Dry Weather Field Screening

&

Illicit Discharge Detection and Elimination

Guide

Equipment & Parameters:

YSI 556

* Dissolved Oxygen
* Temperature
* Conductivity
* Salinity
* pH
* Oxidation Reduction Potential
* Total Dissolved Solids

HACH

* Acidity
* Alkalinity
* Ammonia
* Carbon Dioxide
* Hardness
* Nitrite
* Nitrate
* Chloride
* Chlorine

Acidity

“\_\_\_ mg CaCO3/L to pH \_\_\_.”

Acidity is a measure of a solution’s capacity to react with a strong base (usually sodium hydroxide, NaOH) to a predetermined pH value. This measurement is based on the total acidic constituent of a solution (strong and weak acids, hydrolyzing salts, etc.) It is possible to have highly acidic water but have moderate pH values. Likewise, the pH of a sample can be very low but have a relatively low acidity. Acidity is similar to a buffer in that the higher the acidity, the more neutralizer is needed to counteract it.

Alkalinity

“\_\_\_ mg CaCO3/L to pH \_\_\_.”

Alkalinity is not a pollutant. It is a total measure of the substances in the water that have acid neutralizing ability. It buffers against pH changes and makes water less vulnerable to acid rain.

Ammonia

mg/L

Ammonia may speed the process of eutrophication in waterways. It is toxic to fish and aquatic organisms, even in low concentrations. The higher the pH and the warmer the water temp, the more toxic ammonia is. When water has low DO and Carbon Dioxide ammonia is much more toxic. Ammonia is much higher in sewage

Polluted waters: 0.1mg/L or greater

Aquatic life suffers/die at: .06 mg/L

Carbon Dioxide

mg/L

When Carbon dioxide levels are high and DO levels are low, fish have trouble respiring. This problem becomes worse as temperatures rise. Carbon dioxide quickly combines in water to form carbonic acid, a weak acid. The presence of carbonic acid in waterways may be good or bad depending on the water’s pH and alkalinity.

Fish avoid waters at: 1.0 to 6.0 mg/L

30mg/L kills the most sensitive fish immediately

Chloride

ppm or µg/L by dividing by 1000

The chief source of chloride pollution is the salt used on our roadways during the winter. Other sources include industrial waste and sewage from residential areas. Chlorides can harm vegetation in concentrations over 1000ppm.

EPA Recommended value: 230mg/L

Chlorine

mg/L

Chlorine is an excellent disinfectant and is commonly added to most drinking water supplies in the U.S. Chlorines become more toxic as the pH level of the water drops. It becomes more toxic when it is combined with other toxic substances such as cyanides, phenols, and ammonia.

Maximum for all fish and aquatic life: 0.01 mg/L or less

Conductivity

µS/cm

Measures the electrical conductance of water. The amount of dissolved material in the water determines the waters ability to conduct electricity. TDS is measured by recording conductivity. Conductivity goes up as the amount of total dissolved solids (salts and minerals) in the water increases.

North Canadian value: 1100 µS/cm

Dissolved Oxygen

mg/L = parts per million or & saturation

DO is a sensitive parameter because physical factors such as temperature and water clarity exert a major influence on availability. Warmer water holds less DO. DO also decreases with increasing salinity. Too much aquatic life or bacteria may overpopulate and deplete DO. DO is cyclical. It will typically be high in the day and low at night due to respiration of plant life.

For daytime 80% saturation is good. Night time 10-20%

 North Canadian value: 9.32 mg/L

Aquatic organisms stressed and die at: 3 to 5 mg/L

Hardness

mg/L of CaCO3.

Total hardness is defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate, in milligrams per liter.

 *Levels:*

Soft: 0 - 20 mg/L as calcium

Moderately soft: 20 - 40 mg/L as calcium

Slightly hard: 40 - 60 mg/L as calcium

Moderately hard: 60 - 80 mg/L as calcium

Hard: 80 - 120 mg/L as calcium

Very Hard >120 mg/L as calcium

Nitrate

mg/L

Nitrates get into the waterways from fertilizer run off, leaking septic tanks, animal wastes and discharge from car exhausts. Nitrates stimulate the growth of algae and if algae grow too wildly DO will be reduced and result in fish kills.

Background levels are around .6 mg/L

Nitrite

mg/L

Relatively short lived because they’re quickly converted to nitrates by bacteria. Produce a serious illness (brown blood disease) in fish, even though they don’t exist for very long in the environment.

No effect on warm water fish: 0.5 mg/L or below

Oxidation Reduction Potential (ORP)

mV (millivolts) *-*1200mV to 1200 mV

ORP is not a measure of concentration, but of activity level. The higher the ORP level the more ability the water has to destroy foreign contaminants such as microbes, or carbon based contaminants. As ORP goes up the coliform count goes down.

ORP Levels:

400-475 Swimming pools

600 Water disinfection

800 Water sterilization

pH

In streams, the water’s pH is affected by the chemicals discharged by communities and industries. When acid waters come into contact with certain chemicals and metals, they often make them more toxic

Edmond wastewater: 7.0

Salinity

ppm

Salinity is the saltiness or dissolved salt content of a body of water.

 Fresh water: less than 450ppm or less than .05%

Temperature

Celsius or Fahrenheit

Variables that affect temperature include: color of water, depth, shade amount, latitude, time of year, feeding waterbody, volume of water, temperature of effluents. Warm water also makes some substances such as cyanides, phenol, xylene, and zinc more toxic for aquatic life.

North Canadian value: 17C or 62F

Edmond Wastewater: 20C

Aquatic organisms stressed and die at: 32-35C or 89-95F

Conversions

Celsius = (°Fahrenheit - 32.0) / 1.8

Fahrenheit = 32.0 + 1.8 \* °Celsius

Total Dissolved Solids (TDS)

mg/L

Total dissolved solids (TDS) is an expression for the combined content of all [inorganic](http://en.wikipedia.org/wiki/Inorganic) and [organic](http://en.wikipedia.org/wiki/Organic_compound) substances contained in a liquid which are present in a molecular, ionized or micro-granular suspended form. Electrical conductivity of water is directly related to the concentration of dissolved ionized solids in the water. Ions from the dissolved solids in water create the ability for that water to conduct an [electrical current](http://en.wikipedia.org/wiki/Electrical_current), which can be measured using a conventional conductivity meter. TDS may reduce water clarity, contribute to a decrease in photosynthesis, combine with toxic compounds and heavy metals, and lead to an increase in water temperature.

Tolerable range: 1000 mg/l or less