

CASE STUDY

EquaReact® Poultry Processing



Treatment tanks with clarifier

Pennsylvania Poultry Processor Adds Second EquaReact® System

Overview

A chicken processing plant located in eastern Pennsylvania completed a \$330 million dollar expansion in 2021 that doubled the capacity of the existing facility. The Parkson EquaReact® Nutrient Removal System was selected to treat all wastewater generated from the slaughter, processing, and packaging operations at the new facility.

The Challenge

The treatment scheme at the old plant consisted of screening followed by an EquaReact treatment system. The EquaReact plant consists of an EQ anoxic reactor, nitrification reactor, and anoxic / post aeration tank. With the new processing plant coming online, an expansion was needed that would double the wastewater treatment capacity. The owner wanted a system that would adapt to flow and load variations while providing reliable treatment since the plant has a direct discharge permit.

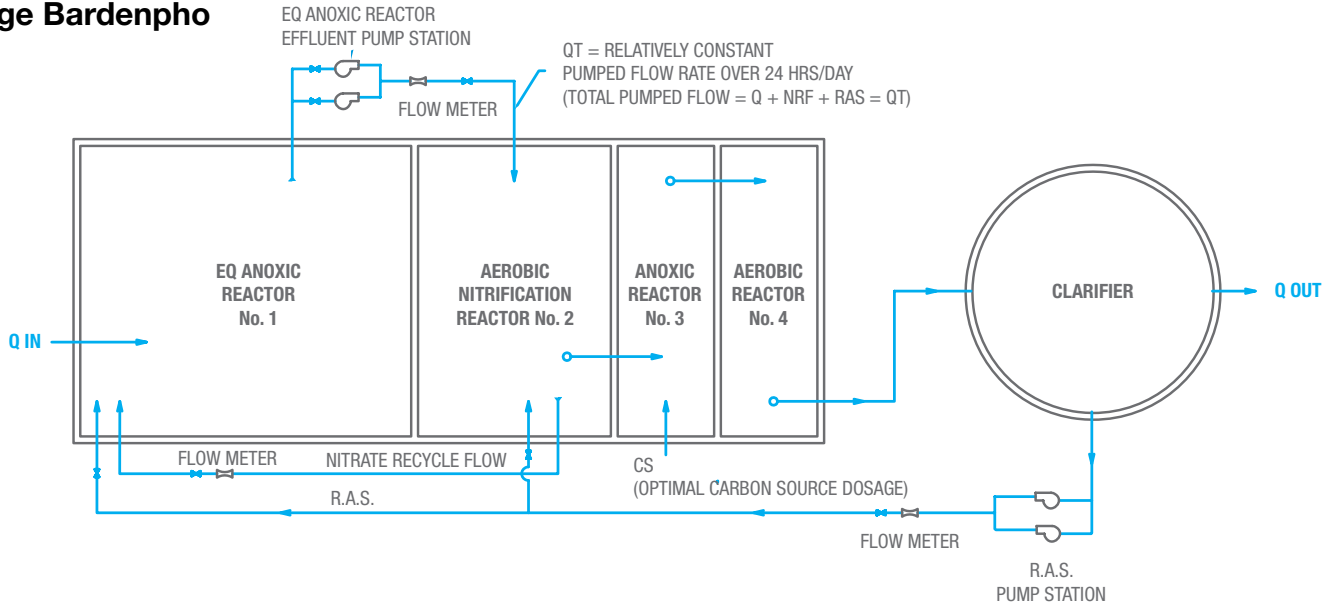
The Solution

Based on positive results the owner was experiencing with their existing EquaReact plant, they elected to go with the same

system to treat the wastewater from the new processing plant. They teamed up with Reid Engineering to design the expansion, just as they had done with the existing plant.

The EquaReact is a four-stage Bardenpho process train that utilizes anoxic, aerobic, post anoxic, post aerobic, and clarification tanks. (*see diagram on following page*) Flow passes through the anoxic tank to an aerated nitrification tank where BOD removal and conversion of ammonia to nitrate occurs. Nitrate from the nitrification reactor is recycled back to the anoxic basin where it is removed from the wastewater by conversion to nitrogen gas. A unique feature of the EquaReact process is the anoxic tank is sized to provide equalization, which helps dampen load variations to the treatment plant. Adequate retention time provided within the EQ anoxic reactor allows the oxidation of some raw BOD by the nitrate that's recycled back from the nitrification reactor. This reduces the BOD load which needs to be treated in the nitrification reactor, resulting in lower aeration demand and less energy consumption. Combining the equalization and anoxic functions in a single tank also reduces overall construction cost and footprint.

EquaReact®
4 Stage Bardenpho



A final tank with partition wall was designed to provide post anoxic and post aerobic polishing prior to flow entering the secondary clarifier. Flow first passes through the post anoxic zone where methanol is added to facilitate removal of remaining nitrate, and subsequently moves through underflow baffles into the final aeration zone where air is added to polish residual BOD prior to clarification.

Reliability

Parkson's VariOx™ jet aeration systems were installed in the anoxic, nitrification, and post anoxic basins. The systems were designed to provide complete mix with or without air from the blowers. This allows the anoxic tank to be mixed in an anoxic condition and allows for variable air flow based on dissolved oxygen levels to be used in the nitrification basin to prevent over-aeration and optimize power consumption. The jets aerators are constructed of fiberglass reinforced plastic (FRP) which is not subject to wear or degradation, allowing oxygen transfer efficiency to be maintained over the life of the system (which can be greater than 25 years). They utilize a combination of motive liquid flow provided by pumps, plus air flow provided by blowers. The pumps and blowers are located outside of the treatment basins to ease operation and maintenance with minimal downtime during maintenance.



VariOx jet aeration in nitrification reactor

The Results

The Parkson EquaReact® system was designed to meet the following effluent parameters:

| Pollutant | Concentration (mg/l) |
|-----------|----------------------|
| BOD | <20 |
| NH3-N | <3.0 |
| NO2-N | <8.4 |
| TP | <8.4 |
| O&G | <2.0 |

The system was put into operation at the new plant in November 2021. Since then, the plant has been achieving all its permit limits.



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