

Case Study

City and County of Broomfield, CO

KRÜGER



Aerial of Broomfield, CO WWTP

Plant Highlights

General Information

Project Location: Colorado USA
Client: Broomfield WWTP

Design Load

Flow: 8.0 MGD
BOD: 9,725 lb/d
TSS: 6,504 lb/d
TKN: 2,724 lb/d
NH₃-N: 2,480 lb/d
NO₄-P: 350 lb/d
PO₃-P: 500 lb/d
Design Temperature: 13°C/55°F
Operational Since: July 2003

Challenge

To meet the new effluent guidelines imposed on the plant. To expand the plant to handle increased flows, all while keeping within the municipal budget

Solution

Retrofit the existing aerobic basins with AnoxKaldnes™ K1 media, aeration system and media retention screens to provide for increased nitrification capacity without having to build any new aerobic reactors

Achievements

Ability to meet effluent NH₃-N of <1 mg/L at winter temperatures, overall stability of the treatment system improved due to the addition of media to the aerobic basins. No increased operational issues required due to the upgrade of the plant

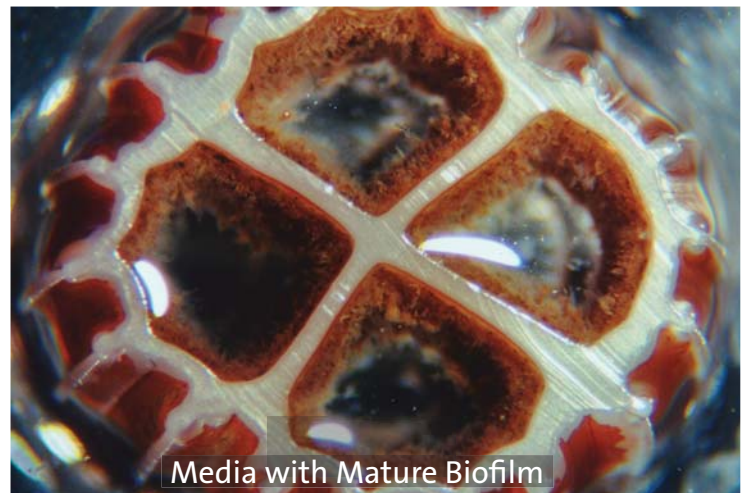
The Overview

The City and County of Broomfield, Colorado, with a population of 48,000 was in need of improved wastewater treatment to meet effluent guidelines for phosphorus, ammonia, nitrates and BOD removal from their wastewater.

During the winter of 2000-2001, AnoxKaldnes™ conducted a pilot study to prove the effectiveness of the AnoxKaldnes™ Hybas™ process. It was selected as the most cost-effective choice for the city and county among four other alternatives.

The Challenge

Broomfield's existing system consisted of an activated sludge system for BOD removal only. Because of an increase in projected flows from 5 to 8 MGD and the implementation of new effluent guidelines, expansion of the plant was required. The new effluent guidelines restricted the levels of phosphorus (<1 mg/L), ammonia (<2 mg/L), nitrates (<10 mg/L), and BOD (<10mg/L) that could be present in the water.



Media with Mature Biofilm

The Design

After a successful pilot test, the decision was made to install the AnoxKaldnes™ Hybas™ process. The Hybas™ process alters the conventional activated sludge plant to increase the overall solids inventory. This is accomplished by utilizing plastic carrier elements to provide surface area for additional biological growth, such as the nitrifier bacteria population to meet the design requirements.

The carrier elements provide a home for the slowest growing nitrifying bacteria and keep them in the system. The bacteria live well protected in the media and provide for highly effective and consistent treatment.

The upgrade to AnoxKaldnes™ Hybas™ process was done within the existing tanks, thus allowing the facility to increase its treatment capacity without having to build any new aerobic activated sludge treatment volume.

In order to keep the carrier elements within the reactors, specially designed screens are used to retain the media but allow the MLSS to flow out of the basin and into the clarifier for settling. In addition, due to maintenance issues of fine bubble aeration systems with respect to cleaning and replacing domes, it was decided that the existing aerobic tanks were to be retrofitted with an AnoxKaldnes™ stainless steel aeration system to provide a) oxygen for bacteria, b) mixing energy to keep media in constant motion, and c) durability over the next 20+ years.

The Results

Broomfield WWTP upgraded from 5.4 MGD to 8.0 MGD without having to increase aerobic tank volume. Broomfield WWTP now operates at a MLSS aerobic SRT of 3.5 – 4.5 days withstanding winter temperatures of 55°F and maintains complete nitrification and Total Nitrogen of less than 10 mg/L. In addition, Broomfield operates with secondary effluent concentrations for BOD and TSS of <5 mg/L.



Average Influent and Effluent Characteristics

	Total BOD	Total COD	TSS	NH3-N	NO3-N	NO2-N	Alkalinity	TP
Influent	208	608	364	33.5	3.1	2.5	235.3	7.5
Effluent	2.1	31.3	3.5	0.3	7.3	1.78	87.1	0.93

*All values mg/L