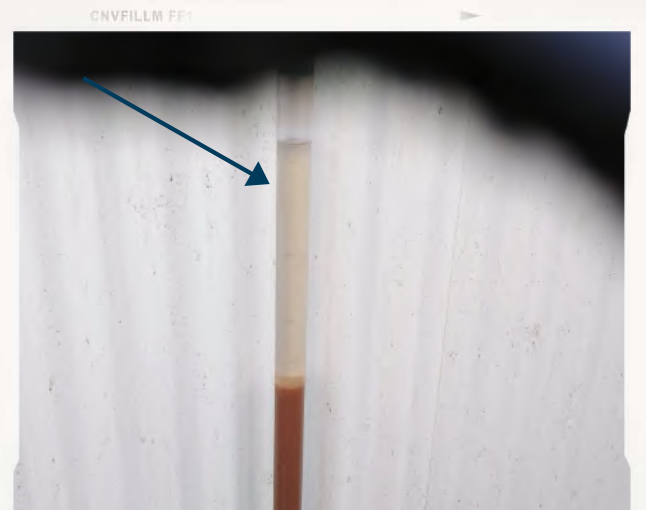
## SETTLEABILITY & SLUDGE REMOVAL

These photos show dramatic improvements in settleability in aeration tank liquid using the 5-minute test. This meant greater sludge removal efficiency by pump trucks.

Day 6: test



Day 58: test



# FOAMING

Water conditioning resulted in significant improvements in foam control in the aeration tank.



"We also saw significant improvements in odour and foam control, as well as a decrease in sludge and dead zones"

Client Testimonial: Sustainability Manager

# ODOUR

Odour survey results.



# WATER QUALITY

The outlet water quality was greatly improved and smell at the outlet went from strong / intense to weak / none after 7 weeks.

Day 1: Outlet - cloudy & smell @ 9



Day 45: Outlet - clearer & no smell



# CASE STUDY

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WASTEWATER

## TSS / TURBIDITY REDUCTION

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ACCELERATING TSS REDUCTION  
30-DAY DIGESTER COMPARISON TEST



BIOCELERATOR



# WWTP DIGESTERS

A 300kL / day WWTP at a QLD tourism resort was used for a 30-day trial using Biocelerator in one of two digester tanks (30,000L) with identical sludge.



30,000L

Digesters A & B  
capacity

NATA

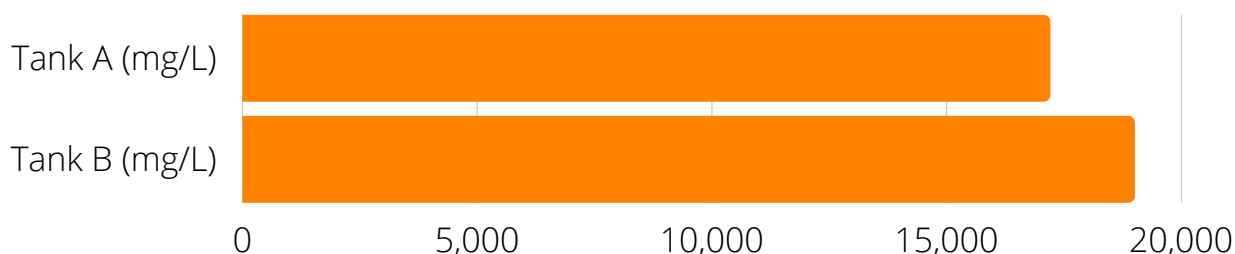
Testing  
standards

30 days

adding  
Biocelerator

## FASTER SLUDGE BREAKDOWN

Biocelerator was added to digester Tank A for 30 days at 500mL /day. Digester Tank B had none added. NATA testing was done before and after 30 days on both Tanks. This showed Biocelerator improved TSS by 9.47%.



## 9.47% MORE TSS REMOVED

Results show Biocelerator accelerates the breakdown of sludge in just 30 days.

300KL

WWTP  
capacity

Nil

Capex costs

500mL

per day

9.47%

TSS reduction  
in 30 days

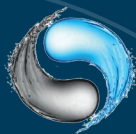


# TECHNICAL REPORT

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## Government STP

- Odour (Malodour)
- Sludge
- FOG
- Financial Analysis



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[biocelerator.com](http://biocelerator.com)

**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

## **I – INTRODUCTION**

The Ribeirão Vermelho wastewater treatment plant, which was designed by Holos Engenharia, began operating in February of 2010. It consists of a preliminary treatment sector (bar screens for the removal of solids, mechanical desander and Parshall flume), four UASB reactors, four anaerobic upflow filters, two maturation lagoons, twelve drying beds, a UV disinfection system and a waste gas burner (which is not operational). Due to the average influent rate of the plant, one of the reactors and the No. 4 filter are not operational.

Maturation lagoon No. 2, shown in Figure 1, had undergone extensive aggradation, and, in light of the difficulty of removing this sludge, COPASA and VEEGA Comércio Importação e Exportação Ltd signed a technical partnership with the aim of evaluating the performance of Biocelerator, a product which, according to its manufacturer, would improve the performance of the wastewater treatment plant with respect to BOD, COD, settleable solids (organic material) and scum formation, and eliminate the sludge/organic matter that had accumulated in the maturation lagoon.



**Figure 1:** View of maturation lagoon No. 2, depicting the degree of aggradation prior to the application of Biocelerator

Biocelerator began to be applied on 29/11/2016 at a rate of 10 litres/day, divided over two different times (morning and afternoon): 3 litres were applied at the preliminary treatment sector and 1 litre at the inlet of each lagoon. After 83 days of Biocelerator application, significant performance improvements were noted at the treatment plant, as described herein.



**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

## II - PURPOSE

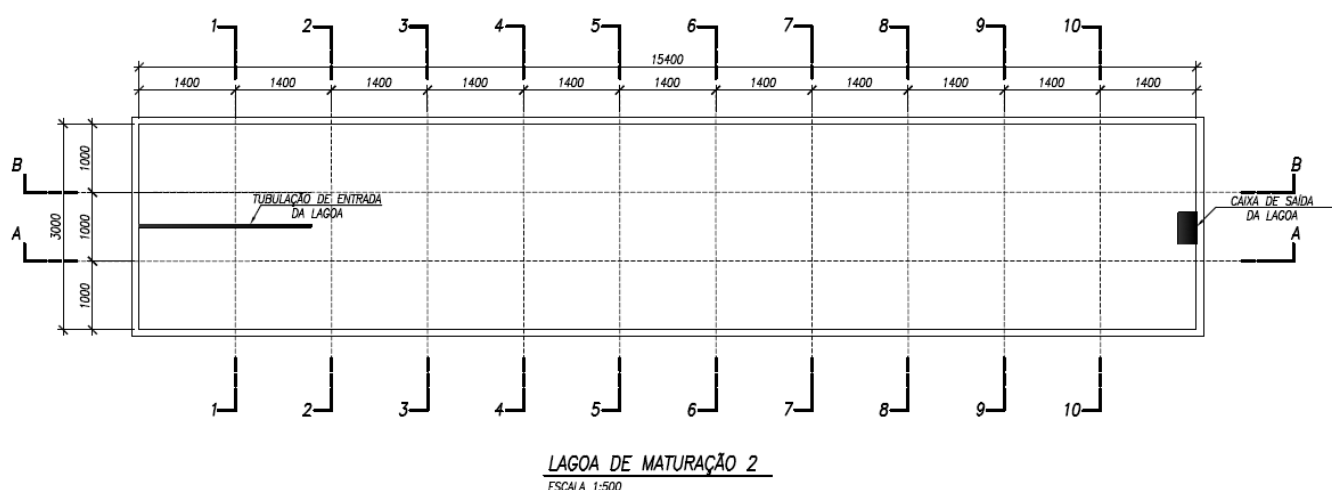
To evaluate the benefits of applying Biocelerator at the Ribeirão Vermelho wastewater treatment plant by demonstrating the performance improvements at the plant, not only with respect to mitigating the aggradation of maturation lagoon 2, but also in reducing the formation of scum at the reactors and curtailing the emanation of offensive odours.

## III - DISCUSSION

Since it became operational in February 2010, the Ribeirão Vermelho wastewater treatment plant has been operated in accordance with the COPAM/CERH (Environmental Policy Council/State Water Resources Board) Joint Normative Resolution with respect to effluent quality standards. However, the following operational challenges emerged during this time period:

- The formation of scum in the reactors;
- The (probable) blockage of the filters;
- The aggradation of maturation lagoon No. 2;
- The release of characteristic offensive odours;
- The constant need to remove and discard the sludge from the reactors and filters; this sludge, once dewatered, is then removed from the drying beds.

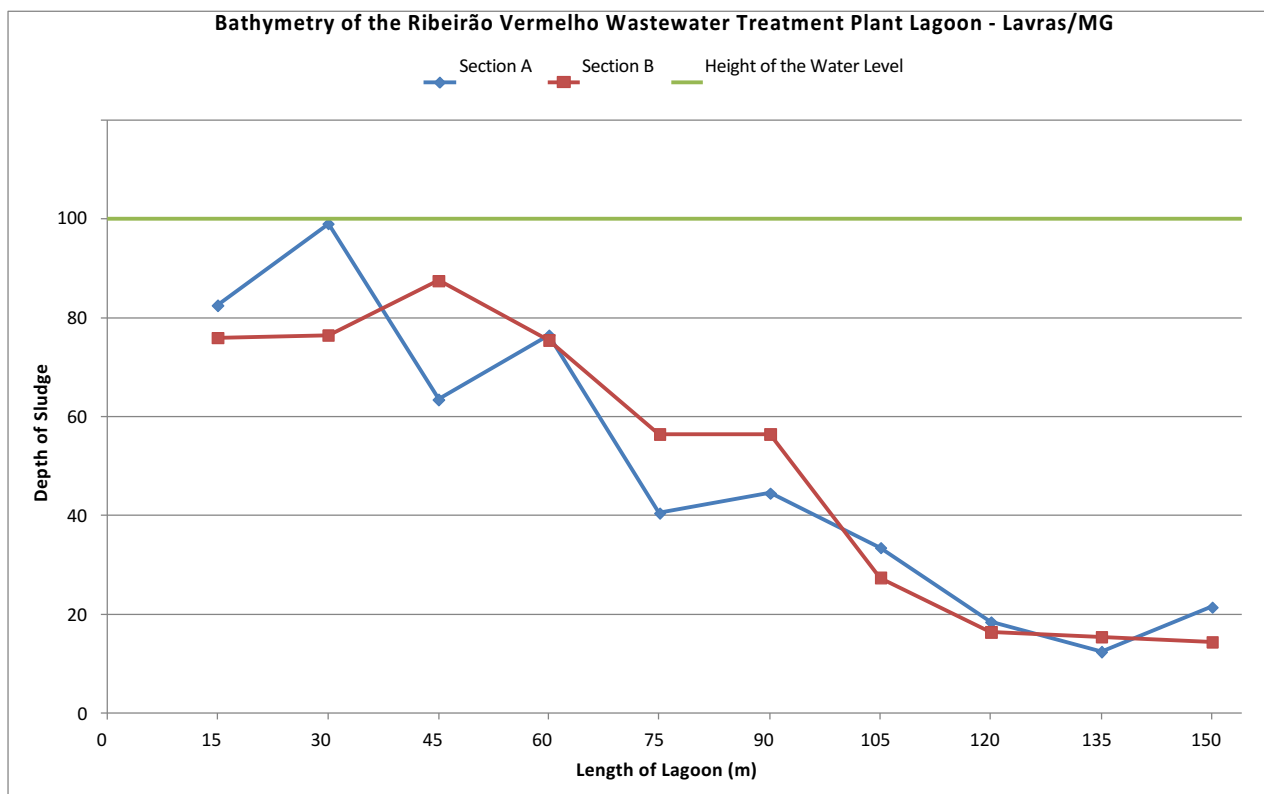
With the aim of more precisely characterizing the aggradation of maturation lagoon No. 2 at the Ribeirão Vermelho plant, a bathymetry of the lagoon was completed on 07/11/2016 along two longitudinal sections and 10 transverse sections, as shown in Figures 2 and 3.



**Figure 2: Maturation Lagoon 2 Bathymetry Sections and Measurements**

**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

120



**Figure 3:** Cross-sections of the bathymetric measurements at maturation lagoon 2

The aggradation profile shows that approximately 58.8% of the useful volume of the lagoon had undergone aggradation, as shown below:

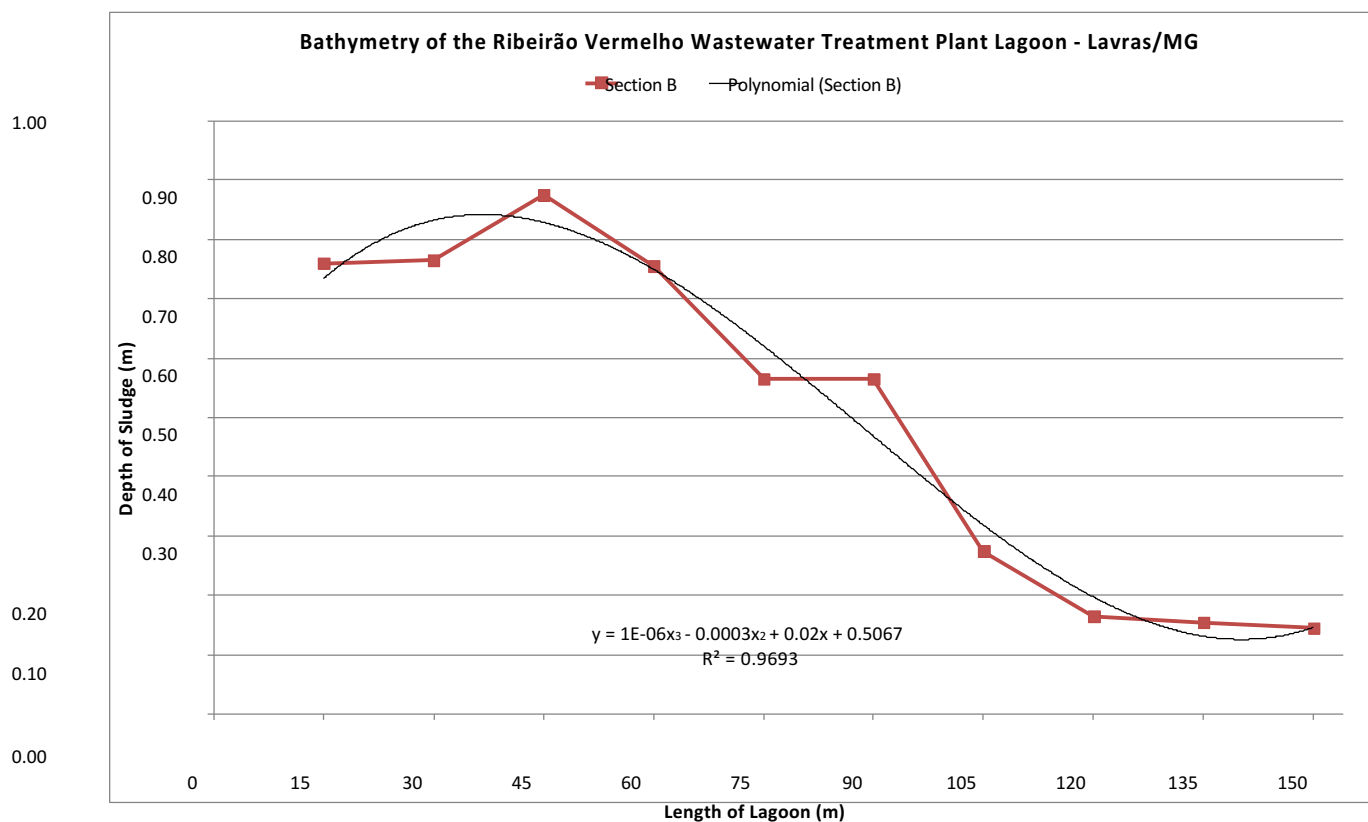
- Taking longitudinal cross-section B as a point of reference, and adding a trendline on this section while adopting a third-order polynomial regression, the equation that describes the formation of the sludge is shown in Figure 4:

$$y = f(x) = 1 \times 10^{-6} x^3 - 0.0003 x^2 + 0.02 x + 0.5067$$

$$\text{where } R^2 = 0.9693$$



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**Figure 4:** Regression of the bathymetric profile of maturation lagoon 2

- Taking the integral of the function above, the area beneath the curve can be calculated, thus obtaining the approximate volume of sludge which, according to the calculations below, equals 2,717 m<sup>3</sup>;

$$\int f(x) = 1x10^{-6} \frac{x^4}{4} - 0.0003 \frac{x^3}{3} + 0.02 \frac{x^2}{2} + 0.5067x + C$$

$$\int_0^{154} 1x10^{-6} \frac{x^4}{4} - 0.0003 \frac{x^3}{3} + 0.02 \frac{x^2}{2} + 0.5067x + C = 90.58m/m$$

As such:

$$\text{Volume of sludge} = 90,58 \times 30 \cong 2,717m^3$$

- Considering that the lagoon has a volume of 4,620m<sup>3</sup> (154x30x1.00), the approximate volume of sludge is equal to 58.8% of the total volume of the maturation lagoon.

In parallel, on 29/11/2016, COPASA's Southern Regional Laboratory completed a characterization of this sludge in which it was determined that, on average, 57.8% of the sludge consisted of total volatile solids (organic matter). Based on the operational challenges that were listed previously, COPASA and VEEGA Comércio Importação e Exportação Ltd signed a technical partnership in order to apply and

**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

experiment with Biocelerator. Considering an average effluent flow rate from the wastewater treatment plant of 100 L/s, or 8,640,000 L/d, the application of 10 litres of Biocelerator per day was recommended by the manufacturer, who also stated that it was not necessary to apply the product continuously. In light of the above, it was determined that the Biocelerator be applied at 08:00 a.m. and 02:00 p.m. At these times, 3 litres would be applied at the preliminary treatment sector and 1 litre would be applied at the inlet of each lagoon. Because Biocelerator is not a threat to the health or well-being of the plant's operations personnel, they were able to disperse the product using only the PPEs that they already normally use.

After only 22 days of Biocelerator application, the following preliminary results were recorded:

- Maturation lagoon No. 1 no longer had a greenish appearance;
- Formation of scum/sludge clusters in the maturation lagoons;
- Release of gases in both lagoons, in the "dead zones" as well, where small bubbles formed;
- Flow of sewage in "dead zones" where previously there was no flow in maturation lagoon No. 2;
- Although it had not been eliminated completely, the appearance of the scum in the reactors had changed;
- Reduction of offensive odours at the plant.

After 83 days of Biocelerator application, upon completion of the partnership with VEEGA (Biocelerator dosage period), the results that were obtained at the plant were the following, as seen in Figures 5 through 13:

- The effluent from the maturation lagoons had become substantially clearer, devoid of solids and offensive odours;
- Sewage had begun to flow in the "dead zones" in maturation lagoon No. 2;
- The island of scum in maturation lagoon No. 2 had been significantly reduced, and, over a period of a few days, there was continuous, preferential flow along the entire length of the lagoon, including an absence of "dead zones";
- Over the final days of testing, it was noted that the sludge at the bottom of the lagoon was loosening, since once again sludge, albeit of lesser density, was being generated at the lagoons, remaining at the surface;
- Reduction of scum/sludge at the outlets of the maturation lagoons;
- The scum from the reactors had been completely consumed; only a large quantity of inorganic material remained (small pieces of plastic and fabric, among other objects);
- Operators and other plant staff noticed a significant reduction in offensive odours, as did members of the community as they walked or drove past the plant on the adjacent road;
- Marked improvement in the efficiency of the plant regarding reductions in BOD and COD, attaining efficiency levels that had been recorded two years previously;
- Reduction of the solids in the reactors, and, as a result, there was no need to dispose of sludge from the reactors since the quantity of settleable solids was negligible, varying from 0 to 5 mg/L (maximum value), even during periods of maximum flow. The following were the last dates on which material was discarded from the reactors:

**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

Reactor 1 – 07/12/2016, 14/09/2016, 22/06/2016, 16/03/2016, 14/01/2016;

Reactor 2 – 09/12/2016, 11/08/2016, 16/06/2016, 05/04/2016, 08/02/2016;

Reactor 3 – 26/09/2016, 22/07/2016, 15/06/2016, 09/02/2016.



**Figure 5: Comparison of the conditions - inlet of maturation lagoon No. 1 - before & after**



**Figure 6: Comparison of the conditions - outlet of maturation lagoon No. 1 - before & after**



**Figure 7: Comparison of the conditions - inlet of maturation lagoon No. 2 - before & after**



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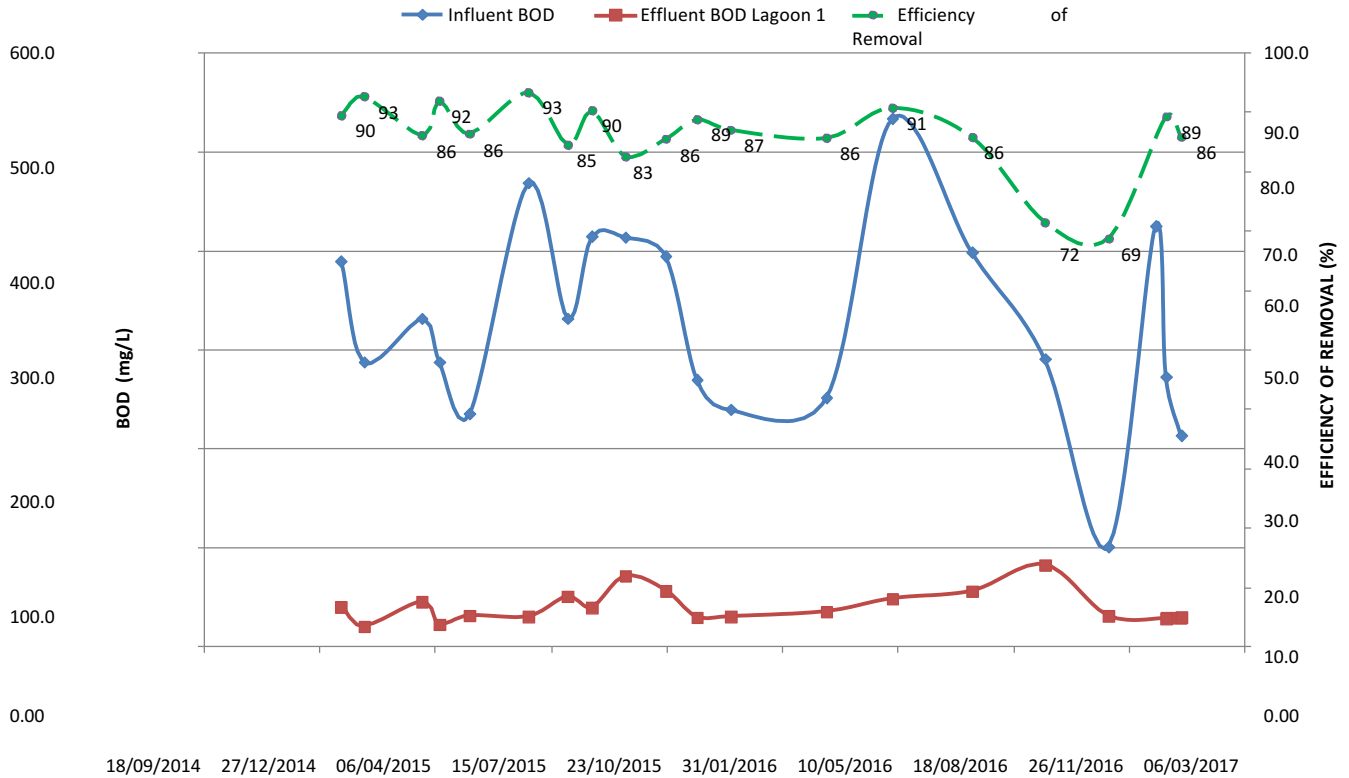
**Figure 8: Comparison of the conditions at the outlet of maturation lagoon No. 2 - before and after**



**Figure 9: Comparison of the scum at the reactors - before and after**

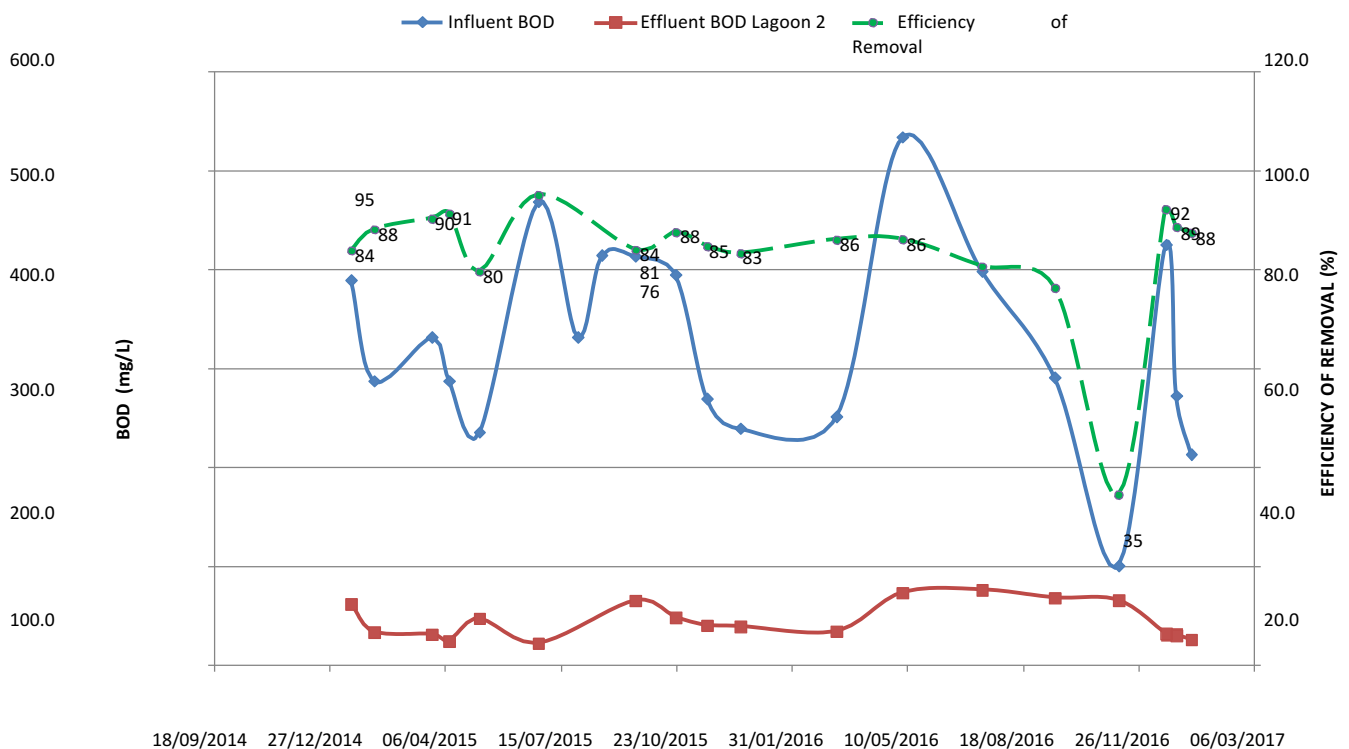
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**LAGOON 1 - RIBEIRÃO VERMELHO  
WASTEWATER TREATMENT PLANT**



**Figure 10: Performance comparison of the plant for BOD at Lagoon No. 1**

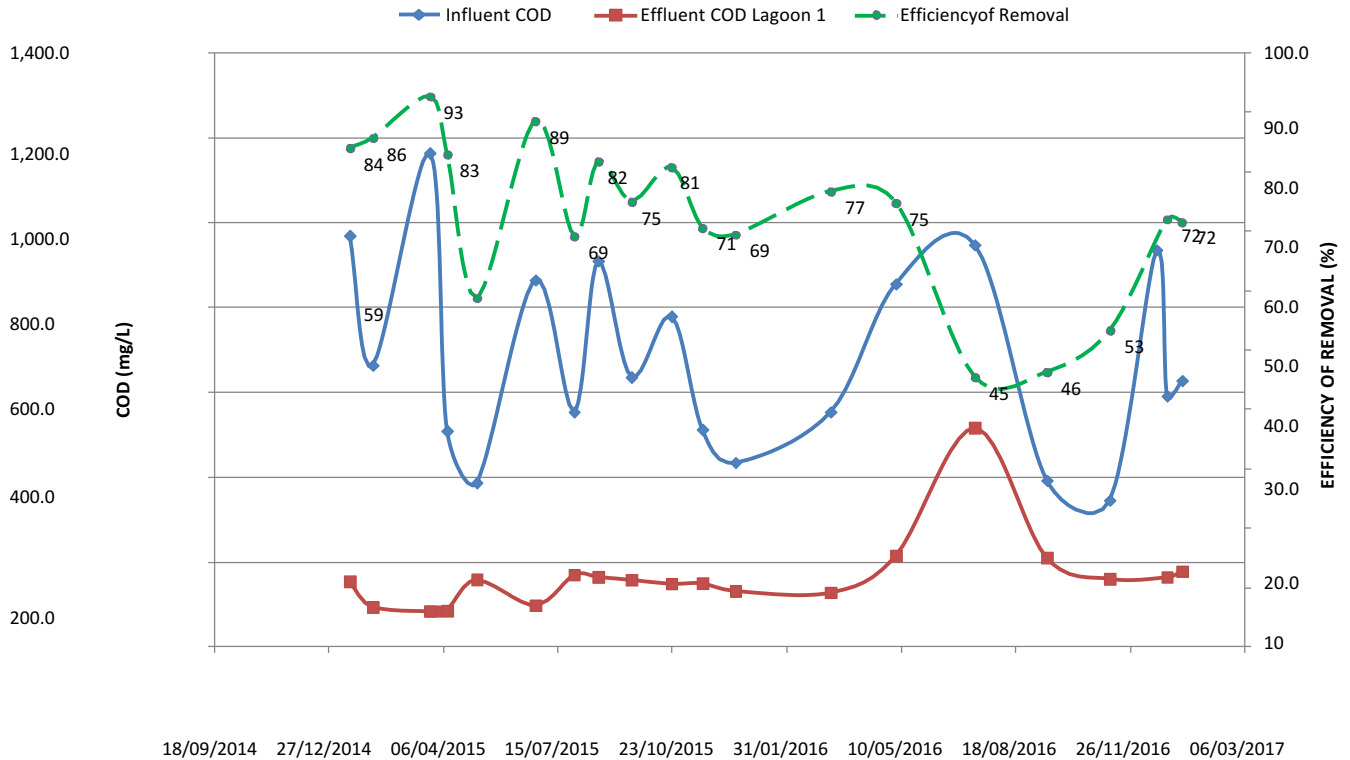
**LAGOON 2 - RIBEIRÃO VERMELHO  
WASTEWATER TREATMENT PLANT**



**Figure 11: Performance comparison of the plant for BOD at Lagoon No. 2**

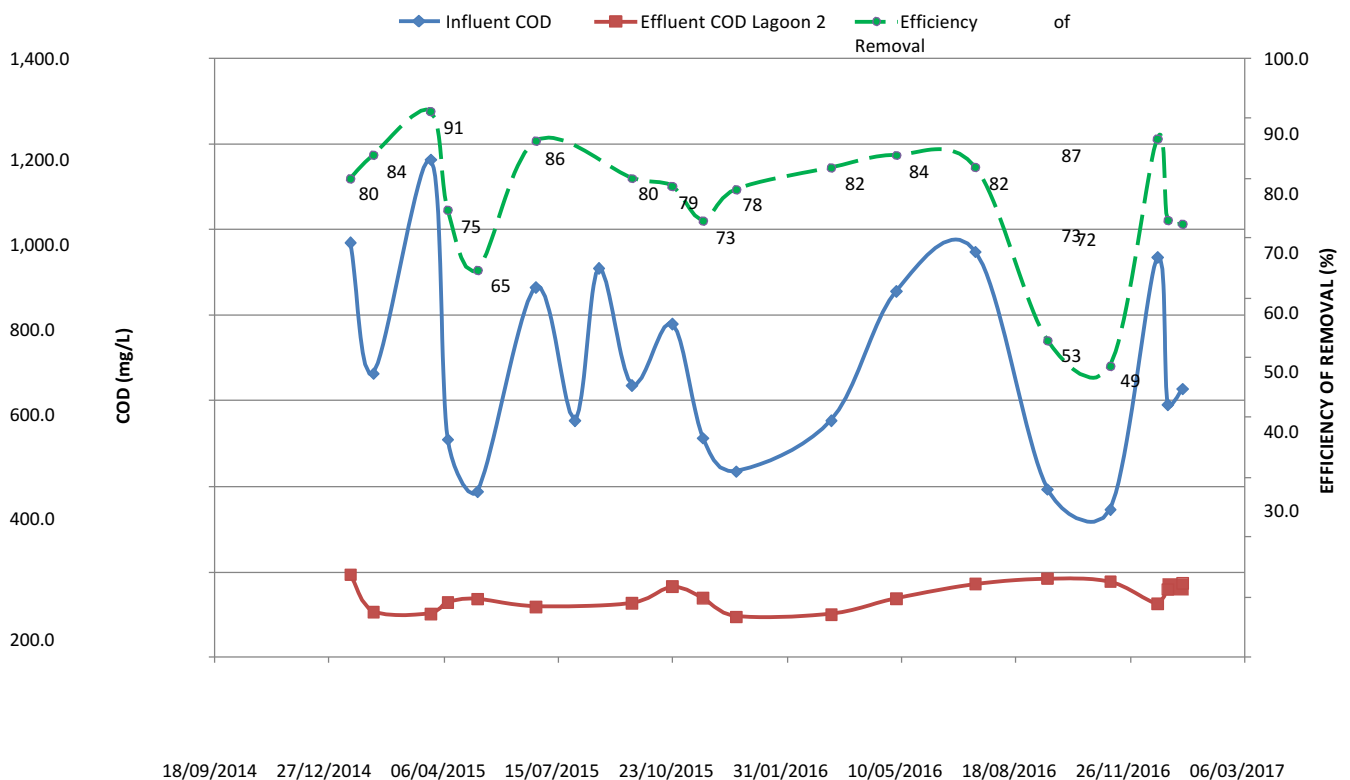
**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

**LAGOON 1 - RIBEIRÃO VERMELHO  
WASTEWATER TREATMENT PLANT**



**Figure 12: Performance comparison of the plant for COD at Lagoon No. 1**

**LAGOON 2 - RIBEIRÃO VERMELHO  
WASTEWATER TREATMENT PLANT**



**Figure 13: Performance comparison of the plant for COD at Lagoon No. 2**



**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

In addition to the improvements that are listed above, the application of Biocelerator brought about financial gains for COPASA, mainly with respect to the reduction in manpower required for the periodic cleaning of the drying beds and the transport and disposal of the sludge in a landfill, which was outsourced.

Considering that:

- Each time a reactor is emptied, two drying beds are required;
- The equivalent of three dumpsters of material is generated by each drying bed;
- The time required for removal of the sludge is two weeks per drying bed, taking into account two plant assistants working continuously;
- The cost of transporting each dumpster is R\$ 80.00;
- The salary of each plant assistant is approximately R\$ 1,706.61 per month;
- The payroll taxes for each plant assistant is approximately R\$ 1,809.01/month;
- The cost of meal vouchers per assistant is approximately R\$ 1,133.39/month.

The total savings that arise simply from eliminating the need to dispose of the sludge from the three reactors equals:

$$\text{Cost 1} = (1706.61 + 1809.01 + 1133.39) \times 2 \times 3 + 3 \times 2 \times 80 = \text{R\$}28,374.06 / \text{month}$$

The approximate cost that was estimated for dredging maturation lagoon No. 2, which was estimated in 2015, was greater than R\$2,000,000.00. As such, considering that the volume of sludge contained in maturation lagoon No. 2 was approximately 58.8% of the total volume of the lagoon, and, furthermore, that 57.8% of that volume consisted of volatile solids, the total cost reduction with respect to the optional dredging of the lagoon would be equal to:

$$\text{Cost 2} = 2,000,000 \times 0.588 \times 0.578 = \text{R\$}679,728.00$$

Considering that the plant has been operating for six years and that it would be necessary to dredge the lagoon for it to operate in conformity with current environmental legislation, the average cost of maintaining the operation would equal:

$$\text{Cost 3} = \frac{679,728}{6 \times 12} = \text{R\$} 9,440.67 / \text{month}$$

Adding costs 1 and 3, the monthly savings for COPASA, just for maturation lagoon No. 2 and the drying beds, would equal:

$$\text{Total} = 28,374.06 + 9,440.67 = \text{R\$} 37,814.73 / \text{month}$$

#### IV – CONCLUSION

Despite the relatively short period during which Biocelerator was tested at the Ribeirão Vermelho Plant (3 months), it quickly became clear that the product is highly efficient in delivering what it promises. We would like to continue using it at this wastewater treatment plant, and we would also like to, as soon as possible, begin applying it in other plants in the Lavras Regional District in light of the fact that similar challenges are also being dealt with in those facilities. These challenges include the difficulty and/or impossibility of removing scum from inside the reactors at the São



**TECHNICAL  
REPORT**

**No.: 007/2017**

**TR**

**Date: 20/02/2017**

**pg.:11/11**

**SUBJECT: Evaluation of the efficiency of Biocelerator at the Ribeirão Vermelho wastewater treatment plant**

Tiago, Água Limpa and Conceição da Barra de Minas wastewater treatment plants; issues regarding offensive odours at the Santana da Viagem plant; the low efficiency of the Colônia do Marçal plant and the lack of drying beds and space for disposing of sludge at the Prados, Santana da Vargem and Conceição da Barra de Minas plants.

Lastly, considering that the application of the product reduces the need for hiring personnel to operate wastewater treatment plants, existing plant assistants can be allocated to complete other work required by COPASA, thus reducing the company's need to hire extra manpower to maintain its operations.

**José Eli de Sousa**  
Manager of the Lavras Regional  
District

Note: Biocelerator is labelled Biotreat in South American market

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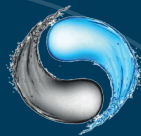
DEVELOPED BY: Eng. Publio  
Reis Pereira

OFFICE:  
SPSL/DTLV

# NATA TEST RESULTS

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Certificate of Analysis



**BIOCELERATOR**  
BIOLOGICAL MEDIUM STIMULANT

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# CERTIFICATE OF ANALYSIS

Page : 2 of 5  
Batch Number : 18041805

CITY OF  
**GOLDCOAST**

## Certificate of Analysis

Client Sample ID: 2018008100			
Client Sampling Date: 18/04/2018			
Client Sampling Time:			
Parameter	Units	LoR	WO150
APHA 9223 : Coliforms (Colilert)			
E.coli	MPN /100mL	1	<1
Total Coliforms	MPN /100mL	1	<1
AS/NZS 4276.3.1 : Plate Count (Heterotrophic) (36°C /48hrs) Pour Plate			
Plate Count	CFU/mL	1	3600 Est
APHA 2320 : Alkalinity			
Alkalinity	mg CaCO <sub>3</sub> /L	2	49
CMM 3.2.4 : Chlorine (Colorimeter)			
Chlorine Free	mg/L	0.05	<0.05
CMM 5.1 : Colour			
True Colour	HU	2	2
APHA 2550 B : Conductivity			
Conductivity	mS/cm	0.03	0.216
APHA 4500 F C : Fluoride			
Fluoride	mg/L	0.1	0.8
APHA 4500 H+ : pH			
pH		0.03	7.9
APHA 2130 B : Turbidity			
Turbidity	NTU	0.1	0.15
CMM 6.14 : Elements (Acid Soluble) by ICP-MS			
Aluminium (Filterable)	mg/L	0.006	0.024

## Certificate of Analysis

Client Sample ID: 2018008100			
Client Sampling Date: 18/04/2018			
Client Sampling Time:			
Parameter	Units	LoR	WO150
APHA 2340 B : Cations (Total) by ICP			
Calcium	mg/L	1	16
Calcium Hardness	mg/L	1	41
Hardness	mg/L	1.3	53
Magnesium	mg/L	0.1	2.9
Magnesium Hardness	mg/L	0.1	12
CMM 6.14 : Elements by ICP-MS			
Arsenic	mg/L	0.001	<0.001
Boron	mg/L	0.001	0.011
Cadmium	mg/L	0.001	<0.001
Chromium	mg/L	0.001	<0.001
Copper	mg/L	0.001	0.011
Iron	mg/L	0.02	<0.02
Lead	mg/L	0.001	0.002
Manganese	mg/L	0.001	<0.001
Mercury	mg/L	0.0001	<0.0001
Nickel	mg/L	0.001	<0.001
Zinc	mg/L	0.001	0.022

## Certificate of Analysis

Client Sample ID: 2018008100			
Client Sampling Date: 18/04/2018			
Client Sampling Time:			
Parameter	Units	LoR	WO150
CMM 6.10.2 : Cations (Total) by ICP			
Potassium	mg/L	0.5	1.8
Sodium	mg/L	0.5	20
CMM 6.10.10 : Silicon/Silica (Total) by ICP			
Silica	mg/L	0.1	12
Silicon	mg/L	0.1	5.4
CMM 7.1.2 / CMM 7.2 / CMM 7.3 / CMM 10.1.2 / CMM 10.2 : Nutrients by FIA			
Ammonia (as NH <sub>3</sub> )	mg/L	0.006	<0.006
Ammonium	mg/L	0.01	<0.01
Nitrate (as NO <sub>3</sub> )	mg/L	0.03	0.10
Nitrate Nitrogen	mg/L	0.01	0.02
Nitrite Nitrogen	mg/L	0.01	<0.01
Oxidised Nitrogen	mg/L	0.006	0.022
CMM 2.5.6 - Volatile Organics (GC/MS)			
Bromodichloromethane	mg/L	0.005	0.011
Bromofom	mg/L	0.005	<0.005
Chlorofom	mg/L	0.005	0.045
Dibromochloromethane	mg/L	0.005	<0.005
Total Trihalomethanes	mg/L	0.005	0.059

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30/04/2018

## Certificate of Analysis

Client Sample ID: 2018008100			
Client Sampling Date: 18/04/2018			
Client Sampling Time:			
Parameter	Units	LoR	WO150
APHA 2540 C : Total Dissolved Solids			
Total Dissolved Solids	mg/L	1	150