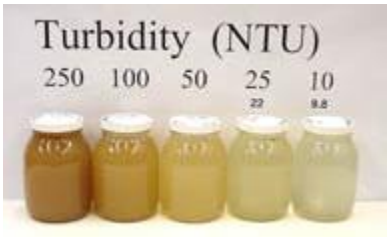
Turbidity



What is turbidity?

If you've ever visited the Colorado River you were probably able to see only about 30 centimeters (~1 ft) beneath the water's surface. On the other hand, if you visit some lakes in Alaska, you will see 30 meters (100 ft) below the surface! The amount of material suspended in the water – soil (sediment), microorganisms, pollution – affects how deeply light can penetrate. We call this material **suspended solids**. The Colorado River has more suspended solids in it than the Alaskan lakes and so light cannot penetrate as deeply.

The degree to which light penetration is blocked by suspended solids is called **turbidity.** Turbidity tells us how much material is suspended in the water. Common types of suspended solids include small pieces of soil, plant material, industrial waste, and microorganisms. Any natural or artificial process that places suspended matter in water causes turbidity.

Why do we care about turbidity?

If a stream's turbidity increases beyond natural levels, it loses its ability to support life that has adapted there.

- Suspended solids prevent sunlight from reaching aquatic plants that grow on the stream bottom.
- Without light, photosynthesis cannot take place, which may reduce the concentration of dissolved oxygen in the water. Dissolved oxygen is necessary for the survival of fish and other aquatic life.
- Turbidity can raise the surface water temperatures of ponds and lakes because suspended sediment absorbs heat.
- Turbidity makes it difficult for fish to see their prey.
- Heavy loads of suspended solids can also clog fish gills and filter-feeding devices of aquatic **macroinvertebrates**.
- As solid matter settles, it may cover and harm bottom-dwelling plants, animals and spawning beds for fish such as trout.
- All streams have a natural level of turbidity. While some forms of aquatic life need clear water to survive, other aquatic species are adapted to and thrive in high turbidity. The Colorado River is very turbid, yet its waters hold abundant life.

How do we interpret our results?

To compare our results with state standards, we need to convert the distance measured with the turbidity tube to standard turbidity units. Because turbidity is usually measured with an instrument called a nephelometer, the turbidity unit is a **NTUs** (Nephelometric Turbidity Units). The higher the turbidity (NTUs) the greater the amount of scattered light, or the cloudier the appearance. Use the conversion chart on the back of the field directions.

- An increase of more than 10 NTUs over natural levels is considered unacceptable for: aesthetics, warm-water fisheries, coldwater fisheries, drinking water and non-game aquatic life
- An increase of more than 15 NTUs over natural levels is considered unacceptable for: Water oriented wildlife

Conductivity

What is conductivity?

Solids found in streams come in two forms, suspended and dissolved. Suspended solids (turbidity) include silt, stirred up bottom sediment, decaying plant matter, or sewage treatment effluent. Dissolved solids in freshwater samples include sodium, magnesium, calcium, iron and aluminum. The presence of these **dissolved solids** affects the water's ability to pass an electrical current. Conductivity is the measurement of the water's ability to **pass an electrical current**.

Why do we care about conductivity?

If conductivity levels are high, especially due to dissolved salts, many forms of aquatic life are affected. The salts act to dehydrate the skin of animals. High concentrations of dissolved solids can add a laxative effect to water or cause the water to have an unpleasant mineral taste. It is also possible for dissolved ions to affect the pH of a body of water, which in turn may influence the health of aquatic species.

How do we interpret our results?

Conductivity values in lakes and streams are typically found to be in the range of 50-1,500 µS/cm. Stream supporting a good mix of fisheries range between 50 – 500 µS/cm.

- A high reading is not necessarily an indication that a stream is polluted or unhealthy. It is normal for streams to dissolve and accumulate fairly high concentrations of ions from the minerals in the rocks and soils over which they flow.
- Further tests can help to determine the specific ion or ions that contributed to changes in the initial conductivity reading (such as fertilizers from fields or lawns, wastewater treatment plants, acid rain, or salt from roads in the winter).