

2. effluent from a septic tank or other pretreatment component that has BOD₅ greater than 170 mg/L; and/or TSS greater than 60 mg/L; and/or fats, oils, and grease greater than 25 mg/L and is applied to an infiltrative surface.

Biochemical Oxygen Demands (BOD₅), Dissolved Oxygen, and Total Suspended Solids (TSS)

Biochemical oxygen demand (BOD₅) is the most widely used parameter applied to wastewater. BOD₅ is a measure of the dissolved oxygen required by microorganisms to oxidize or decompose the organic matter in wastewater. A typical BOD₅ value for septic tank effluent is 150 milligrams per liter. For a Type I system, the BOD₅ limit is 170 milligrams per liter.

When the dissolved oxygen (DO) contained in septic tank effluent is measured, it is usually very low, typically one milligram per liter. While DO in water can be as high as 12 milligrams per liter, the microorganisms in the septic tank normally use up any available oxygen to break down organic matter.

Total suspended solids (TSS) is a measure of the solids that remain in the wastewater after settling has occurred in the tank. A typical TSS value is 60 milligrams per liter. BOD and total suspended solids together measure the strength of the wastewater. They can serve as an indicator of system performance. Table 5.8 identifies estimated BOD for other establishments. The data is taken from a CIDWT Publication entitled, Analyzing Wastewater Treatment Systems Serving Residential and Commercial Facilities for High Strength and Hydraulic Loading, 2008. You can calculate the estimated concentration of BOD₅ by using the following equation:

$$\text{Concentration (mg/L)} = \# \text{ lbs BOD}_5 \div Q(\text{gpd}) \div 8.35 \times 1,000,000$$

TABLE 5.8 Estimate of Waste Strengths from Other Establishments

Type of Facility	BOD (lbs/unit/day)
Airports	
Per passenger	0.02
Per employee	0.05
Apartment houses- multiple family	0.175/unit
Boarding houses	0.14/person
Bowling alley (no kitchen)	0.15/lane
Camps	
Construction (Semi-permanent)	0.140/person
Day (no meals)	0.031/person
Luxury	0.208/person
Resort - night & day/limited plumbing	0.140/person
Church (no kitchen)	0.02/seat
Country club	0.208/member
Dwelling- single family	0.17/person
Employee/personnel addition	0.04/employee
Factory	
No showers	0.073/employee
With showers	0.083/employee
Hospital	0.518/bed

5-32 ■ SECTION 5: Wastewater Sources and Flows

TABLE 5.8 Estimate of Waste Strengths from Other Establishments (cont'd)

Hotel	0.125 per room/ two person
Mobile home park	0.140/person
Motel	
per bed space	0.083/bed
Per room w/ bath, toilet & kitchen wastes	0.14/person
Nursing home	0.26/person
Office building (no food)	0.05/employee
Park	
toilet wastes only	0.01/person
bathhouses, showers and flush toilets	0.021/person
Restaurant	
Kitchen waste	0.015/meal
Toilet and kitchen waste	0.021/customer
Additional for bars and cocktail lounges	0.01/customer
School, day	0.031/student
Add for gym/showers	0.011/student
Add for cafeteria	0.011/student
School, boarding	0.208/student
Service station	0.021/vehicle served
Shopping center (no food service or laundry)	0.050/employee
Sports stadiums	0.20/person
Stores	0.832/toilet room
Swimming pools and bathhouses	0.021/person
Theaters	
Drive-in	0.010/car space
Indoor	0.010/seat
Trailer Park	0.35/trailer

Types of BOD

Biochemical Oxygen Demand

BOD or Biochemical Oxygen Demand is the quantity of dissolved oxygen consumed by microorganisms during the microbial and chemical oxidation of the constituents contained in a wastewater sample during an incubation period at a given temperature. The biochemical oxygen demand represents the oxygen utilized during the oxidation of both carbon and nitrogenous compounds.

Biochemical Oxygen Demand (BOD₅)

BOD₅ or Biochemical Oxygen Demand – 5-day is the quantity of dissolved oxygen consumed by microorganisms during the breakdown of organic matter in a wastewater sample during a 5-day incubation period and measured in mg/L at 20°C. It is used as a means to describe the amount of organic matter present in the water.

Biodegradable organic matter is provided in terms of pounds of BOD₅ per person (capita) per day by using the BOD₅ concentration and daily flow. Biochemical oxygen demand is a measure of the oxygen required by bacteria, chemicals, and other organisms to break down organic matter over a five day period. It is an indicator of the overall strength of the wastewater. Most designs assume that all residential sources generate a concentration of 300 mg/L of BOD₅, and after pretreatment in a properly sized septic tank the BOD₅ is reduced to approximately 170 mg/L (Table 5.7). However, these concentrations can vary from site to site.