

# Understanding Wastewater Permit Parameters

The Environmental Protection Agency (EPA) and the Mississippi Department of Environmental Quality (MDEQ) work together to monitor compliance with the Clean Water Act (CWA) and Mississippi Code, which regulate municipal wastewater systems. The goal of this publication is to define the measured and treated parameters of a municipal wastewater system and explain why treatment and management are important to the municipality.

The Clean Water Act of 1972 created a basic model for regulating discharges of pollutants into U.S. water, measuring surface water quality, and developing water quality standards. Through the National Pollutant Discharge Elimination System (NPDES) program, the EPA regulates wastewater management through a series of parameters. These regulations are applicable to industrial facilities and municipalities that discharge from point sources to surface waters.

When water is used by citizens in a typical residential setting, it becomes contaminated with pollutants and is commonly referred to as domestic wastewater. Pollutants in domestic wastewater must be removed to protect the environment and human health. Municipalities must provide proper operation of wastewater treatment facilities to ensure the treatment and removal of pollutants. Budgeting and having a quality maintenance program are vital to a facility's operational success.

To avoid costly equipment breakdowns, wastewater systems should establish an efficient preventive maintenance schedule. A quality operation and maintenance program for the wastewater system is able to identify breakdown issues before they occur, further equipment life, reduce the overall costs to citizens, and address the professional development of system managers and operators.

Mississippi has 298 incorporated municipalities. The majority of these municipalities own and operate their own wastewater

treatment facilities<sup>1</sup> (WWTF) and operate under an NPDES permit. A WWTF must be permitted by the MDEQ every 5 years. The permit allows a WWTF to discharge wastewater in accordance with the NPDES. In certified wastewater operator circles, the permit is referred to as the NPDES permit or simply "the permit." The NPDES permit allows the municipality to discharge its wastewater with certain effluent<sup>2</sup> limitations and monitoring requirements based on the treatment technology used and the water quality conditions in the receiving stream. There are additional factors that determine the effluent limitations and monitoring requirements, but the majority of NPDES permits contain similar parameters that must be met. These are defined below.

## Definition of Parameters

**Flow** = The amount of wastewater discharged from a wastewater facility. Flow is reported in units of million gallons per day (MGD).

**pH** = Power of hydrogen, or the hydrogen ion concentration in a solution. Indicates whether a substance is acidic or alkaline (basic). A pH of 7 is neutral. Values less than 7 are acidic, and values greater than 7 are alkaline (basic).

**DO** = Dissolved oxygen, or the free oxygen dissolved in water or wastewater. DO is reported as concentration of milligrams per liter (mg/L). The typical permit limit is 6.0 mg/L.

**BOD** = Biochemical oxygen demand, which is an indirect measure of the organic strength of wastewater. This is based on the amount of oxygen used by microorganisms (bacteria) over a 5-day period. BOD is reported as the concentration of mg/L and pounds per day. Limits may range from 2 mg/L to 45 mg/L depending on the water quality conditions in the receiving stream and wastewater treatment technology used.

<sup>1</sup> A wastewater treatment facility may also be referred to as a publicly owned treatment works (POTW). POTW is a term used in the United States for a sewage treatment plant that is owned, and usually operated, by a local government agency, and that is usually designed to treat domestic sewage and not industrial wastewater. Source: Primer for Municipal Wastewater Treatment Systems, United States Environmental Protection Agency, September 2004, 4 & 16.

<sup>2</sup> Effluent is best described as the final product of all earlier treatment processes, and it can be discharged to a stream, river, bay, lagoon, or wetland. Source: Cal Poly Humboldt.

**TSS** = Total suspended solids, or the solid matter suspended in wastewater that will not pass through a filter. Consists of both organic and inorganic solids. TSS is reported as concentration of mg/L and pounds per day. Typical permit limits are 30–90 mg/L.

**Ammonia Nitrogen** = A measure of the amount of ammonia in the wastewater. Ammonia creates an oxygen demand in the receiving stream. It can produce a toxic effect in low-flow receiving streams. Limits may range from 1 mg/L to 13 mg/L depending on the water quality conditions in the receiving stream.

**Total Nitrogen** = Combination of all nitrogen (nitrogenous) compounds. Not all permits have limits; some are required to simply monitor and report.

**Phosphorus** = A nutrient used by organisms to grow. Not all permits have limits; some are required to simply monitor and report.

**Fecal Coliform** = Bacteria found in the intestinal tract of humans and animals. Indicates the possible presence of pathogens. Reported as number of colonies per 100 ml of sample. Typical permit limits are 200 colonies/100 ml (dry) and up to several thousand/100 ml (wet). MDEQ will soon replace Fecal Coliform with E. Coli.

**Chlorine Residual** = The amount of chlorine remaining in wastewater after disinfection. Report total residual (free + combined). Permit limits range from 0.011–1.0 mg/L maximum, depending on the water quality conditions in the receiving stream.

## Parameter Importance to a Municipality

It is clear that one important reason to care about correctly operating and maintaining a municipal wastewater system is the simple fact that it is the law. Beyond federal and state laws, water is the most critical life-sustaining substance, and everyone should do their part to keep waters clean and safe.

The basic function of a wastewater treatment facility is to speed up the natural processes by which water is purified. In early years, natural treatment processes in streams and lakes were adequate to perform basic wastewater treatment, but, as the population and industry have grown to their present sizes, increased levels of treatment before discharging domestic wastewater have become necessary.<sup>3</sup>

To ensure sufficient water resources for drinking, industrial uses and recreational purposes, it is necessary to put clean water back into the environment. Doing so will protect our remaining freshwater resources and the people and other organisms that depend on clean water to survive. It is not only important to secure clean water now, but for all subsequent generations.

<sup>3</sup> Source: Primer for Municipal Wastewater Treatment Systems, United States Environmental Protection Agency, September 2004, 5.

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