



WATER REPORT



2020 SALEM VA WATER QUALITY REPORT

We are pleased to present to you this year's Annual Water Quality Report. This report is designed to inform you about the quality of water and services we deliver to you every day. Our constant goal is to provide you with a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and protect our water resources. We are committed to ensuring the quality of your water. Our water source is the Roanoke River and three ground water wells. In emergencies, we purchase or exchange water with the Western Virginia Water Authority (WVWA).

The Virginia Department of Health completed a source water assessment for our waterworks system 2018. This assessment provides information on possible sources of contamination to our source water. As determined by the source water assessment, the possibility of contamination to our water source (Roanoke River) is high. This is

because surface water is exposed to an inconsistent array of contaminants at varying concentrations due to changing hydrologic, hydraulic and atmospheric conditions with land use activities of concern in the assessment area. To view a copy of this water assessment, please contact the City of Salem Water Department office at 540-375-3029.

Please remember that we need your help in the protection of this valuable water resource.



Awarded the Virginia Office of Drinking Water Gold Award for Excellence in Clarification, Filtration and Backwash from 2013, '14, '15, '16, '17, '18, '19 & '20.

WHAT'S NEW?

Included in our Water Report this year is data from the Western Virginia Water Authority. The reason we include this data is because it was necessary for us to buy water from the WVWA. As you may remember, there was a train derailment upstream from our river intakes. Because of this we were not unable to produce the amount of water necessary to satisfy the City's demand for water. Our utility is committed to protecting public health and meets or surpasses all state and federal health standards for tap water. We constantly monitor for various constituents in the water supply to meet all regulatory requirements. Monitoring various sites in the distribution system helps us to better protect public health. To help advance the science of drinking water, we collect data for the USEPA to find out the occurrence of various compounds and organisms in the water supply. This is the first step in the USEPA's efforts to determine whether these should be regulated. The presence of a compound does not necessarily equate to a health risk; the concentration of a compound is a far more important factor in determining whether there are health implications. We closely monitor the concentration of these compounds. Should the USEPA ultimately determine that regulation is warranted, we will take whatever steps are necessary to protect the health of our citizens.

WHO CAN I CONTACT?

This report shows our water quality and what it means.

If you have any questions concerning this report or your water utility, please contact

Frank Young – Chief Water Treatment Plant Operator or Marcus Potts – Chemist at 540-375-3029. We want our valued customers to be informed about their water utility. To learn more, please attend any of the regularly scheduled City Council meetings. These meetings are held on the second and fourth Monday of each month in council chambers.

The department routinely monitors for constituents in your drinking water mandated by Federal and State laws. The following table shows the results of our monitoring for the period of January 1st to December 31st, 2020. All drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some constituents. It's important to remember that the presence of these constituents does not necessarily pose a health risk.

In the following table you will find many terms and abbreviations you might not be familiar with. To help you better understand these terms we've provided the following definitions:

Non-Detects (ND) - laboratory analysis indicates that the constituent is not present.

Parts per million (ppm) or Milligrams per liter (mg/l) - one part per million corresponds to one minute in two years or a single penny in \$10,000.

Parts per billion (ppb) or Micrograms per liter - one part per billion corresponds to one minute in 2,000 years, or a single penny in \$10,000,000.

Picocuries per liter (pCi/L) - picocuries per liter is a measure of the radioactivity in water.

Millirems per year (mrem/yr) - measure of radiation absorbed by the body.

Nephelometric Turbidity Unit (NTU) - nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Action Level - The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT) - A treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

Maximum Contaminant Level - The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal - The "Goal" (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Presence/ Absence(P/A) - The concentration of the contaminant is zero to be in compliance with the Total Coliform Rule.

WHAT DOES THIS MEAN?

As you can see by the table, our system had no violations. We're proud that your drinking water meets or exceeds all Federal and State requirements. We have learned through our monitoring and testing that some constituents have been detected. The USEPA has determined that your water IS SAFE at these levels. In order to ensure that tap water is safe to drink, USEPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. (MCL's are set by

the U.S. Environmental Protection Agency. In developing the standards EPA assumes that the average adult drinks two (2) liters of water each day throughout a 70-year life span. The USEPA generally sets MCL's at levels that will result in no adverse health effects for some contaminants or a one-in-ten thousand to one-in-a-million chance of having the described health effect for other contaminants). Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same public health protection. This table lists contaminants that had some level of detection. Many other contaminants were analyzed but were not present or were below the detection limits of the lab equipment. Most of the results in the table are from testing done in 2020. However, state and federal agencies allow us to monitor for some contaminants less than once per year because the concentrations of the contaminants do not change frequently. Some of our data, though accurate, is more than one year old.

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791) or www.epa.gov/your-drinking-water/safe-drinking-water-hotline.

To learn even more about your water after reviewing this report, please call our office at

540-375-3029 or visit the City's website at www.salemva.gov.

We, at the City of Salem Water Department, work around the clock to provide top quality water to every tap. We ask that all our customers help us protect our water sources, which are the heart of our community, our way of life and our children's future.

TEST RESULTS 2020

Contaminant	Violation Y/N	Level Detected	Unit Measurement	MCLG	MCL	Likely Source of Contamination
Microbiological Contaminants						
1. Total Coliform Bacteria	N	0 samples	P/A	0	presence of coliform bacteria > 5% of monthly samples	Naturally present in the environment
2. Fecal coliform and <i>E.coli</i>	N	0 samples	P/A	0	a routine sample and repeat sample are total coliform positive, and one is also fecal coliform or <i>E. coli</i> positive	Human and animal fecal waste
3. Turbidity Lowest Monthly Percentage	N	0.030-0.12 100%	NTU	N/A	≤ 0.3NTU	Soil runoff (see note #3)
4. Cryptosporidium	N	0.098 – 0.103	Oocysts per 1 liter	0	99% removal by filtration plus addition as required under the LT2ESWTR	Human and animal fecal waste (see note #4) THIS IS UNTREATED WATER!!
5. Giardia lamblia	N	1.0 – 2.0	Ooysts per 1 liter	N/A	99.9% removal or inactivation	Human and animal fecal waste (see note #5) THIS IS UNTREATED WATER!!
Radioactive Contaminants						
2017 Data, Sampling and Analysis is required every 6 years- required in 2023						
6. Beta/photon emitters	N	3.0 ± 0.69	pCi/l	0	4 mrem/yr	Decay of natural and man-made deposits
7. Alpha emitters	N	0.70 ± 0.51	pCi/l	0	15	Erosion of natural deposits
8. Combined radium	N	0.6 ± 0.49	pCi/l	0	5	Erosion of natural deposits
Inorganic Contaminants and Metals						
9. Aluminum	N	0.072	ppm	0.05-0.20	0.20	Metal used in electrical conductors, fire retardants, ceramics, electronics, solder
10. Barium	N	0.044	ppm	2	2	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
11. Corrosivity	N	12.0	Aggressive Index	N/A	noncorrosive	Physical property of water
12. Chloride	N	11.0	ppm	N/A	250	Naturally occurring in environment
13. Sulfate	N	22.1	ppm	N/A	250	Naturally occurring in environment
14. pH	N	7.35 – 7.96	standard units	N/A	6.6 – 8.5	Acidity or basicity of water
15. Total dissolved solids	N	174	ppm	N/A	500	Physical property of water
16. Sodium	N	4.87	ppm	N/A	N/A	Naturally occurring in environment
17. Chlorine	N	1.03 – 2.00	ppm	4	4	Required disinfectant added during the treatment process to eliminate bacteria

18. Fluoride	N	0.27 – 0.79	ppm	4	4	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and plastic factories
19. Nitrate/Nitrite (as Nitrogen)	N	0.43	ppm	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
20. Hardness	N	121 – 240	ppm	N/A	N/A	Primary dissolved limestone minerals from soil and rock materials
21. Alkalinity	N	122 – 182	ppm	N/A	N/A	Primary dissolved limestone minerals from soil and rock materials

Volatile Organic Contaminants

22. TTHM [Total trihalomethanes] Highest LRAA 2020	N N	12.9 – 72.4 45.0	ppb ppb	0	80	By-product of drinking water chlorination (see note #22)
23. HAA5 [Haloacetic acids] Highest LRAA 2020	N N	8.4 – 44.1 31.0	ppb ppb	0	60	By-product of drinking water Chlorination (see note #23)

Total Organic Carbon

24. Total Organic Carbon	N	1.00	ppm	N/A	Treatment Technique	Naturally present in the environment (see note #24)
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Lead and Copper Analysis 2019 Data

Contaminant	Unit of Measurement	MCLG	MCL	90 th Percentile Level Found	Action Level Exceeded	Samples > AL	Typical Source of Contamination
25. Copper	ppm	1.3	AL= 1.3	0.070	No	0	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
26. Lead	ppm	0	AL= 0.015	0.0021	No	0	

- Analysis frequency is every three years per USEPA regulation; 32 residential samples were collected from the distribution system.

Contaminants:

(1) Total Coliform. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present.

(2) Fecal coliform/E.Coli. Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

(3) Turbidity. Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. Combined effluent turbidity must be ≤ 0.3 NTU in 95% of measurements taken each month.

(4) Cryptosporidium. Pathogenic protozoa that is widely distributed in non-potable water supplies. Although the most commonly used filtration methods cannot guarantee 100 percent removal. Our

monitoring indicates the presence of these organisms in our source water. Current test methods do not allow us to determine if these organisms are dead or if they are capable of causing disease. Ingestion of Cryptosporidium may cause cryptosporidiosis, a gastrointestinal illness (e.g. diarrhea, vomiting, and cramps). Most healthy individuals can overcome the disease within a few weeks. However, immune-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage immune-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. Cryptosporidium must be ingested to cause disease, may be spread through means other than drinking water. LT2ESWTR = The Long Term 2 Enhanced Surface Water Treatment Rule addresses the health effects associated with Cryptosporidium in surface water used as a drinking water supply.

(5) Giardia lamblia. Pathogenic protozoa that is widely distributed in non-potable water supplies. This organism can cause gastrointestinal illness (e.g. diarrhea, vomiting, and cramps).

Radioactive Contaminants:

(6) Beta/photon emitters. Certain minerals are

radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.

(7) Alpha emitters. Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

(8) Combined Radium 226/228. Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.

Inorganic Contaminants:

((9) Aluminum. People at risk for health problems include dialysis patients. Symptoms of chronic aluminum exposure include softening of the bones and brain dysfunction.

(10) Barium. Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.

(11) Corrosivity. Describes how aggressive water is at corroding pipes and fixtures. Corrosive water can cause lead and copper in pipes to leach into drinking

water.

(12) Chloride. Chlorides are usually not harmful, but they can corrode metals and effect the taste of food products.

(13) Sulfate. Health concerns regarding sulfate in drinking water have been raised because of reports that diarrhea may be associated with the ingestion of water containing high levels of sulfate.

(14) pH. The U.S. E.P.A. does not regulate pH levels in drinking water, it is classified as a secondary water contaminant whose impact is considered aesthetic.

(15) Total dissolved solids. Total dissolved solids can give water a murky appearance and detract from the taste quality of the water.

(16) Sodium. An essential element required for normal body function including nerve impulse transmission, fluid regulation, and muscle contraction and relaxation. However, in excess amounts, sodium increases individual risk of hypertension, heart disease, and stroke. One of the chief sources of sodium is the consumption of salt; salt restrictions are often recommended as a first-line of treatment for individuals suffering from these conditions.

(17) Chlorine. Some people who use drinking water containing chlorine well in excess of EPA's standard could experience irritating effects to their eyes and nose and stomach discomfort.

(18) Fluoride. Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Children may get mottled teeth.

(19) Nitrate. Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.

(20) Hardness. Hardness does not pose a health risk and is not regulated by state or federal agencies. It often causes aesthetic problems, such as scaling on pipes and fixture; lowers detergent performance.

(21) Alkalinity. High alkalinity does not pose a health risk, can cause aesthetic problems.

(22) Total Trihalomethanes. Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.

LRAA = Locational Running Annual Average

(23) Haloacetic acids. Some people who drink water containing haloacetic acids in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.

LRAA = Locational Running Annual Average

(24) Total Organic Carbon. A parameter that is monitored to determine the probability of disinfection by-product formation (TTHMs No. 22 and HAA5s No. 23) exceeding the MCL. Treatment Technique: The annual average removal ratio is ≥ 1.0 .

(25&26) Lead and Copper. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Salem Water Department is responsible for providing high quality drinking water, but it cannot control the variety of

materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap 30 seconds to 2 minutes or until it becomes cold or reaches a steady temperature before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your tested. Information on lead in drinking, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

The USEPA promulgated a new Lead and Copper Rule in 2020, here is a short summary of the new rule we will be using to make your drinking water safe:

EPA's new Lead and Copper Rule better protects children and communities from the risks of lead exposure by better protecting children at schools and childcare facilities, getting the lead out of our nation's drinking water, and empowering communities through information. Improvements under the new rule include:

- Using science-based testing protocols to find more sources of lead in drinking water.
- Establishing a trigger level to jumpstart mitigation earlier and in more communities.
- Driving more and complete lead service line replacements.
- For the first time, requiring testing in schools and childcare facilities.
- Requiring water systems to identify and make public the locations of lead service lines

For more information visit the Federal Register visit <https://www.regulations.gov>: Docket ID No. EPA-HQ-OW-2017-0300.





2020 Calendar Year Data or most recent testing period

Substance	Units	Ideal Goals (EPA's MCLG)	Highest Level Allowed (EPA's MCL)	Carvins Cove Data (range) average	Spring Hollow Data (range) average	Crystal Spring Data (range) average	Falling Creek Data (range) average
Regulated Substances							
Barium	ppm	2	2	0.05	0.03	0.04	0.01
Chromium	ppm	0.1	0.1	ND	ND	0.0011	ND
Fluoride	ppm	4	4	(0.39 - 0.76) 0.61	(0.7 - 0.77) 0.73	(0.6 - 0.74) 0.7	0.05
Total Nitrate & Nitrite (as N)	ppm	10	10	ND	0.4	0.8	ND
Total Organic Carbon	ppm	TT	N/A	(1.43 - 2.0) 1.73	(1.08 - 1.37) 1.23	N/A	0.8
Turbidity	NTU	TT	0.3	(0.08 - 0.23) 0.12	(0.07 - 0.27) 0.13	(0.01 - 0.01) 0.01	(0.03 - 0.24) 0.08
Radioactive Contaminants							
Gross Alpha	pCi/L	0	15	0.7	0.24	1.0	- 0.83
Gross Beta	pCi/L	0	50	1.7	2.4	7.7	0.11
Radium 228	pCi/L	0	5	< 0.35	0.36	0.7	-0.58
Combined Radium	pCi/L	0	5	(0.7)	(0.6)	(1.7)	
Lead and Copper Testing							
Lead	ppb	0 ppb	AL = 15	0 of 52 samples exceeded AL 90th percentile = 1.51 ppb			
Copper	ppm	1.3 ppm	AL = 1.3	0 of 52 samples exceeded AL 90th percentile = 0.30 ppm			
Disinfectants and Disinfection By-Products							
Chlorate	ppm		0.8	(0.01 - 0.02) 0.01	(ND - 0.21) 0.07	N/A	N/A
Chlorine	ppm		4	(1.2 - 1.4) 1.3	(1.18 - 1.3) 1.24	(1.1 - 1.1) 1.1	(0.9 - 1.9) 1.2
Chlorite	ppm		0.8	ND	ND	N/A	N/A
HAA5s	ppb	0	60	(ND - 61) site range		(7 - 38) LRAA range	
TTHMs	ppb	0	80	(15 - 80) site range		(24 - 81) LRAA range	
Unregulated and Secondary Substances							
Alkalinity	ppm	unregulated		(20 - 36) 26	(124 - 139) 132	118	(12 - 20) 18
Conductivity	µmhos/cm	unregulated		96.7	294	250	67.1
Hardness (Total)	ppm	unregulated		(26 - 42) 33	(150 - 161) 156	(133 - 137) 137	(16 - 18) 17
Iron	ppm		0.3	(ND - 0.03) 0.02	ND	ND	(ND - 0.04) 0.02
Manganese	ppm		0.05	(0.008 - 0.036) 0.02	ND	ND	0.01
Orthophosphate as P	ppm	unregulated		(0.24 - 0.29) 0.27	(0.23 - 0.34) 0.25	ND	(0.1 - 0.29) 0.19
pH	pH units		6.5 - 8.5	(7.4 - 7.7) 7.6	(7.6 - 7.8) 7.6	(7.6 - 7.8) 7.7	(7.1 - 8.6) 7.9
Sodium	ppm	unregulated		6.0	4.8	3.7	8.92
Zinc	ppm		5	ND	ND	ND	0.13 1

The Western Virginia Water Authority supplies customers in the City of Roanoke and the Counties of Roanoke, Franklin and Botetourt with an annual water quality report. This provides you with information about the source of your water, what it contains and how it compares to the standards set by regulatory agencies based on data collected during calendar year 2020 or the most recent testing period.

The Water Division of the Western Virginia Water Authority is pleased to deliver safe drinking water. Once again, the Water Authority was in full compliance with all state and federal monitoring and reporting requirements.

This data summarizes water-testing results from 2020 or the most recent reporting year for both regulated and non-regulated substances. Many other primary and secondary contaminants have been analyzed but were either below the instrument's detection limits or below the MCLs.

Falling Creek Water Treatment Facility was not in operation during calendar year 2020.

Cryptosporidium and Giardia are microscopic organisms that can cause fever, diarrhea and other gastrointestinal symptoms when ingested. The organisms come from animal and human wastes and are eliminated through water filtration and disinfection. Even though the presence of these organisms is not regulated by the state or federal government, the Water Authority has tested for these organisms. Giardia, 0.2 cyst per 1 liter, was detected in the water at Falling Creek in March 2016 and 8 cyst per 1 liter in June 2017. Cryptosporidium was detected in the water at Carvins Cove (0.1 cyst per 1 liter in January 2016 and 0.1 cyst per 1 liter in February 2016).

Water from the Carvins Cove source tested positive for the presence of total coliform in three tests in calendar year 2020. Water from the Spring Hollow source tested positive for the presence of total coliform in one test in calendar year 2020. Water from the Crystal Spring source tested positive for the presence of total coliform in one test in calendar year 2020. There were no detections of *E. coli* bacteria in Carvins Cove or Crystal Spring. There was one detection of *E. coli* bacteria in Spring Hollow water in calendar year 2020.

Tests for volatile organics (VOCs), pesticides and synthetic organic compounds (SOCs) have been conducted, and all met current state and federal standards for drinking water.

UCMR4-2019

Parameter	Units	Carvins Cove	Spring Hollow	Crystal Spring	Falling Creek
Germanium	ug/L	ND	ND	ND	ND
Manganese	ug/L	ND	0.439	ND	8.63
alpha-Hexachlorocyclohexane	ug/L	ND	ND	ND	ND
Chlorpyrifos	ug/L	ND	ND	ND	ND
Dimethipin	ug/L	ND	ND	ND	ND
Ethoprop	ug/L	ND	ND	ND	ND
Oxyfluorfen	ug/L	ND	ND	ND	ND
Profenofos	ug/L	ND	ND	ND	ND
Tebuconazole	ug/L	ND	ND	ND	ND
Permethrin, cis & trans	ug/L	ND	ND	ND	ND
Tribufos	ug/L	ND	ND	ND	ND
Butylated hydroxyanisole	ug/L	ND	ND	ND	ND
o-Toluidine	ug/L	ND	ND	ND	ND
Quinoline	ug/L	ND	ND	ND	ND
1-Butanol	ug/L	ND	ND	ND	ND
2-Methoxyethanol	ug/L	ND	ND	ND	ND
2-Propen-1-ol	ug/L	ND	ND	ND	ND
Microcystins					
Anatoxin -a	ug/L	ND	ND	ND	ND
Cylindrospermopsin	ug/L	ND	ND	ND	ND
Total Microcystins & Nodularins	ug/L	ND	ND	ND	ND
Bromochloroacetic acid	ug/L	ND-2.02			
Bromodichloroacetic acid	ug/L	ND-1.99			
Chlorodibromoacetic acid	ug/L	ND-0.348			
Dibromoacetic acid	ug/L	ND			
Dichloroacetic acid	ug/L	2.56-28.5			
Monobromoacetic acid	ug/L	ND			
Monochloroacetic acid	ug/L	ND-3.14			
Tribromoacetic acid	ug/L	ND			
Trichloroacetic acid	ug/L	2.85-27.3			
Bromide (Raw)	ug/L	ND			
TOC (Raw)	ug/L	ND-2510			