

What Do the Measured Units Mean? What is an Acceptable Measurement?

Upon the adoption of the Clean Water Act in 1972 and the Safe Drinking Water Act of 1974, Federal and State agencies established standards and limits for contamination of the waters of the United States, including those used for drinking water supply. Those limits were based upon health assessments using analytical technology of the time, with many limits established at levels measured in the parts per million (ppm). As technology and research improved, Federal and State agencies occasionally adjust those limits, now measured in the parts per billion (ppb), as deemed necessary and justified by scientific review. Water professionals have the technology today to detect more substances at lower levels than ever before.

As analytical methods improve, various compounds, including hexavalent chromium, are likely to be found at very low levels in many of our nation's lakes, rivers and streams. Because units of measurement are often difficult to place into context, the following comparisons are provided:

One-Part-Per-Million (mg/L or ppm)

- one automobile in bumper-to-bumper traffic from Cleveland to San Francisco
- one inch in 16 miles
- one minute in two years
- one ounce in 32 tons
- one cent in \$10,000

One-Part-Per-Billion (ug/L or ppb) = 1/1000 ppm

- one 4-inch hamburger in a chain of hamburgers circling the earth at the equator 2.5 times
- one silver dollar in a roll of silver dollars stretching from Detroit to Salt Lake City
- one kernel of corn in a 45-foot high, 16-foot diameter silo
- one sheet in a roll of toilet paper stretching from New York to London
- one second of time in 32 years

One-Part-Per-Trillion (ng/L or ppt) = 1/1000 ppb or 1/100,000 ppm

- one square foot of floor tile on a kitchen floor the size of Indiana
- one drop of detergent in enough dishwasher to fill a string of railroad tank cars ten miles long
- one square inch in 250 square miles
- one mile on a 2-month journey at the speed of light

One Part Per Quadrillion (pg/L or ppq) = 1/1000 ppt or 100,000 ppb or 1,000,000 ppm

- one postage stamp on a letter the size of California and Oregon
- one human hair out of all the hair on all the heads of all the people in the world
- one mile on a journey of 170 light years

Current EPA and North Carolina standards for all types of chromium provide for a maximum contaminant limit of 100 parts per billion (ppb), with some States adopting a more stringent standard of 50 ppb of total chromium.

The following table presents the results of City of Raleigh laboratory tests for total chromium in finished water. Finished water is water that has passed through all processes in a water treatment plant and is ready to be delivered to consumers.

**Total Chromium Data for 2011
EMJ Finished Water**

Collection Date	Total Chromium ppb
5/1/2011	2.58
6/15/2011	3.24
6/29/2011	3.33
7/21/2011	1.45
10/21/2011	3.46

Finished water is water that has passed through all processes in a water treatment plant and is ready to be delivered to consumers.