

BiOWiSH® Aqua has Positive Long-Term Effects

After Two Years, Sustains Improved Effluent Quality in South Korean Slaughterhouse

Executive Summary

BiOWiSH® Aqua was implemented in a South Korean slaughterhouse in order to meet stricter effluent standards. In the two years since introducing BiOWiSH® Aqua into the effluent treatment process, BOD, COD, SS, TN, and TP levels were maintained below required standards. The slaughterhouse has been able to reduce BiOWiSH® dosing costs while sustaining improved effluent quality. Overall plant stability has improved, and previously proposed plant expansion proved to be unnecessary, resulting in significant capital avoidance.

Objective

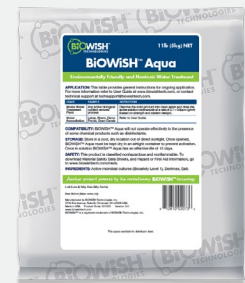
The objective of this study was to determine long-term benefits of bioaugmentation with BiOWiSH® Aqua for industrial effluent.

Background

This South Korean slaughterhouse has been able to maintain effluent compliance standards over the last two years, with technical support from BiOWiSH® local partner Smart Bio Korea (SBK) and the implementation of BiOWiSH® Aqua. Two years ago, the slaughterhouse, which processes around 1,600 pigs per day, sought a solution to meet stricter discharge limits without the need for plant expansion. Effluent BOD, COD, SS, TN, and TP levels were reduced to be compliant with standards within six weeks of initial BiOWiSH® Aqua dosing. This rapid success led to the adoption of BiOWiSH® Aqua into the water treatment program of the slaughterhouse. A case study from the initial implementation period can be viewed at biowishtech.com/resources.

Regular bioaugmentation with BiOWiSH® Aqua has allowed the plant to operate within their discharge requirements, and has contributed significantly to plant stability. This report tracks key effluent measurements throughout the entire duration of the bioaugmentation program.

BiOWiSH® Aqua



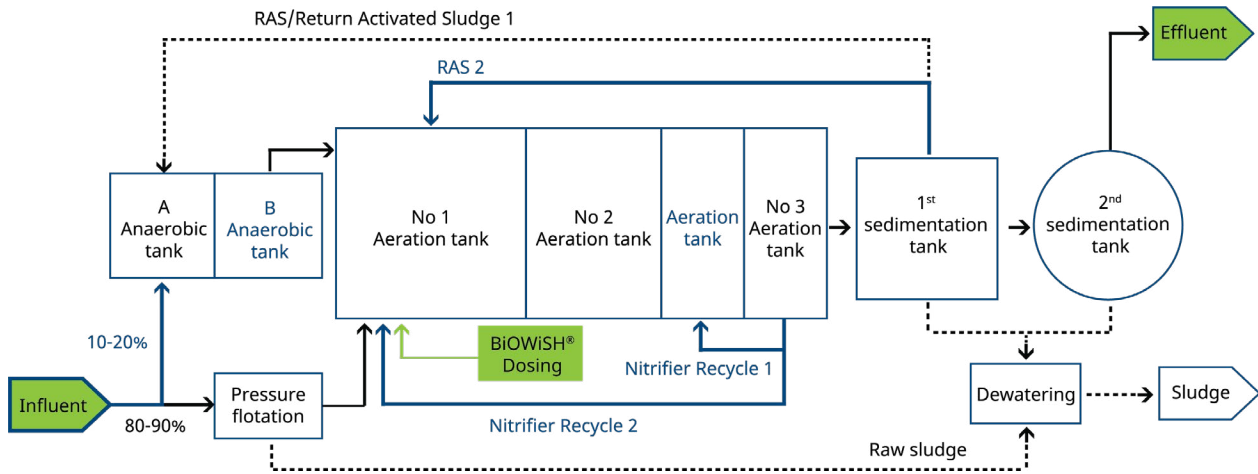
- Rapid nitrification and denitrification in aerobic and anaerobic conditions
- Reduces sludge production
- Increases plant treatment capacity
- Reduces odors
- Reduces aeration requirements
- Reduces need for chemical additives
- Improves plant stability
- Pre-treats influent in collection systems
- Natural and non-toxic

Available Sizes

- 100g/3.5oz
- 1kg/2.2lbs
- 5kg/11lbs
- 10kg/22lbs

Solution

Local BiOWiSH® partner SBK provided BiOWiSH® Aqua as an alternative to costly plant expansion. BiOWiSH® Aqua improved wastewater treatment so that this slaughterhouse was able to maintain long term compliance. The following process schematic shows modifications (blue) and BiOWiSH® Aqua dosing:



Results

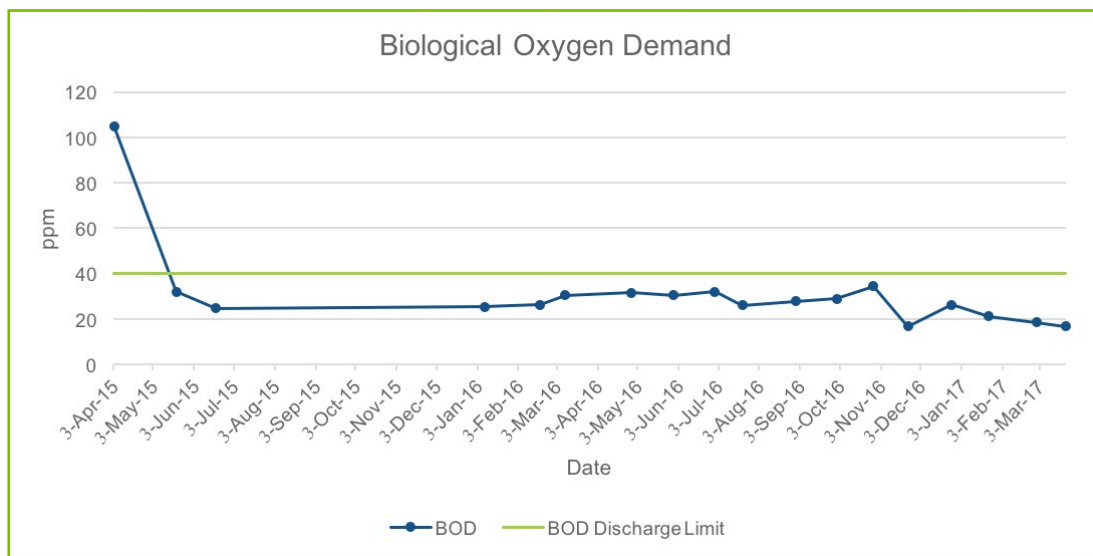
The following tables show key effluent measurements since the start of the bioaugmentation plan using BiOWiSH® Aqua.

| Results from initial treatments | | | | | |
|---------------------------------|----------|----------|---------|---------|---------|
| | BOD mg/l | COD mg/l | SS mg/l | TN mg/l | TP mg/l |
| Discharge Limit | 40.0 | 50.0 | 40.0 | 30.0 | 4.0 |
| Initial Value | 105.0 | 156.8 | 124.0 | 103.2 | 7.5 |
| 6 Weeks | 32.1 | 48.8 | 18.0 | 22.1 | 1.5 |
| 10 Weeks | 24.8 | 37.2 | 13.5 | 15.3 | 1.6 |
| Reduction | 76% | 76% | 89% | 85% | 61% |

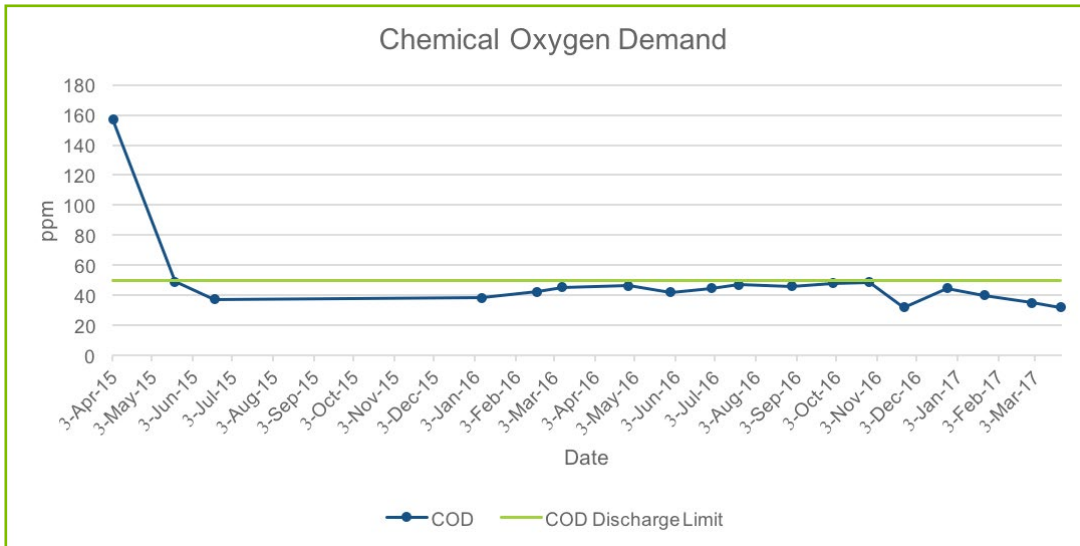
Reduction throughout two years of BiOWiSH® Aqua treatment

| Date | BOD mg/l | COD mg/l | SS mg/l | TN mg/l | TP mg/l |
|--------------------|--------------|--------------|--------------|--------------|--------------|
| 1-Apr-15 | 105 | 156.8 | 124 | 103.2 | 7.5 |
| 20-May-15 | 32.1 | 48.8 | 18 | 22.13 | 1.5 |
| 19-Jun-15 | 24.8 | 37.2 | 13.5 | 15.3 | 1.6 |
| 8-Jan-16 | 25.4 | 38.1 | 12.0 | 20.18 | 1.812 |
| 19-Feb-16 | 26.2 | 42.1 | 28.0 | 20.74 | 1.955 |
| 9-Mar-16 | 30.5 | 45.2 | 24.0 | 11.86 | 3.369 |
| 28-Apr-16 | 31.5 | 46.2 | 30.0 | 18.80 | 3.416 |
| 30-May-16 | 30.5 | 42.0 | 25.0 | 13.11 | 2.155 |
| 30-Jun-16 | 32.0 | 44.5 | 32.0 | 15.31 | 3.157 |
| 21-Jul-16 | 26.1 | 47.0 | 10.5 | 14.74 | 2.984 |
| 30-Aug-16 | 27.9 | 46.0 | 12.0 | 13.06 | 3.201 |
| 30-Sep-16 | 29.0 | 47.9 | 18.0 | 23.84 | 2.493 |
| 28-Oct-16 | 34.5 | 48.5 | 16.0 | 26.32 | 2.276 |
| 23-Nov-16 | 16.8 | 31.9 | 6.0 | 10.42 | 0.633 |
| 26-Dec-16 | 26.2 | 44.5 | 33.0 | 25.52 | 2.871 |
| 23-Jan-17 | 21.2 | 39.8 | 28.0 | 28.16 | 0.748 |
| 28-Feb-17 | 18.5 | 35.0 | 32.0 | 20.15 | 1.358 |
| 22-Mar-17 | 16.8 | 31.7 | 18.0 | 10.87 | 2.883 |
| Mean | 30.83 | 48.51 | 26.67 | 22.98 | 2.55 |
| % Reduction | 70.63 | 69.06 | 78.49 | 77.73 | 65.99 |

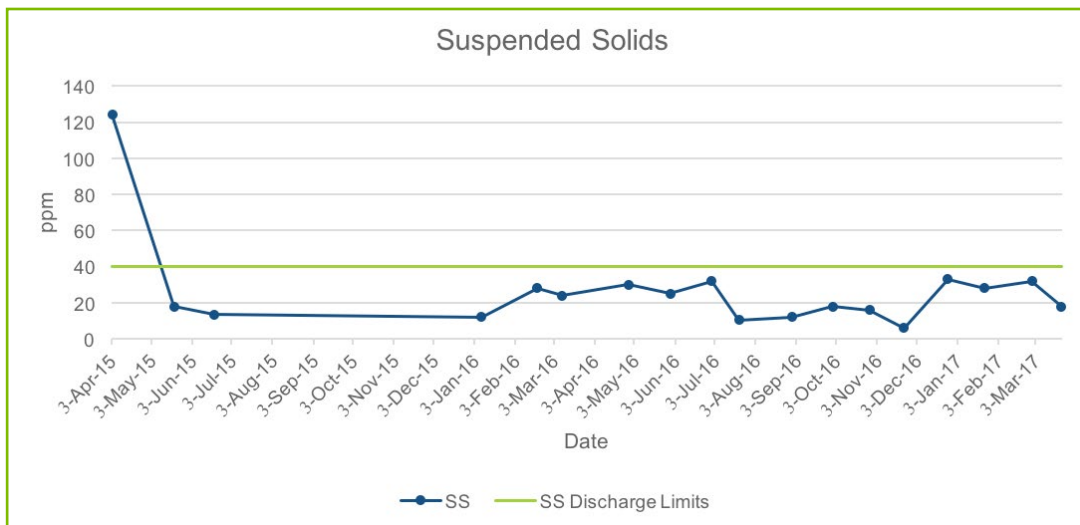
Graphs showing stable plant performance since BiOWiSH® implementation:



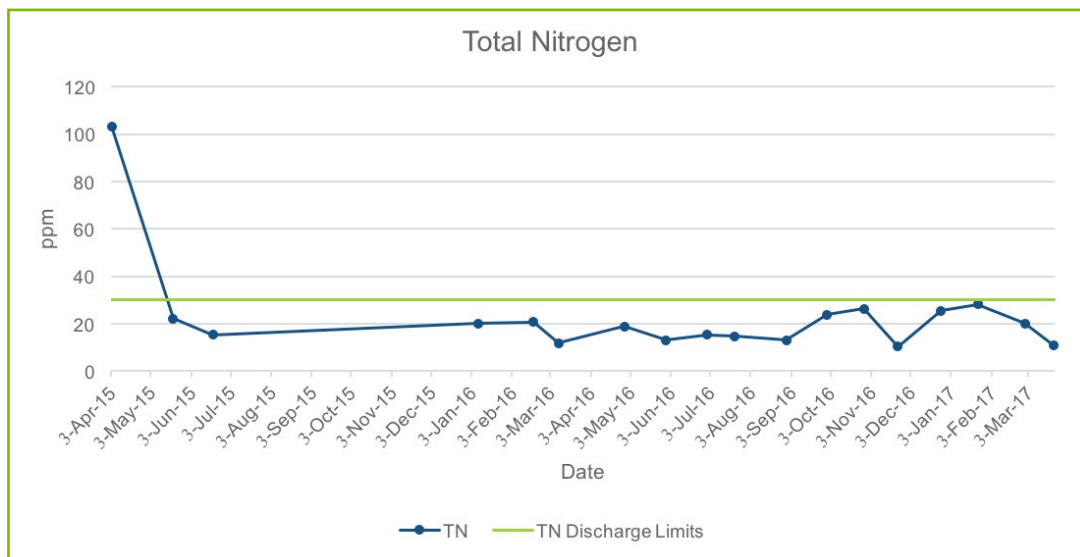
Graph showing BOD levels observed less the discharge standards (<40ppm)



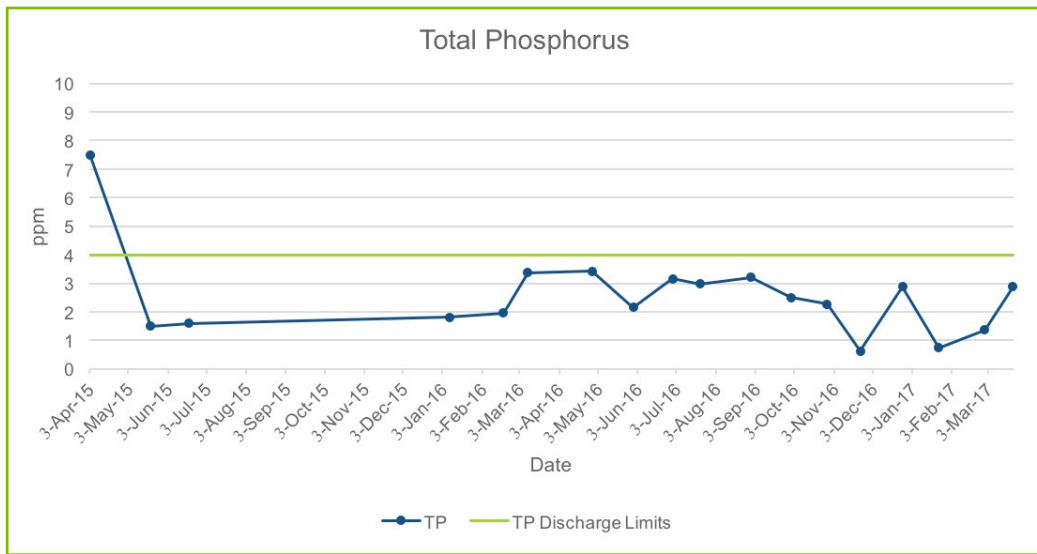
Graph showing COD levels observed less than discharge standards (<50ppm)



Graph showing Suspended Solids levels observed less than discharge standards (<50ppm)



Graph showing Total Nitrogen levels observed less than discharge standards (<30 ppm)



Graph showing Total Phosphorus levels observed less than discharge standards (<4.0ppm)

Conclusion

BiOWiSH® Aqua is an effective long-term treatment solution for improving effluent quality and plant stability. Extended use of BiOWiSH® Aqua at this South Korean slaughterhouse led to consistent reductions in effluent BOD, COD, SS, TN, and TP. BiOWiSH® eliminated the need for proposed plant expansion, resulting in significant capital avoidance. Since the start of the bioaugmentation program in 2015, BiOWiSH® Aqua sustained these results while dosing costs were reduced by over 50%.

BiOWiSH Technologies is grateful for the opportunity to serve our partners and their customers with our innovative technology.



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