Near North Laboratories Inc.

Environmental Services
• Accredited by CALA for specific tests
• Licensed by the Ontario Ministry of Environment for Specific Drinking Water Analyses

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Analysis Interpretation Guide – 50 Parameter

Alkalinity

Ideal range is between 30 - 500 mg/L as CaCO3. Water that exceeds 500 mg/L as CaCO3 will form a deposit when boiled and cause an unpleasant taste. Less than 30 mg/L as CaCO3 will corrode plumbing and may cause iron to dissolve.

Appearance

Appearance is an important aesthetic consideration for drinking water. The first notation refers to water clarity and the second notation refers to coloration and particulates.

Bromide

Bromine (Bromide) is found in sea water and exists as the Bromide ion at a level of about 65 mg/L. Bromine has been used in swimming pools and cooling towers for disinfection, however use in drinking water is not recommended. Bromine is extremely reactive and corrosive, and will produce irritation and burning to exposed tissues. There is no maximum limit.

Chloride

Chloride can be the source of an unpleasant taste and high levels may indicate contamination from roads and septic systems. Can corrode pipes. Levels 5 - 20 mg/L are ideal for drinking water.

Conductivity (measured)

Conductivity is a measure of ionic activity (ability of water to conduct a current). It is used to verify chemistry results. Natural water ranges between 50 - 1500 us/cm.

Dissolved Organic Carbon (DOC)

The aesthetic objective for dissolved organic carbon (DOC) in drinking water is 5 mg/L. High DOC is an indicator of possible water quality deterioration during storage and distribution due to the carbon being a growth nutrient for biofilm dwelling bacteria. High DOC is also an indicator of potential chlorination by-product problems. Coagulant treatment or high pressure membrane treatment can be used to reduce DOC.

Fluoride

Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5 - 0.8 mg/L, the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L mg/L but less than 2.4 mg/L the Ministry of Health and Long-Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive

exposure to fluoride from other sources. Levels above the MAC must be reported to the local Medical Officer of Health.

Hardness

Hardness usually indicates a presence of calcium and magnesium. High levels (greater than 120 mg/L) indicate "hard" water and prevent the foaming of soaps and detergents and also cause scaling in pipes. Ideally between 80 - 100 mg/L (4.7 to 5.9 grains). 1 grain = 17 mg/L = 17 ppm

Nitrate

Nitrate comes into water supplies through the nitrogen cycle rather then via dissolved minerals. It is one of the major ions in natural waters. Most Nitrate that occurs in drinking water is the result of contamination of ground water supplies by septic systems, feed lots, and agricultural fertilizers. The maximum level for Nitrate is 10 mg/L.

Nitrite

Nitrite enters the water supply the same way as Nitrate but is a possible danger for children and the elderly if the levels are higher then 1mg/L

Nitrate + Nitrite

Nitrate + Nitrite levels exceeding 10 mg/L should be cause for immediate inspection of water system/sources. Indicates seepage from septic systems or contamination from animals and agricultural waste.

pH

pH below 6.5 indicates potential for corrosion of pipes and above 8.5 indicates encrustation of pipes.

Phosphorous – ortho

Orthophosphates applied to agricultural or residential cultivated land as fertilizers are carried into surface waters and to a lesser extent with melting snow. There is no set maximum limit. High levels of ortho phosphate in wells may be an indicator of contamination from surface water runoff.

Sulfate

Sulfate is typically low in natural waters with the exception of sources near industries. Sulfate can also come from geological deposits. Can cause noticeable taste and smell. Can also cause health disorders at levels greater than 500 mg/L.

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Sulfide

The odour related aesthetic objective for sulfide in drinking water is 0.05 mg/L as hydrogen sulphide. Although ingestion of large quantities of hydrogen sulfide gas can produce toxic effects on humans, it is unlikely that an individual would consume a harmful dose in drinking water because of the associated unpleasant taste and odour. Sulfide is also undesirable in water supplies because, in association with iron, it produces black stains on laundered items and black deposits on pipes and fixtures. Lower levels of sulfide can be removed effectively from most well water by aeration. Sulfide is oxidized to sulfate in well-aerated waters over a period of hours and consequently sulfide levels in surface supplies are usually very low.

Tannins & Lignins

Tannins may enter the water supply through the process of vegetable matter and vegetation degradation or through the wastes of the tanning industry. There is no set maximum limit. Presence of high concentrations of tannins may be reflective of surface water runoff contaminating a well. Tannins can interfere with iron removal.

Total Dissolved Solids

The aesthetic objective for total dissolved solids in drinking water is 500 mg/L. The term "total dissolved solids" (TDS) refers mainly to the inorganic substances dissolved in water. The principal constituents of TDS are chloride, sulphates, calcium, magnesium and bicarbonates. The effects of TDS on drinking water quality depend on the levels of the individual components. Excessive hardness, taste, mineral deposition or corrosion are common properties of highly mineralized water. The palatability of drinking water with a TDS level less than 500 mg/L is generally considered to be good.

Total Suspended Solids (TSS)

Total suspended solids reflect particles in water greater then 1.5 micro meter in size. Total Solids is the term applied to the material residue left in the vessel after evaporation of a sample and its subsequent drying in an oven at a defined temperature. Total solids include Total Suspended Solids (TSS), the portion of total solids retained by a filter, and Total Dissolved Solids (TDS), the portion that passes through the filter.

Turbidity

Control of turbidity in drinking-water systems is important for both health and aesthetic reasons. The substances and particles that cause turbidity can be responsible for significant interference with disinfection, can be a source of disease-causing organisms and can shield pathogenic organisms from the disinfection process.
Turbidity is an important indicator of treatment efficiency and the efficiency of filters in particular. A significant relationship has been demonstrated between turbidity increases and the number of Giardia cysts and Cryptosporidium oocysts breaking through filters. Operational Guidelines for turbidity as an indicator of the efficiency of filters in relation to credits for Giardia cysts and Cryptosporidium oocysts removal have been provided in the “Procedure for Disinfection of Drinking Water in Ontario”.
The effect of turbidity on disinfection efficiency, including potential for disinfection by-products, is related to the type and nature of the particles in the water. A raw water supply which is surface water or ground water under direct influence of surface water is likely to contain organic particles that cause turbidity and adversely affect disinfection efficiency. A significant factor in the formation of disinfection by-products is the organic or humic component of turbidity.

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Raw water supply which is ground water with very low organic content may contain inorganic-based turbidity, which may not seriously hinder disinfection. For such waters, an Operational Guideline for turbidity is not established. Since ground water quality is inherently stable, any significant variation in turbidity, excluding pump startup, should be investigated and analyzed immediately for the potential of surface water influence and the presence of organic particles.
Inorganic turbidity formed during the disinfection process or post-disinfection treatment processes through oxidation and chemical participation would not likely interfere with disinfection effectiveness. Therefore the most meaningful location for taking a turbidity sample is before the disinfection process and where applicable after filtration.
Turbidity in excess of 5.0 NTU becomes visible to the naked eye and as such a majority of consumers may object to its presence. Therefore, an aesthetic objective of 5.0 NTU has been set for all waters at the point of consumption.

Total Coliform

Total coliform count must not exceed 0 CFU / 100 mL (OMOE ODWS 2003) or water is judged unsafe. Total coliform is used to indicate the possible presence of pathogenic bacteria. If Total Coliform is detected, it is reason to disinfect the water supply. Total coliforms can be naturally found in soils. For further clarification, contact the Public Health Unit or the Ministry of Environment.

Escherichia coli

Escherichia coli must not exceed 0 CFU / 100 mL (OMOE ODWS 2003) or water is judged unsafe. Escherichia coli bacteria (commonly referred to as E. coli) is a bacteria that originates from the feces of warm blooded mammals. It is used to indicate the possible presence of septic contamination. E. coli bacteria should not be detectable in drinking water. If detected the well should be immediately disinfected and then tested several times for bacteria.

Aerobic Bacteria – General Bacteria Population (GBP)

Aerobic bacteria is not considered harmful for drinking. For aesthetic purposes the GBP should not exceed 200 CFU/100 mL as counted from the total coliform test. However, when present, the well should be examined for structural faults and should be decontaminated. All wells should be monitored on a quarterly to semi-annual basis for coliform contamination.

Aluminum

Aluminum in untreated water is present in the form of very fine particles of alumino-silicate clay. These clay particles are effectively removed in coagulation/filtration. Aluminum found in coagulant treated water is due to the presence of aluminum left over from use of the coagulant. Optimization of treatment should be applied to reduce this “residual” aluminum to under the operational guideline of 0.1 mg/L. High residual aluminum can cause coating of the pipes in the distribution system resulting in increased energy requirements for pumping, interferences with certain industrial processes and flocculation in the distribution system.
Medical studies have not provided clear evidence that residual aluminum has any effect on health.

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Antimony

The interim maximum acceptable concentration for antimony in drinking water is 0.006 mg/L. The standard is set to protect against increased blood cholesterol and decreased blood glucose, as well as prevention of nausea, vomiting and diarrhea upon short-term exposure. Antimony is rarely detected in Ontario drinking water.

Arsenic

The interim maximum acceptable concentration for arsenic in drinking water is 0.025 mg/L. Arsenic is a known carcinogen and must therefore be removed by treatment where present at levels over this concentration. Arsenic is sometimes found at higher levels in ground water in hard rock areas (e.g. Canadian Shield) in Ontario through the natural dissolution of arsenic containing minerals, in some mine drainage waters and in some mine leachates. Arsenic is present at very low concentrations in most surface waters.

Barium

The maximum acceptable concentration for barium in drinking water is 1.0 mg/L. Barium is a common constituent in sedimentary rocks such as limestone and dolomite where it is accompanied by strontium and much larger amounts of calcium. As a result, hard water contains small amounts of barium but seldom at concentrations greater than 1 mg/L. Most treatment methods used for water softening are effective for barium removal.

Beryllium

Beryllium is a metal found in natural deposits as ores containing other elements, and in some precious stones such as emeralds and aquamarine. The greatest use of Beryllium is in making metal alloys for nuclear reactors and the aerospace industry. The United States Environmental Protection Agency (EPA) has set the Maximum Level Contaminant Goal at a level of 0.004 mg/L. There is no maximum acceptable level for Ontario.

Boron

The interim maximum acceptable concentration for boron in drinking water is 5.0 mg/L. Boron in water is most commonly found as borate. Acute boron poisonings have resulted from the use of borates as antiseptic agents and from accidental ingestion, however, the amount consumed was much higher than would be encountered through drinking water. Infants, the elderly and individuals with kidney diseases are most susceptible to the toxic effects of boron compounds.

Cadmium (inorganic)

The maximum acceptable concentration for cadmium in drinking water is 0.005 mg/L. Cadmium is a relatively rare element that is extremely unlikely to be present as a significant natural contaminant in drinking water. Cadmium compounds used in electroplated materials and electroplating wastes may be a significant source of drinking water contamination. Other than occupational exposure and inhalation from cigarette smoke, food is the main source of cadmium intake.

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Calcium

Calcium is used as an indication of hardness. It is found naturally and used in some road salts. Excessive amounts cause scaling and greater soap consumption.

Chromium

The maximum acceptable concentration for chromium in drinking water is 0.05 mg/L. Trivalent chromium, the most common and naturally occurring state of chromium, is not considered to be toxic. However, if chromium is present in raw water, it may be oxidized to a more harmful hexavalent form during chlorination. Chromium in the more highly oxidized form may be present in older yellow paints and in residues from plating operations and around old recirculating water cooling systems.

Cobalt

Cobalt is a hard, brittle, grey metal with a bluish tint. It is solid under normal conditions and is generally similar to Iron and Nickel in its properties. In particular Cobalt, like Iron, can be magnetized. There is no set maximum limit for Cobalt.

Copper

Copper is tested for health and aesthetic considerations, it can cause blue-green staining and can lead to health disorders. Typical sources are copper pipes and infiltration from agricultural and industrial areas. Maximum acceptable level is 1 mg/L.

Iron

Iron is the most frequent cause of staining. Usually leaves a reddish - brown precipitation. Can be a source of unpleasant taste in water. Greater than 0.3 mg/L is undesirable.

Lead

The maximum acceptable concentration for lead in drinking water is 0.01 mg/L at the point of consumption. A cumulative poison, ingestion of lead can result in serious illness or death with fetuses, infants, children (up to age six) and pregnant woman being most susceptible to adverse health effects. Lead can enter drinking water, particularly in soft or aggressive water areas, through contact with lead solder or lead service connections. In order to minimize exposure to lead introduced into drinking water from plumbing systems, it is recommended that only the cold water supply be used, after an appropriate period of flushing to rid the system of standing water. Flushing of the water system should be done prior to analytical sampling, drinking, beverage preparation and cooking.

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Magnesium

Magnesium is major component of hardness. High levels can cause discomfort with digestion.

Manganese

Manganese is a frequent cause of staining of laundry (black specks). It can also leave a slimy feel to dishes and cutlery. The Ontario aesthetic maximum acceptable limit is 0.05 mg/L.

Molybdenum

Molybdenum is found naturally in soil and is used in the manufacture of special steels and in the production of tungsten, and pigments. Molybdenum compounds are used as lubricant additives and in agriculture to prevent Molybdenum deficiency in crops. There is no set maximum limit.

Nickel

Nickel is a metal found in natural deposits as ores containing other elements. The greatest use of Nickel is in the making of stainless steel and other alloys. The United States Environmental Protection Agency (EPA) has set the Maximum Containment Level Goal (MGCL) as 0.0001 mg/L. There is no Ontario drinking water maximum for Nickel.

Potassium

Potassium is one of the alkali minerals, typical low in natural waters. An essential nutrient for the muscles, nerves and heart. Can be used as a substitute for sodium in softeners

Selenium (inorganic)

The maximum acceptable concentration for selenium in drinking water is 0.01 mg/L. Selenium occurs naturally in waters at trace levels as a result of geochemical processes such as weathering of rocks. It is difficult to establish levels of selenium that can be considered toxic because of the complex inter-relationships between selenium and dietary constituents such as protein, vitamin E and other trace elements. Food is the main source of selenium intake other than occupational exposure. Selenium is an essential trace element in the human diet. Drinking water containing selenium at the maximum acceptable concentration of 0.01 mg/L would be the source of only 10 per cent of total selenium intake. The maximum acceptable concentration, therefore, is considered to provide a satisfactory factor of safety against known adverse effects.

Silicon

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Silicon is the most abundant element on earth after Oxygen. Large amounts of Silicon can be found in various minerals, and is abundant in oceans and nearly all waters as silicic acid. There is no set maximum limit.

Silver

Silver mainly occurs in argenite and stephanite, from which it is released through weathering. In soils it is mainly present in sulphide minerals. Naturally occurring pure silver is extremely rare. There is no set maximum limit.

Sodium

Sodium should be less than 20 mg/L for persons on low sodium diets. Indicates leaching from water softeners and infiltration from road salts. Can be from geological sources. Provincial criterion is less than 200 mg/L.

Strontium

Strontium is a soft, silver-yellow, alkaline-earth metal. It has three allotropic crystalline forms and in its physical and chemical properties is similar to Calcium and Barium. Strontium reacts vigorously with water and quickly tarnishes in the air. Due to its extreme reactivity to air, this element always naturally occurs combined with other elements and compounds. There is no set maximum limit.

Thallium

Thallium is a metal found in natural deposits as ores containing other elements. The greatest use of Thallium is in specialized electronic research equipment. The United States Environmental Protection Agency (EPA) has set the Maximum Contaminant Level Goal (MCLG) at 0.004 mg/L

Titanium

Titanium is a component of various types of rock and is therefore abundant in soils. Titanium oxide and other titanium compounds are among the most stable soil components. Consequently, only small amounts of titanium end up in water from rock weathering. There is no set maximum limit.

Vanadium

Unit 11-191 Booth Road, RR#5, North Bay, Ontario P1A 4K3
Phone (705) 497 0550 / Fax (705) 497 0549

Vanadium is a natural occurring element. It is a white to grey metal, often found as crystals. It has no particular odor. Vanadium occurs naturally in fuel oils and coal. In the environment it is usually combined with other elements such as Oxygen, Sulfur, or Chloride. There is no set maximum limit

Zinc

The taste related aesthetic objective for zinc in drinking water is 5.0 mg/L. The concentration of zinc may be considerably higher at the consumer's tap in standing water because of corrosion taking place in galvanized pipes, but this can be cleared easily by brief flushing. Corrosion control using small concentrations of zinc based inhibitors has been found effective in some water systems.

.

Disclaimer
The above information is provided to help you determine the acceptability of the water. Results relate only to the items tested. Analytical reports must only be copied in full. This information should never be substituted for the advice provided of medical, environmental, or health officials. Near North Laboratories Inc. accepts no liability for omissions or misprints of the interpretations provided.

References
Ontario Drinking Water Standards 2003 (ODWS)
Ontario Ministry of the Environment (OMOE); Water Management
Ontario Ministry of Health (OMOH)
http://www.freedrinkingwater.com
http://www.epa.gov
http://www.who.int
http://www.lenntech.com
http://www.eoearth.org
http://www.aquapurefilters.com
Standard Methods for the Examination of Water and Waste water 20th Edition