

BACTERIOLOGICAL ANALYSIS

Evaluation of the bacteriological quality of drinking water is done using "coliform" testing. Coliform bacteria are found in the intestinal tract of warm-blooded animals, surface water, some soils, and decaying vegetation. Coliform bacteria are used as "indicator" organisms. If they are present, pathogenic, or disease-causing organisms, could be present. The DEQ laboratory and many private laboratories use the "defined substrate method". A positive result may indicate that a water supply is not properly protected from contamination. The "defined substrate method" also detects *E. coli*, an organism that always originates from mammal or bird intestinal tracts. If *E. coli* is detected, it is more likely that the water supply may contain disease-causing organisms resulting from fecal contamination.

RESULTS OF COLIFORM ANALYSIS

Result Code	This means:
ND	<u>"Non-Detected"</u> – No coliform organisms were detected in the water sample. The sample met the state drinking water standard for bacteriological quality at the time of sampling. (Similar results may be reported as negative; absent; or zero, "0".)
POS	<u>"Positive"</u> – Coliform organisms were present in the water sample. Safety cannot be assured. Collection of a resample to confirm the original result is recommended. An investigation in to the cause of the problem by a qualified individual is advised. (Similar results may be reported as present or any number from 1 to 200.)
EC-POS	<u>"E. coli detected"</u> – <i>E. coli</i> organisms were detected in the water sample. <i>E. coli</i> organisms are found in the intestines of warm-blooded animals, and as such, their presence in a water supply is considered an indication of sewage contamination. Precautions are recommended in the use of the water supply. These results are the same as fecal coliform positive; however, <i>E. coli</i> results indicate sewage contamination with more certainty.
COMMENTS	Coliform organisms may die during sample holding time (time from collection to testing). The laboratory will comment that results may not be representative/valid if sample holding time is longer than 48 hours. The federal standard for a coliform holding time limit for public water supplies is 30 hours.

PARTIAL CHEMICAL ANALYSIS

The Michigan Department of Environmental Quality laboratory analyzes eight commonly requested parameters in a routine procedure called a "partial chemical analysis". Below are two tables of these parameters and associated problems. Table I lists three parameters where the USEPA and the state of Michigan have established drinking water health advisory levels for public water supplies. Parameters listed in Table II are associated with aesthetic water quality problems.

Test results are reported in milligrams per liter (mg/l).

Test	Good	Satisfactory	Caution	Problem
Nitrate as Nitrogen	ND-3	4-10	Over 10 ¹	Methemoglobinemia ^{2,3} (blue baby) esp. infants
Nitrite as Nitrogen	ND-0.3	0.4-1	Over 1 ¹	Methemoglobinemia ^{2,3} (blue baby) esp. infants
Fluoride	1.0-1.2	0.7-2	Over 2 ⁴	Low levels are beneficial in preventing tooth decay. High levels may cause mottling of enamel.

Test	Good	Satisfactory	Caution	Problem
Chloride	ND-20	20-250	Over 250	Taste, corrosion
Hardness	25-100	Over 250 or Less than 25	Over 250	Scaling of water fixtures, soap scum at high levels, corrosion at low levels
Iron	ND-0.2	0.2-0.3	Over 0.3	Staining, turbidity, taste, odor
Sodium	ND-20	20-160	Over 160	Taste, special diets may require water of low sodium content
Sulfate	ND-50	50-250	Over 250	Taste, odor, scaling in boilers & heat exchangers
			Over 500	May have laxative effect especially for new supply users (traveler's diarrhea)

¹ USEPA drinking water standard

² See DEQ pamphlet EQC2033 "Nitrate in Drinking Water" 12/99

³ USEPA requires analysis within 48 hours

⁴ USEPA drinking water standard is 4.0 mg/l for the state of Michigan