

# BiOWiSH™ Aqua

## BiOWiSH™ Aqua Reduces High Ammonia (Total Nitrogen) Loading in South Korean Landfill Leachate

### Executive Summary

South Korea's KM Green Landfill tested BiOWiSH™ Aqua as an environmentally friendly way to reduce TN levels and meet discharge limits. BiOWiSH™ Aqua not only reduced TN levels well below the required 30 mg/l discharge limit in as little as 3 weeks, but also eliminated the need for chemicals in the TN reduction process.

### Background

KM Green Co., Ltd, is a waste processing company that runs South Korea's largest solid waste disposal site.

The landfill site is comprised of 600,000 m<sup>2</sup> in the Gyeonbuk Gumi areas and follows best management practices. They are focused on best-in-class environmental preservation.



**Fig. 1.** Google Image of Treatment Site

This landfill facility generates approximately 25m<sup>3</sup>/day of leachate containing high levels (>1000 ml/l) of Ammonia Nitrogen. The existing treatment process design was not able to comply with the required Ammonia Nitrogen discharge standards.

The treatment plant has the following treatment stages:

1. Chemical Treatment: Deaeration Tower
2. Biological Treatment: Total Bioreactor Volume = 1200 m<sup>3</sup>
3. Chemical Treatment: adding chemical to enhance TN removal
4. Filtration

### BiOWiSH™ Aqua



- Reduces sludge production and handling
- Increases plant capacity; Capital avoidance
- Reduces aeration; Energy savings
- Reduces need for chemical additives
- Improves plant stability
- Reduces hydrogen sulfide, ammonia and nitrates



The biological treatment with hydraulic retention time greater than 30 days showed less than 50% reduction in TN values. This was a clear indication that the biology in the reactors was incapable to achieve effective TN reduction through nitrification/denitrification.

## Process Flow Diagram

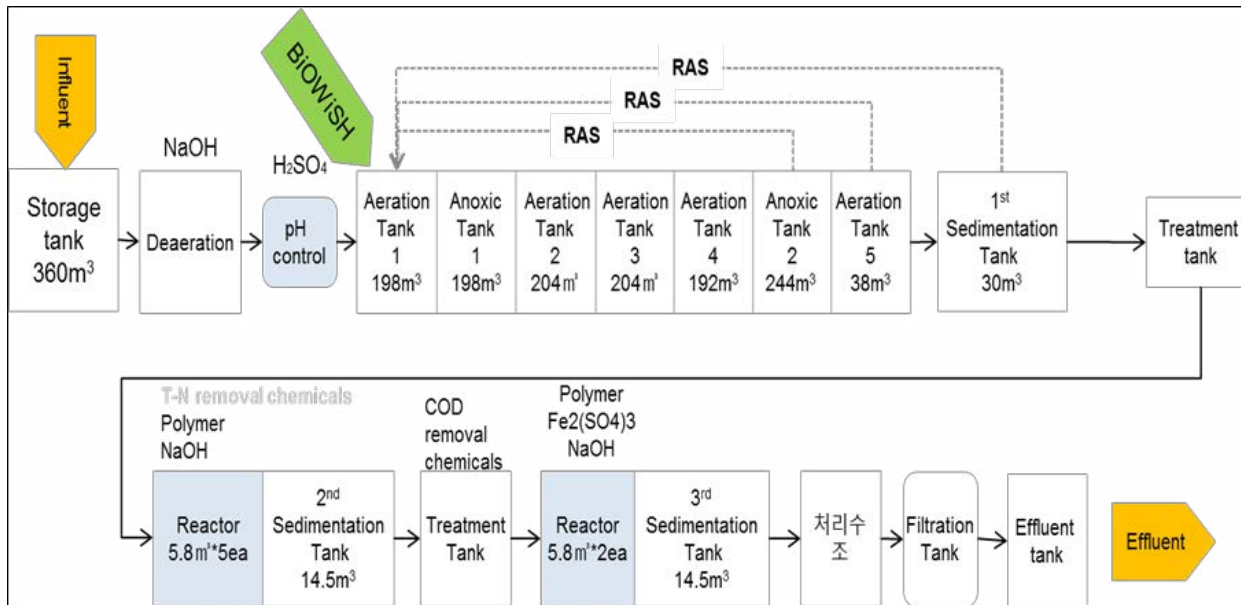


Fig. 2. Leachate Treatment Plant PFD at KM Green Landfill

## Objective

The main objective of the BiOWiSH™ bioaugmentation program was to enhance TN reduction in the biological treatment, achieve discharge levels below 30 mg/l and reduce the consumption of several chemicals used for TN removal after the biological treatment.

## Solution

A 1000-liter tote was prepared once a week by dissolving 3.5 kg of BiOWiSH™ Aqua in water. This active solution was dosed on continuous basis into the first aeration basin.



Fig. 3. 1000 Liter Tote for Dosing BiOWiSH™



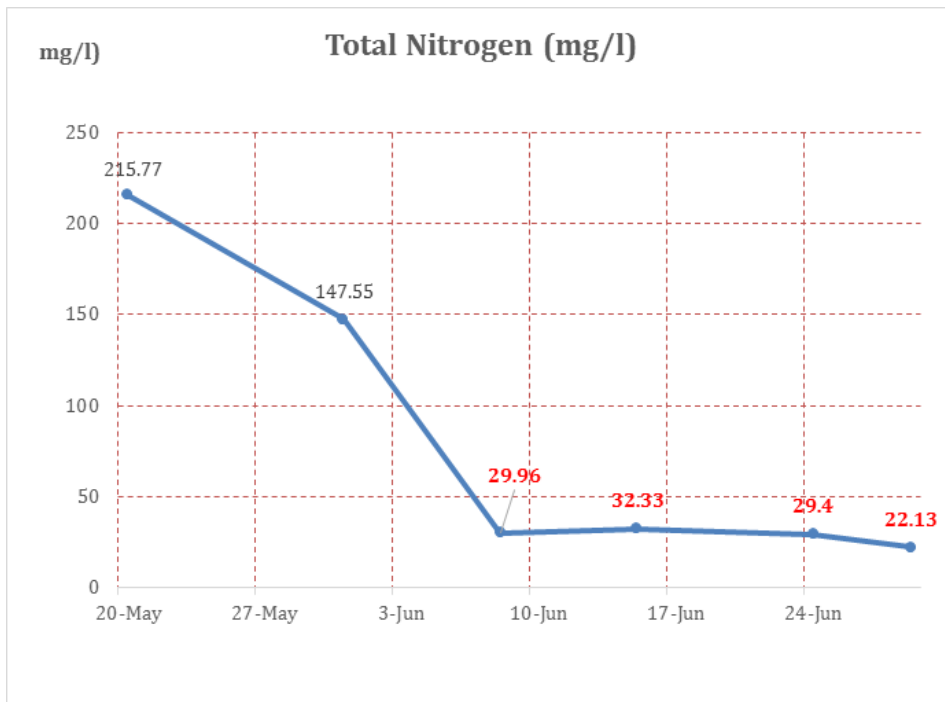
Fig. 4. Dosing Point in Aeration Tank 1

## Results

Bioaugmentation with BiOWiSH™ Aqua successfully achieved TN levels below 30 mg/l in the first sedimentation tank within 3 weeks of dosing. From week 4 to week 7, the plant management stopped using TN removal chemicals and at the same time they could achieve TN well below the discharge standards.

Sampling Date	Total Nitrogen (mg/l)
20-May	215.77
31-May	147.55
8-Jun	29.96
15-Jun	32.33
24-Jun	29.40
29-Jun	22.13

**Table 1.** Results after BiOWiSH™ Application



**Graph 1.** Total Nitrogen Reduction after BiOWiSH™ Implementation

## Discussion

BiOWiSH™ Aqua was instrumental in boosting biological TN removal, achieving the desired Total Nitrogen levels below 30 mg/l. It also helped eliminate the need to use chemicals for removing the excess TN after biological treatment.

The bio-augmentation program with BiOWiSH™ Aqua provided a cost-effective treatment to meet the client's requirement.



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