Nitrification in Cold Weather

Low temperatures can have dramatic effects on a microbial community. When this happens it is important to have a microbial community that consists of microbes that are effective at removing organics at lower temperatures.

Many biological wastewater treatment plants experience a reduction in activity at lower operating temperatures. Typically, lower temperatures result in reduced BOD and COD degradation. IFM’s cold weather products exhibit growth and activity below 55° F (13° C) and improve treatment at cold temperatures.

**IFM offers microorganisms specially selected for the ability to thrive at low temperatures**

CWM 1738 helps plants to comply with their permits and improves plant efficiency at low temperatures. It contains a blend of psychrophilic (cold-loving) microorganisms and is active all the way down to 2 °C (36 °F). The strains in CWM 1738 have a wide range of organic degradation abilities and can be used at a wide range of industrial facilities.

Combined with appropriate operational adjustments, bioaugmentation can also offset polymer and other chemical costs this winter.

**Key Benefits:**

- Improves COD reduction at low temperatures
- Improves system stability at low temperatures
CWM 1738 and ARM 1010
Successful winter plant start-up with nitrification

Background

A municipality needed to start up a 4.54 million L/day (1.2-MGD) oxidation ditch in late February. The influent was primarily domestic waste, with an industrial contribution containing high surfactant concentrations. The main objective for the plant was to establish a healthy biomass capable of BOD, TSS, and ammonia removal in the least amount of time possible. February is typically the coldest month of the winter in this part of the country, and water temperatures can dip as low as 6°C (43°F). The contract operator and the municipality believed the start-up would be slow, particularly for ammonia removal, due to the low temperatures. A representative was asked to evaluate the plant to determine if bioaugmentation could help reduce the start-up time.

Application

The plant began a two-week bioaugmentation program using CWM 1738 to boost the performance of the biomass. In addition, CWM 1738 was added during this time period to enhance surfactant degradation and to control severe foaming that was experienced during the first few days of the start-up.

Once the sludge age surpassed ten days, the pH, alkalinity, dissolved oxygen, and effluent BOD were reviewed, and it was determined that the plant should sustain nitrification. However, because of the cold temperatures, nitrification had not started, and there was concern that it might take several weeks or longer for sufficient natural populations of nitrifying bacteria to develop.
Results

From March 13-18, the plant added ARM 1010 to reduce the start-up time for nitrification. The plant began nitrifying within days and achieved an effluent ammonia level of less than 1 ppm within a week. During the start-up, the water temperature never exceeded 12°C (54°F). The system consistently maintained an effluent ammonia concentration of less than 1 mg/L following the successful start-up.

![Graph showing effluent ammonia concentration over time](image)

**Figure 3.** After a healthy biomass was established, the solution was added to initiate nitrification. Within a week, the effluent ammonia concentration was consistently less than 1 mg/L.

Conclusion

IFM’s biological program was easy to implement and provided significant benefits over other disposal alternatives. CWM 1738 resulted in lower operating costs; improved plant efficiency; and, simplified operations.

Interested in more information?

Industrial Fluid Management (IFM) brings bioaugmentation technology to the wastewater treatment industry. For more information, visit the Industrial Fluid Management website at [www.ifmenviro.com](http://www.ifmenviro.com).