

Evaluation of the Certificate of Analysis Results

Introduction: Suppliers of the fluoride chemical must, by State law, provide a Certificate of Analysis for each delivered batch of fluoride to the receiving water utility. The results of: Arsenic, Barium, Cadmium Chromium, Copper, Lead, Mercury, Selenium and Thallium reported in the Certificate of Analysis measure the concentration of these constituents as impurities in the concentrated fluoride supply. The concentrations of these constituents **should not be compared to drinking water standards**. This is because the concentrated fluoride and its impurities will be greatly diluted when added to the drinking water supply.

Interpreting the Results: The safety of the fluoride supply is regulated by the Division of Drinking Water. The Division uses the NSF/ANSI Standard 60 to determine compliance. This standard uses the following approach: It assumes that the dosage rate will be 10 times the normal or optimal dosage rate and that the resulting concentration of the impurity will be less than 10% of the maximum allowable concentration of that impurity in the delivered drinking water. Hence there is a safety factor of 100 inherent with the NSF/ANSI Standard 60.

To properly compare the concentration of the impurities in the Certificate of Analysis with the drinking water standards, or Maximum Contaminant Levels (MCL's), one must know the dosage concentration of the added fluoride. Following are two tables that will help. The first table lists the drinking water standards or MCL's for each of the constituents appearing on the Certificate of Analysis.

Contaminant	Maximum Contaminant Level in parts per million or milligrams per liter (mg/l)	Maximum Contaminant Level in parts per billion or micrograms per liter (ug/l)
Arsenic	0.05	50
Barium	2	2000
Cadmium	0.005	5
Chromium	0.1	100
Copper	1.3	1300
Lead	0.015	15
Mercury	0.002	2
Selenium	0.05	50
Thallium	0.002	2

The second table provides factors to convert the concentration of the values listed in the Certificate of Analysis to compare it with the above MCL's. To use this table one must have a copy of the Certificate of Analysis (CoA) at hand. Secondly, one must determine which units the results for the 9 parameters are measured in (mg/l or ug/l) in the CoA. Then, one must determine the dosage concentration of the fluoride chemical. In the table below, three dosage concentrations are presented: 1.2 mg/l, 1.0 mg/l and 0.8 mg/l.

Dosage concentration of the fluoride	1.2 mg/l	1.0 mg/l	0.8 mg/l
Factor (multiply the concentration reported in the CoA by the factor shown and compare it with the MCL in the table above)	0.0000012	0.000001	0.0000008

In using the factors in the above table, be sure to note the concentration in the CoA. It will be expressed in either parts per million (mg/l) or parts per billion (ug/l). Then multiply the concentration by the factor in the table and compare it with the appropriate column in the MCL table. For example, if the CoA expresses concentrations as parts per million (mg/l), compare it with the middle column in the MCL table. If the CoA expresses concentrations as parts per billion (ug/l), compare it with the far right column in the MCL table.