



NICHOLAS MEAT INFORMATION BRIEF

Recycling Water

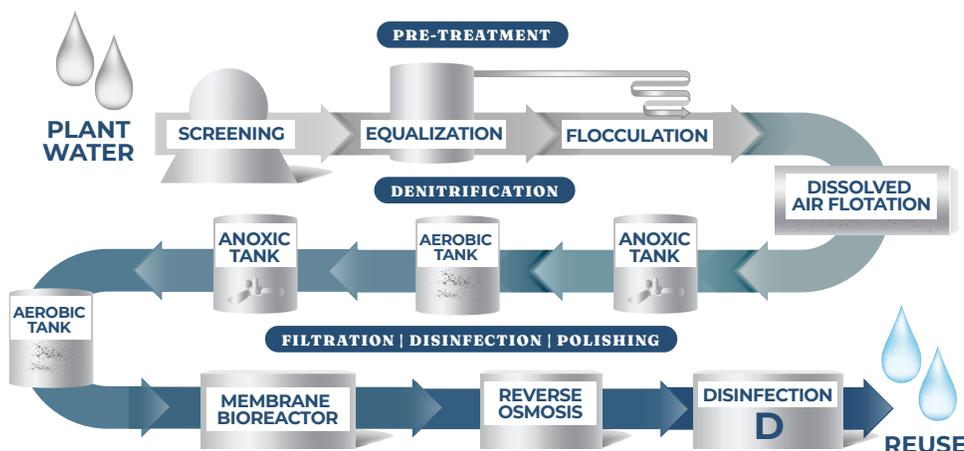
How will water be recycled through the Sustainable Resource Facility?

Recycling water (also known as water reuse or water reclamation), according to the Environmental Protection Agency (EPA), is the practice of reclaiming water from a variety of sources, treating it, and reusing it for beneficial purposes such as agriculture and irrigation, groundwater replenishment, industrial processes, and environmental restoration. The EPA states, “Water reuse can provide alternatives to existing water supplies and be used to enhance water security, sustainability and resilience.”

These benefits, as referenced by the EPA, are at the focus of the Nicholas Meat Sustainable Resource Facility (SRF). This first-of-its-kind facility for the U.S. meat processing industry features award-winning waste-to-energy and water reuse technology and is being constructed on a 40-plus acre site, located across Hwy. 80 from the main Nicholas Meat facility by Loganton, Penn.

Process water, which is water that has been used in the processing facility, will be piped from the plant to the SRF to undergo advanced treatment including biological denitrification, disinfection and reverse osmosis. This will enable Nicholas Meat to reuse up to 90 percent of the water within our meat processing operations.

Water Treatment & Reuse Process



Understanding the Terms

Pre-Treatment: The initial processes to prepare the waste stream for subsequent treatment.

Screening: Screening removes larger particles.

Equalization: The process to make wastewater a homogenized mix, i.e. equalizing the characteristics of the wastewater.

Flocculation: The process to cause suspended particles to group together for easier removal from the wastewater solution.

Dissolved Air Flotation: The process to float and remove solids, oil, and grease from the waste stream.

Nitrification/Denitrification: The process whereby nitrogen is removed from the wastewater.

Anoxic Tank: A tank where no free oxygen exists, only bound oxygen. In this tank heterotrophic bacteria convert nitrate (NO_3) to nitrogen gas (N_2) i.e.: denitrification.

Aerobic Tank: A tank whereby aeration is used to convert ammonium to nitrate, i.e.: nitrification.

Polishing: The process to remove organic constituents not removed in filtration.

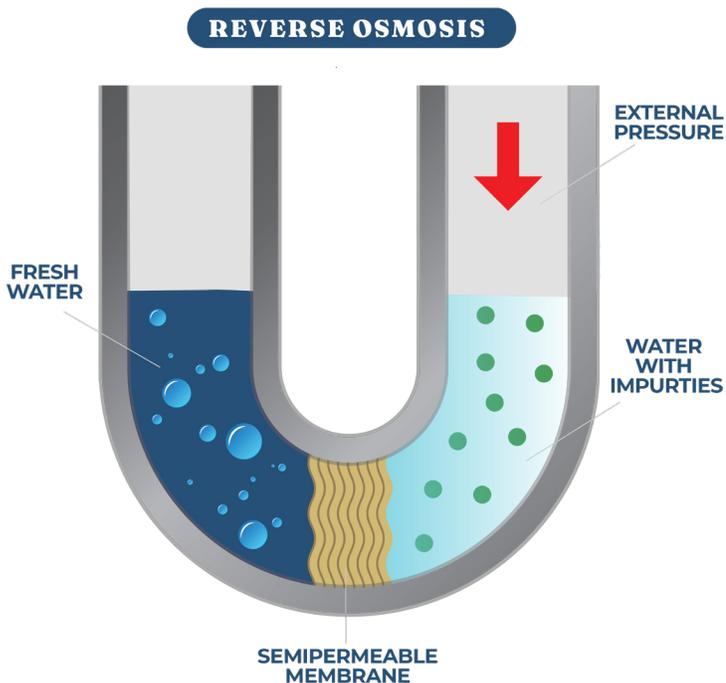
Membrane Bioreactor: A filter designed to remove suspended solids from wastewater.

Reverse Osmosis: A finer membrane filter designed to remove dissolved solids from water.

Disinfection: The process designed to kill or inactivate microorganisms in water.

What is Reverse Osmosis?

Reverse osmosis is a purification process that uses a membrane to filter the water and remove any impurities. The membrane contains thousands of very tiny holes that are just large enough to allow water molecules through. Anything that's larger than a water molecule is trapped by the membrane. The smallest forms of bacteria are approximately 0.2 microns in size. This is very small, but still much bigger than a water molecule which is approximately .0001 microns in size. The holes in reverse osmosis membranes are slightly larger, thus allowing water to push through while all other content is removed. This process produces purified water.



What is Nitrification and Denitrification?

In biological water purification, nitrification plays an important role in removing nitrogen from wastewater. That is followed by denitrification.

Nitrification is a phase in the nitrogen cycle in which living organisms oxidize ammonia in soil or wastewater to useful nitrogen forms that are then consumed by different species of organisms.

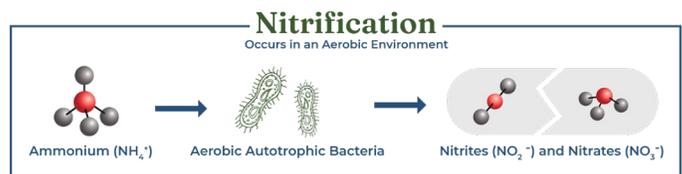
Denitrification is like nitrification. It is a microbial process performed by various kinds of

microorganisms. In biological water treatment, denitrification is generally the next step following nitrification.

A large quantity of aerobic bacteria is able to perform denitrification. When there is no oxygen in the water, these bacteria use nitrates and nitrites as a source of oxygen.

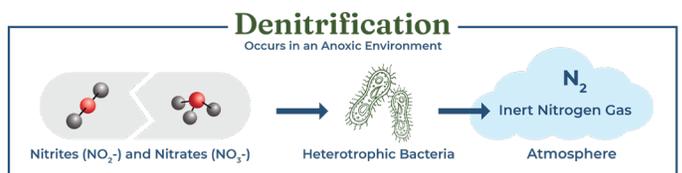
Nitrification

- Nitrogen occurs in wastewater usually as ammonium (NH_4^+) or bonded in organic compounds.
- The transformation of ammonium into nitrate (nitrification) occurs by two bacterial species.
- Occurs in an Aerobic environment.



Denitrification

- Nitrate-nitrogen ---> nitrogen gas
- Bacteria use chemically bound O_2 in lieu of dissolved oxygen
- Anoxic environment
- Heterotrophic bacteria (organic matter)
- Temperature dependent
- Rate impacted by carbon source



You can also learn more

about water reuse by visiting this website:

<https://www.epa.gov/waterreuse>

Basic Information about Water Reuse | US EPA

LEARN MORE ABOUT HOW NICHOLAS MEAT IS DEDICATED TO A SUSTAINABLE SUGAR VALLEY AT:

www.NicholasMeats.com