

Case Study

City of Johnstown, CO

KRÜGER



LagoonGuard™

Plant Highlights

General Information

Project Location: Colorado USA
Client: Johnstown, CO

Design Load

Flow: 0.75 - 4.5 MGD Peak
BOD: 194 lb/d
TKN: 126 lb/d
Design Temperature: 4.9°C/41°F
Operational Since: November 2004

Challenge

The existing lagoon treatment system could not meet nitrification requirements. Temperature drops and space constraints were key issues when looking at upgrade solutions.

Solution

Two trains of two reactors were constructed in below-ground rectangular concrete basins. Total footprint of 60x60 feet with a volume of 43,200 ft³.

Achievements

The LagoonGuard™ alternative requires minimal operator attention and minimal space. The system is consistent even when the temperature drops.

The Overview

Stricter regulations forced the town of Johnstown, Colorado to examine alternatives for an upgrade to their existing system.

The Challenge

Originally, the Johnstown site consisted of a series of three lagoons built in the 1950's, with the most recent upgrade taking place in 1980. The city was faced with expanding their treatment capacity, along with meeting lower ammonia limits. The effluent discharge standards required the city to meet the new ammonia limits year round.

The wastewater temperature in the plant is low (<7°C/ 45°F) during winter making it difficult to nitrify on a consistent basis. In order to meet the nitrification limits, the city had two options to choose: build a new activated sludge plant, or use their existing facility and install an AnoxKaldnes™ LagoonGuard™ treatment system. The MBBR process was estimated to cost 50% less than the activated sludge alternative.

The city chose to install the AnoxKaldnes™ LagoonGuard™. Two trains of two Moving Bed Biofilm Reactors in series were added after Lagoon 2, along with a DAF at the end of Lagoon 3.

The Design

The process flow scheme uses two lagoons for treatment of BOD, an AnoxKaldnes™ LagoonGuard™ system for nitrification, and a DAF for final TSS and TP polishing after the third lagoon.

The lagoons will be operated in both summer and winter modes. In summer mode, the plant will operate as described above. During the winter months, when the wastewater temperatures drop below 45°F, only one lagoon will be put into operation, followed by the LagoonGuard™. This will prevent the temperature from dropping further, which could halt or significantly slow down the nitrification process.

The AnoxKaldnes™ LagoonGuard™ setup consists of two process flow trains, each with two reactors in series. Influent wastewater flows into the first and second pond (lagoon) cells for BOD treatment and effluent from the second cell flows directly into the new LagoonGuard™ treatment tank.

The LagoonGuard™ two-stage system removes any remaining soluble BOD in the wastewater and nitrifies the ammonia. The system allows for a small footprint and requires minimal operator attention.

The LagoonGuard™ process consists of thousands of polyethylene carrier elements that provide a home for a vast, highly-active bacteria culture that treats the wastewater. These elements are kept in constant motion throughout the entire volume of the wastewater by a medium bubble aeration system. Retention screens were also added to retain the media within the reactors.

The Results

The plant is now operating with a capacity of 0.75 MGD with a media fill of 26%. The prognosis for growth of the town requires a 1.5 MGD plant in later years. The future growth can be accommodated by filling the basins to 52% without any other modifications to the MBBR reactors.

