

Case Study

Fairplay, CO

KRÜGER

Plant Highlights

General information

Project Location:	Fairplay, CO
Client:	Fairplay Sanitation District
Operational Since:	Winter of 2008
BOD	876 lb/d
NH ₃ - N	88 lb/d

Challenge

To meet the ammonia permit limits in a small footprint at cold temperatures with ease of operation.

Solution

Install an AnoxKaldnes Hybas™ system to increase the nitrification capacity and a pre-denitrification zone to meet Total Nitrogen effluent.

Conclusion

Kruger's AnoxKaldnes IFAS system consistently treats the wastewater during harsh weather conditions within a small footprint.

The Challenge

The Fairplay Sanitation District was challenged in meeting their ammonia permit limits and wanted a process that would produce a stable effluent in a small footprint. Influent water temperatures were regularly recorded in between 6°C and 10°C. Due to these cold temperatures, nitrification was not being achieved on a consistent basis. Additionally, the District had to factor in the issue of the groundwater table rising and falling as well as the alkalinity of the wastewater that is needed for nitrification.

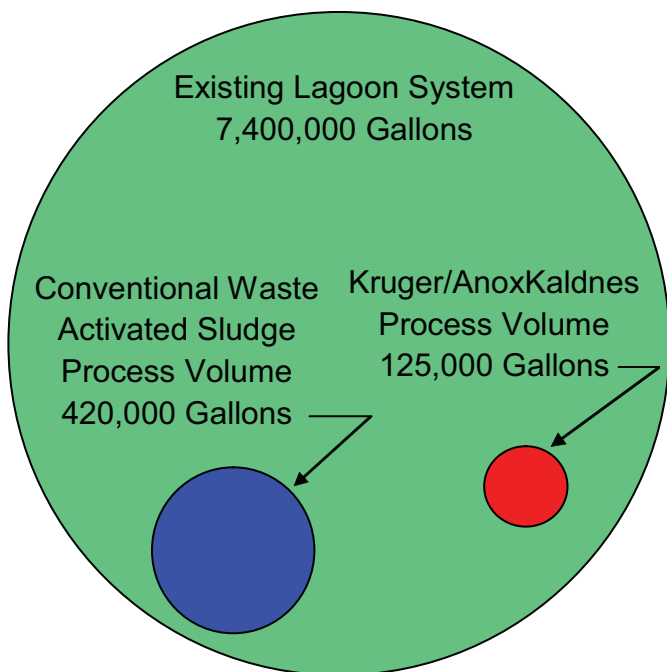
Plant Overview

The Fairplay Sanitation District Plant consisted of over 3 million gallons of aerated lagoon treatment. The plant sits at approximately 10,000 ft of elevation. The harsh climate with cold temperatures the majority of the year leads to an inconsistent ammonia removal. The lagoons brought additional challenges including excess algae growth in the summer and freezing in the winter.

In 2005 the City began planning to upgrade the facility to a fully mechanical plant. The main objectives were to build an easily operated mechanical plant in a small footprint that could be covered to allow for heat retention as well as protection from the extreme elements for the operators.

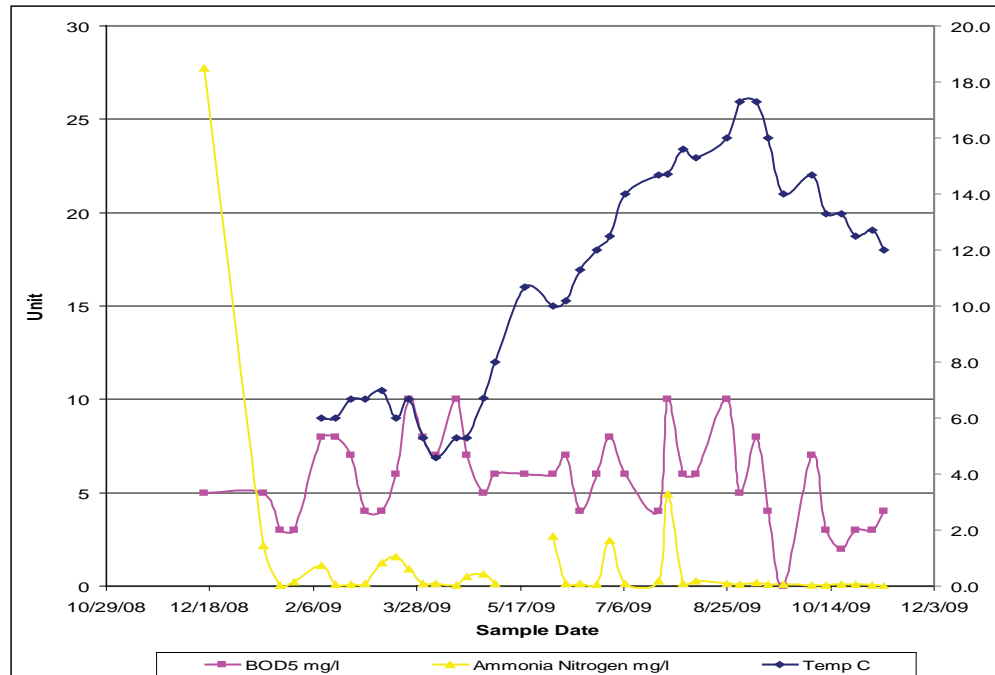
The resulting IFAS facility is 125,000 gallons of aerobic volume with two rectangular clarifiers. This portion of the facility is outside and covered. The remaining footprint encompasses the headworks, pumps, laboratory, and ancillary equipment. The new flow scheme consists of headworks including a 3 mm spiral screen and grit removal; 2 trains each of 1 anoxic reactor and 2 aerobic reactors containing the AnoxKaldnes K1 media; secondary clarification; and UV disinfection. The existing lagoon 3 was converted to an aerobic digester for waste activated sludge (WAS).

The IFAS reactors are 15' x 15' x 16' SWD with percent media fills of 65% in the first reactor and 38% in the second. The design MLSS is 3,000 mg/l. The biological system is



Graphic Courtesy of
Burns and McDonnell Engineering

Fairplay, CO Effluent Quality



designed to treat screened influent down to 10 mg/l soluble BOD₅ and 1.0 mg/l effluent NH₃-N. The return activated sludge (RAS) rate has a maximum of 100% of influent flow, and the internal recycle design rate is 70%.

The plant is designed to have comparable manpower requirements as the previous lagoon system. An operator makes a walk-through each day and spends a half day on site two times per week. Due to the remote location and harsh climate, the focus of this plant design was on simplicity and consistent performance with little operator attention.

Process Solution

Hybas™ is the trademarked name for the AnoxKaldnes IFAS technology. The core principle of the AnoxKaldnes Hybas™ Biological Treatment process is the use of non-clogging biofilm carriers placed in an aerobic reactor with activated sludge mixed liquor. The carrier media does not require backwashing, has a low head-loss, and provides a high specific surface area for biofilm development.

The media are retained within the reactor using stainless steel retention screens, while the mixed liquor passes through and is separated in the secondary clarifiers. An added benefit of the IFAS principle is the increase in the nitrification capacity without increasing the solids loading rate to the clarifiers.

Mixing of the media and mixed liquor in the reactor is provided by an engineered aeration system. The biofilm carrier elements are made of high density polyethylene and have a specific gravity of about 0.95. The addition of media to the aeration basins makes it possible to maintain nitrifying biomass in a much smaller footprint than with convention activated sludge systems. A volume of 6,427 ft³ of AnoxKaldnes K1 media, aerations grids and media retention sieves have been installed for the 0.3 MGD upgrade of the Fairplay Sanitation District.

The pre-denitrification zone is designed to combine nitrified internal recirculation, raw influent, and RAS to achieve total nitrogen removal and partial BOD reduction upstream of the aerobic IFAS zones.

Conclusion

Kruger prides itself in meeting the needs of the client. The objectives have been fulfilled at this installation for David Stanford, President of H₂O Consultants quotes, "I have operated wastewater systems for thirty years. This is the easiest most forgiving mechanical wastewater plant I have ever operated."