

Wastewater Terms

GRANT WEAVER, PE & WASTEWATER OPERATOR
PRESIDENT, THE WATER PLANET COMPANY

Aerobic. In the presence of air (free oxygen). Aeration tanks are aerobic as a result of the introduction of air.

Alkalinity. A measure of the buffering capacity of water. That is, the ability of water to maintain pH. Waters with high alkalinity are well buffered and because of this provide a more consistent habitat for sensitive bacteria. Water with low alkalinity is poorly buffered and subject to potentially toxic pH swings. Nitrifying bacteria need an alkalinity of approximately 60 mg/L to remain active.

Ammonia. A form of nitrogen. In wastewater, ammonia (NH_3) is typically present as ammonium (NH_4), the chemical form Water Planet uses in most materials. Ammonia (NH_4) is created by the breakdown of the organic nitrogen forms of urea and fecal material.

Ammonification. An anaerobic biological process that converts organic nitrogen to ammonia (NH_4).

Anaerobic. Absent air.

Anoxic. Minimal air: not enough to support aerobic treatment, but too much air to allow for anaerobic bacteria (strict anaerobes) to thrive.

BOD. Biochemical Oxygen Demand. A measure of organic pollution. The amount of oxygen a sample of water will consume over a period of five days. Nitrifying bacteria thrive in environments low in BOD, denitrifying bacteria need a high BOD loading to live. Phosphate accumulating organisms (PAOs) need as much as 25-times as much BOD as there is soluble phosphorus (ortho-P) to support biological phosphorus removal.

Denitrification. The biological conversion of nitrate (NO_3) to nitrogen gas (N_2).

F:M Ratio. Food to Microorganism Ratio. An expression used to describe the quantity of organic waste that bacteria consume during the wastewater treatment process. The higher the F:M Ratio, the more BOD that exists for every unit of Mixed Liquor.

Fermentation. Incomplete anaerobic digestion that produces volatile fatty acids. VFAs are necessary for biological phosphorus removal and are a very good source of BOD for biological nitrogen removal.

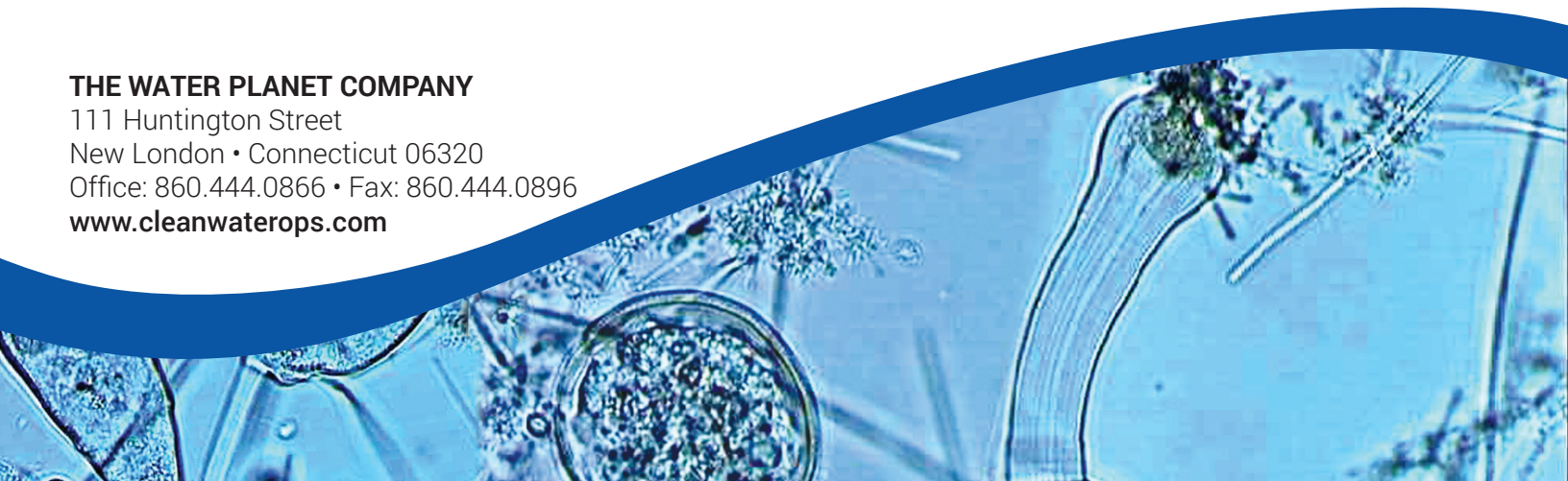
Hydrolysis. Another word for Ammonification.

MGD. Million Gallons per Day. A measure of flow. Wastewater flows are typically reported in "millions of gallons per day." Much like the term "miles per hour," MGD is used for any period of time: week, day, hour, or even instantaneous.

MCRT. Mean Cell Residence Time. An expression used to describe the average age of bacteria in a wastewater treatment plant. Similar, but not identical to Sludge Age.

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mg/L. Milligrams per Liter. A metric measure of concentration. Because one liter of water weighs 1,000,000 milligrams, one mg/L is equivalent to one part per million, PPM.

Mixed Liquor. The bacteria in an aeration tank.

MLSS. Mixed Liquor Suspended Solids. A measure of concentration of the bacterial population in a wastewater treatment plant aeration tank that includes organic and inorganic matter.

MLVSS. Mixed Liquor Volatile Suspended Solids. A more precise measure of concentration of the bacterial population in a wastewater treatment plant aeration tank that includes organic matter only. The MLVSS concentration is typically approximately 80% of the MLSS.

Nitrate. A form of nitrogen. In wastewater, nitrate (NO_3) is created by the aerobic breakdown of ammonia (NH_4).

Nitrification. The biological conversion of ammonia (NH_4) to nitrate (NO_3). Nitrite (NO_2) is an intermediate compound in nitrification: ammonia (NH_4) is converted to nitrite (NO_2), nitrite (NO_2) is converted to nitrate (NO_3).

Nitrite. A form of nitrogen. In wastewater, nitrite (NO_2) is an intermediate chemical compound that is formed during nitrification and denitrification. Chlorination disinfection becomes difficult when effluents contains more than 0.5 mg/L nitrite (NO_2) because each one mg/L of nitrite (NO_2) uses five mg/L of free chlorine.

Nitrogen. The chemical element "N." Nitrogen exists in any number of chemical forms: organic-Nitrogen, ammonia (NH_4), nitrite (NO_2), nitrate (NO_3), and nitrogen gas (N_2).

Nitrogen Gas. A form of nitrogen. In wastewater, nitrogen gas (N_2) is by the anaerobic breakdown of nitrate (NO_3). Nitrogen gas (N_2) bubbles into the atmosphere. Air is primarily nitrogen and a lesser amount oxygen.

ORP. Oxygen Reduction Potential. The ORP meter is an instrument for measuring biochemical activity. Positive ORP reading are generally indicative of aerobic conditions; negative ORP readings indicate anoxic and anaerobic conditions.

ortho-Phosphate. The most common form of soluble phosphorus in wastewater. The concentration is generally expressed "as P," but is sometimes reported "as PO_4 ."

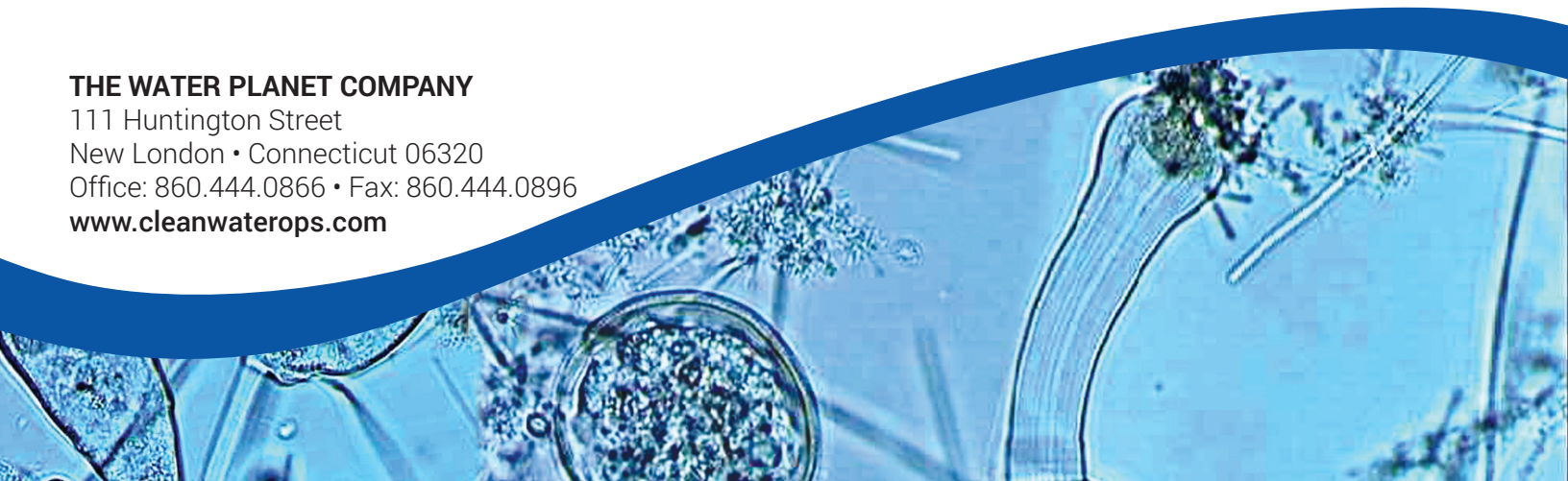
PAO. Phosphate-Accumulating Organism. Bacteria that provide biological phosphorus removal.

PPM. Parts per Million. A measure of concentration. Ten thousand "parts per million" equals one percent.

Phosphorus. The chemical element "P." Phosphorus exists in any number of chemical forms; however in wastewater the most common form by far is phosphate, specifically ortho-phosphate.

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Phosphate. A group of phosphorus chemicals of which ortho-phosphate is by far the most common in municipal wastewater treatment.

Sludge Age. An expression used to describe the average age of bacteria in a wastewater treatment plant. Similar, but not identical, to MCRT.

TKN. Total Kjeldahl Nitrogen. A laboratory test that measures a combination of ammonia (NH_4) and organic nitrogen.

TSS. Total Suspended Solids. A measure of particulate pollution, TSS describes the amount of particulate matter than can be filtered out of water.

total-Nitrogen. The sum of TKN [ammonia (NH_4) plus organic-nitrogen], nitrate (NO_3) and nitrite (NO_2).

Total-Phosphorus. A sum of all phosphorus components.

VFAs. Volatile Fatty Acids. Compounds formed during anaerobic fermentation that are useful as carbon sources for denitrification and as a treatment aids for biological phosphorus removal. The most common VFAs are acetic acid, propionic acid, and butyric acid, isobutyric acid, valeric acid, and isovaleric acid.

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