wellcare® information for you about Total Dissolved Solids (TDS)

What are Total Dissolved Solids?

The expression, "total dissolved solids" (TDS), refers to the total amount of all inorganic and organic substances – including minerals, salts, metals, cations or anions – that are dispersed within a volume of water. By definition, the solids must be small enough to be filtered through a sieve measuring 2 micrometers. TDS concentrations are used to evaluate the quality of freshwater systems. TDS concentrations are equal to the sum of positively charged ions (cations) and negatively charged ions (anions) in the water.

Sources for TDS include agricultural run-off, urban run-off, industrial wastewater, sewage, and natural sources such as leaves, silt, plankton, and rocks. Piping or plumbing may also release metals into the water.

What are the health effects of Total Dissolved Solids?

While TDS is not considered a primary pollutant, high TDS levels typically indicate hard water and may lead to scale buildup in pipes, reduced efficiency of water filters, hot water heaters, etc., and aesthetic problems such as a bitter or salty taste.

The United States Environmental Protection Agency (EPA) recommends treatment when TDS concentrations exceed 500 mg/L, or 500 parts per million (ppm). The TDS concentration is considered a Secondary Drinking Water Standard, which means that it is not a health hazard. However, further testing may be warranted, as water with a high TDS concentration may indicate elevated levels of ions that do pose a health concern, such as aluminum, arsenic, copper, lead, nitrate and others.

How do I test for Total Dissolved Solids?

Well owners experiencing the problems described above may wish to determine the TDS concentration levels of their water. A conductivity test provides an estimate of TDS concentration levels. Contact your local Cooperative Extension Office or the Health Department for a list of state-certified laboratories in your area. Higher TDS concentrations may follow significant rain events.

What are the treatments for Total Dissolved Solids in drinking water?

Treatment options depend on the nature of the cations and anions present in the water. For example, a water softener can reduce problems associated with calcium, magnesium, and iron. A reverse osmosis system or distillation unit may be recommended to treat elevated TDS levels associated with high levels of sodium or potassium.

Check with a local water treatment specialist in your area regarding the best type of treatment for your situation. The most common treatments for TDS are reverse osmosis and electrodialysis.

Reverse osmosis removes TDS using a semipermeable membrane to separate molecules that are larger than water. Reverse osmosis can be effective in treating a wide range of TDS, and the result is high quality water. However, the technology can be costly to install and operate, and requires regular maintenance.

Electrodialysis deionizes water using an electric current to separate ions by their electric charge, while controlling the movement of TDS using selectively permeable membranes that are also electrically conductive. It can be effective for removing specific contaminants; however, electrodialysis is not suitable for high levels of iron, manganese, hydrogen sulfide, chlorine, or hardness.

Distillation or freezing may also be used for areas with higher TDS concentrations. Ion exchange is another option, but is not as effective for treating concentrations lower than 3,000 mg/L.

For more information on Total Dissolved Solids

Hayes, T. (2004). *GasTIPS.* "The Electrodialysis Alternative for Produced Water Management." Retrieved November 22, 2006 from www.gastechnology.org/webroot/downloads/en/4ReportsPubs/4_7GasTips/Summer04/TheElectrodialysisAlternativeForProducedWaterManagement.pdf

HM Digital. What is TDS? Retrieved November 22, 2006 from www.tdsmeter.com/abouttds.html

U.S. Department of the Interior, Bureau of Reclamation. Total Dissolved Solids Fact Sheet. Retrieved November 22, 2006 from www.usbr.gov/pmts/water/media/pdfs/TDS.pdf

Wikipedia. Total Dissolved Solids. Retrieved November 21, 2006 from en.wikipedia.org/wiki/Total_dissolved_solids

Wilkes University Center for Environmental Quality, Environmental Engineering and Engineering Department. Total Dissolved Solids. Retrieved November 21, 2006 from www.water-research.net/totaldissolvedsolids.htm

For more information on your drinking water

The following websites provide up-to-date information on efforts to protect drinking water supplies and steps you can take as a private well owner. In addition, you may contact the wellcare® hotline at 1-888-395-1033.

Underwriters Laboratories Inc. Drink Well™ Well Water Testing	www.uldrinkwell.com
U.S. Environmental Protection Agency	www.epa.gov
Water Quality Association	www.wqa.org

Other information about wells and well water can be found in the following wellcare® information sheets:

General Information about Wells:

- Determining the Depth of a Well
- Determining the Yield of a Well
- Ground Water
- Selecting a Well Contractor
- Sizing a Pressure Tank
- Sizing a Well Pump
- Wells
- Your Well & Septic System
- Coping with Low Water Levels
- Managing a Flooded Well
- Protecting Your Wellhead
- Protecting Your Well
- Well Maintenance
- Wells and Fire Protection
- Wells: What to do When Power Fails
- What To Do if the Well Runs Dry
- Boiling Your Drinking Water
- Disinfecting Your Well
- Drinking Water Testing
- Drinking Water Treatments
- Home Drinking Water Treatment Devices
- Testing Water for Gardening and Lawn Irrigation
- Understanding Drinking Water Test Results
- Buying a Home with a Well
- Closing an Abandoned Well
- Dillon's Rule
- Ground Water Withdrawals
- Real Estate Professionals: Buying or Selling a Home with a Well
- Sanitarians – Closing a Well
- Sanitarians – Inspecting a Well
- Sanitarians – Wells & Septic Systems
- Shared Well Agreement
- Sharing a Well
- Water Conservation
- Who Owns the Water

Well Components:

- Your Pitless Adapter
- Valves
- Your Well Cap
- Your Well Casing
- Your Well Pump
- Your Well Tank

Possible Contaminants You May Find in Your Well Water:

- Arsenic
- Bacteria
- Benzene
- Chlorine Disinfectants & Their Byproducts
- Chromium
- Copper
- Emerging Water Contaminants
- Hardness in Drinking Water
- Iron
- Lead
- Mercury
- MTBE
- Nitrate and Nitrite
- Perchlorate
- Pesticides
- pH in Drinking Water
- Radium
- Radon
- Sodium
- Sulfur
- Trichloroethylene (TCE)
- Total Dissolved Solids (TDS)
- Turbidity in Drinking Water
- Uranium
- Volatile Organic Compounds (VOCs)

For more information about wells and other wellcare® publications

wellcare® is a program of the **Water Systems Council (WSC). WSC** is a national nonprofit organization dedicated to promoting the wider use of wells as modern and affordable safe drinking water systems and to protecting ground water resources nationwide. This publication is one in a series of wellcare® information sheets. There were more than 60 available at the time this document was published. They can be downloaded FREE from the WSC website at www.watersystemscouncil.org. Well owners and others with questions about wells or ground water can also contact the wellcare® **hotline** at **888-395-1033** or visit **www.wellcarehotline.org**

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