MODULE 5: WELL INSPECTING & WATER TESTING

INSPECTION CERTIFATE ASSOCIATES

What does a Well Inspection Entail?

CLIENT INFORMATION

WELL LOG

WELL HISTORY

SITE INFORMATION

WELL COMPONENTS

AS BUILT SITE DIAGRAM

WATER TESTING RESULTS

Well Inspection Report

- First and foremost, the inspection is only as good as the report. Remember, if you did not report it, it was not inspected. All information pertaining to the well, photos documenting the components, and water test results should be included in your report.

Client Information

FULL NAME

CONTACT NUMBER

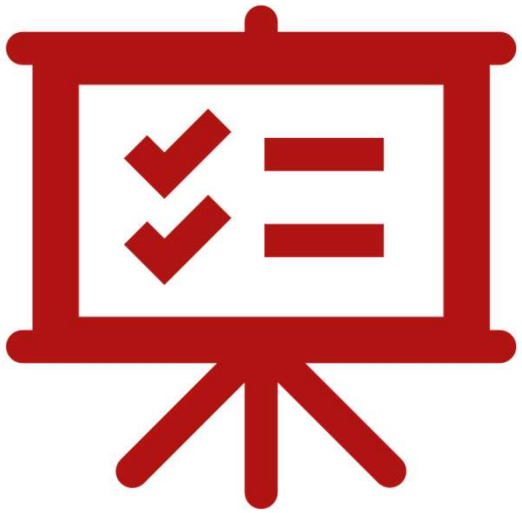
EMAIL ADDRESS

ADDRESS OF RESIDENCE

REASON FOR THE INSPECTION

Well Log

- Every well needs to have a well log. If there is not one provided prior to or during the inspection, than this report will be the start of the well log for your client.
- The log should have the well's history, components and even some site information



Well Log

- The well log will usually include a reference number for the well, the well owner at the time of construction, location of the well, and various construction details. These may include the drilling method used, the depth of the well, the strata penetrated, the depth at which water was found, and the static water level at the time of completion. The well log may also include information on well components, such as the amount and type of casing, the size and type of screen, and the size and setting of the well pump.

Well History

- Previous owners
- Type of well
- Age
- Depth
- Diameter and material of casing
- Has it been shocked and why
- Previous water test results

Well History

- Try to get as much information as possible on the construction, maintenance and condition of the well to pass along to the buyers. Ask the seller or contact the company that drilled the well for the well log or well history (also known as a well record or drilling report). If the well owner (seller) or company that drilled the well does not have a copy of the well log, some states can provide copies of well logs upon request. Several states also offer this information online. Contact the state or local oversight agency for further assistance.

Site Characteristics

Cesspool (receiving raw sewage), 200 ft.
Pit, privy, filter bed, 50 ft.
Septic tank, tile sewer, foundation drain, 50 ft.
Iron sewer with approved mechanical joints, 10 ft.
Pumphouse floor drain, 2 ft.
Property boundary, 5 ft.
Outer boundary of any road, 20 ft.
Landfill, garbage dump, 200 ft.

Other Considerations

Agricultural activity

Mining Activity

Industrial Activity

Resource Extraction (Oil Wells)

Examining the Well's Location

- When inspecting a well, you should evaluate the well's location. The well should be uphill from possible contamination sources (e.g. septic systems, farms) to ensure that surface water does not reach the wellhead.
- The soil around the well should be burmed as to prevent puddling around the wellhead and to divert any runoff water from going to the wellhead. There should be no voids in the soil around the top of the wellhead which could allow water to travel down the borehole to the aquifer

Abandoned Wells

- Find out if there are any abandoned or out-of-service wells on the property. Abandoned wells must be properly closed and sealed so that they do not pose a threat to groundwater quality and a potential safety hazard.

Well Components

- Well Pump
- Well Head
- Well Cap
- Pressure Tank
- Pressure Switch
- Filtration and Treatment
- Miscellaneous Equipment
- Plumbing Materials

Well Casing

- Common materials used are carbon steel, galvanized steel, stainless steel and plastic, usually PVC. The type of casing is dictated by the site's geology and local/state codes.
- Extends 12 or more inches above the land surface. In flood prone areas, the casing is one to two feet above the highest recorded flood level. This helps to prevent substances from washing into the well.
- No holes or cracks are visible in the well casing.
- The casing depth, as recorded in the well log, meets or exceeds state and local codes. If no codes exist, the casing should extend 50 or more feet below the land surface. If drilled into loose sand and gravel, the well casing should extend the full depth of the well. A well screen is fitted to the bottom to keep out sand. If the well is drilled into hard rock, the casing extends into the top of the rock and is sealed to keep out surface water, and no screen is needed.

Well Covering

- The top of the casing is properly covered with a well cap or well seal. See diagram on page 6 for both types of coverings.
- The well cap is vermin-proof, watertight, and securely attached to the well casing. Meets or exceeds state and local codes.
- The well seal is sanitary, watertight, and securely attached to the well casing. Meets or exceeds state and local codes.

Well Pump

- Pumps vary in sizes and types. Jet pumps and submersible pumps are the most common types. Determine the type of pump being used for the well by referring to the well log or through visual inspection.
- Note: Shallow well jet pumps are above ground pumps that can be found at the wellhead or near the pressure tank. Submersible pumps are installed inside the well and are not visible.
- The size of the well pump is based on the static water level, well yield, working pressure, and needs of the household. The pump should meet normal peak demand for the household rather than average use.

Pressure Tank

- There are three general types of water tanks: diaphragm bladder tanks with permanent separation between the air and water, tanks with a float or wafer separating the air from the water, and plain steel tanks. Determine the type and size of tank that is being used by referring to the well log or contacting the manufacturer. Confirm the tank size is adequate for the household/family it will be serving.
- Check for corrosion and leaks at the plumbing fittings and the pressure tank.
- Check the pressure gauge and the pressure control switch. Pressure control switches operate the pump within a "cut-in" and a "cut-out" pressure. The low number is the cut-in pressure and the high number is the cut-out pressure. Turn the water on at a laundry tub or sink and note the pressure when the pump comes on and when it goes off. These pressures will be the low and high limits, respectively. The difference between the cut-in and cut-out pressure is called the "differential." The differential is the operating pressure range of your system

Pressure Tank

- Measure the time it takes for the pump to go from the cut-in to the cut-out pressure with no water running in the house. Depending on the size of the pressure/storage tank, the pre charge pressure of the tank, and the pump, it should take 1 to 2 minutes. If it is less than 45 seconds or greater than 2 minutes 15 seconds, further investigation by a licensed well contractor should be done to diagnose the cause.
- Note: Special circumstances apply if the well has a constant pressure system. If you think this may be the case, consult a well professional or check with the manufacturer.
- Note: A low-yielding well serving a high-demand household or multiple households, may require a storage system with a large storage tank and secondary pump that can deliver water at an adequate flow to the house. Yield testing will help determine if the well is adequate for the household.

Water Filtration and Treatment

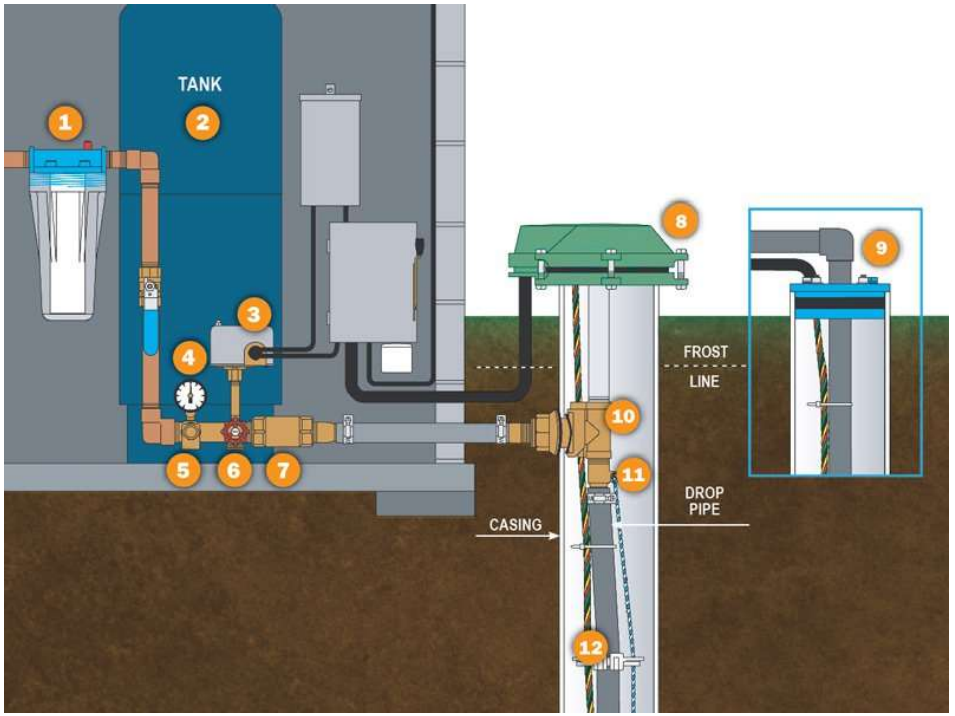
- If the home has any water filtration and treatment devices, these should be appropriate and regularly maintained. Water treatment devices include point-of-entry equipment, which treats the water as it enters the house, or point-of-use equipment, which treats the water at an individual tap, such as the kitchen sink.

Water Filtration and Treatment Documentation

- Size
- Type
- Configuration
- Maintenance Information
- Any pertinent issues

System Schematic

- A system schematic should be drawn and each component labeled in their prospective order.



Testing the Water Quality

- First, determine which types of water tests are needed. These typically include tests for bacteria, lead and nitrate/nitrites, as well as contaminants of local concern, such as arsenic or radon.
- Water testing should be performed by a certified laboratory, county extension office, or local health department to ensure the test results are reliable

Conditions or Nearby Activities	Recommended Test
Well downstream from any septic system	Coliform bacteria, nitrate/nitrite
Household plumbing contains lead	Copper, hardness, lead, pH, salts, zinc
Radon present in indoor air or region	Radon
Water softener installed	Chloride, hardness, iron, manganese, sodium
Stained plumbing fixtures	Iron, manganese, sulfate, tannins
Objectionable smell	Hydrogen sulfide, pH, hardness, metals
Water is cloudy, frothy or colored	Hardness, pH, salts, tannins, turbidity
Corrosion of pipes, plumbing	Copper, lead, pH, salts
Nearby areas of intensive agriculture	Coliform bacteria, nitrate, pesticides
Nearby coal, other mining operation	Metals, pH, Total Dissolved Solids (TDS)
Gas drilling operation nearby	Barium, chloride, sodium, strontium
Used motor oil disposed of on property, old oil tanks in ground, or gasoline station within a mile of the property	Volatile organic compounds (VOCs)
Dump, landfill, factory or dry-cleaning operation nearby	Metals, pH, salts, VOCs
Salty taste and seawater, or a heavily salted roadway nearby	Boron, chloride, sodium, TDS

Taking a Water Sample

- The laboratory will provide specific sampling instructions and clean bottles in which to collect the water sample. These instructions should be followed carefully to avoid inaccurate results.
- For example, water samples may require refrigeration or need to get to the laboratory within a certain period of time.

Water Testing

In addition to any instructions provided by the laboratory, follow these steps to collect the water sample:

1. Identify the collection point (for example, the kitchen sink).
2. Remove the washer and aeration device from the faucet. This is usually required, depending on the type of water test(s) you're performing.
3. Disinfect the faucet with either isopropyl alcohol or bleach, and let it stand for 4-5 minutes. Some states require that you use a flame to superheat the metal to disinfect it.
4. Turn the water on and allow it to run until there is a noticeable change in temperature or until you've ensured the well pump has come on and started to fill the tank.
5. Fill your container according to the laboratory's instructions being careful not to touch the inside of the bottle or cap.

Water Test Results

- Compare test results with U.S. Environmental Protection Agency (EPA) maximum contaminant levels for the contaminant, which are required for public water supplies. EPA does not regulate private wells. However, well owners are urged to use these levels as guidelines. For a list of these standards, go to https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations. You should also check with the local or state oversight agency as they may have stricter standards or standards for contaminants that EPA does not regulate.

Post Analysis

- If the water tests warrant filtration and or treatment, you should recommend consulting with a certified water treatment professional and/or a licensed well contractor.
- Follow up water testing post application of the filtration and or treatment equipment to ensure that the equipment is adequately treating the water.

Flow & Yield Testing

- A yield test or flow test is not necessarily indicative of how the well will perform; it is only to be used as a guide as to how much water the well may yield. This is because it is a snapshot of the well, not a long range test. There are many variables, such as the amount of rainfall the area has recently received, the level of the water table at that time, the type of aquifer, and the specific usage or demands on the well.

Conducting a Flow Test

- A flow test involves pumping water from an outside hose bib (preferably on the house to get the best assessment of what is available inside the house) for 30 minutes to determine if the well can sustain an adequate flow for normal peak demand. The flow is noted every 10 minutes. Many local and state oversight agencies and mortgage lenders have minimum requirements. For instance, HUD requires an existing well to deliver water flow of at least 3 to 5 gallons per minute (GPM).

Low Flow Rate

- If a low flow rate is noted, this can be due to pump sizing, backflow prevention on the fixture and possibly small plumbing lines. In these cases, a licensed well contractor can investigate further to determine if anything can be done to improve the flow. The flow test does not represent actual recovery in the well and may only reflect adequate storage in the well at the time of testing. This test represents conditions and data collected on the day of testing. If more extensive testing is needed, such as a true yield test where static, drawdown and recovery rates are determined, you should contact a licensed well contractor.

Determining the Yield of a Well

- The minimum safe yield of a well represents its dependable and continuous output during a long drought. The well yield at the time the well was drilled may be found in the well log.
- Determining the yield of a well involves a complex test to see the balance between the maximum amount of water that can be pumped out of the well and the amount of water that recharges back into the well from the surrounding groundwater source. These tests should be performed by a licensed well contractor.

Notes about Well Capacity and Yield

- The well log or drilling report contains information on the well's estimated capacity and yield in gallons per minute at the time the well was drilled.
- There is a minimum well yield of one gallon per minute, which amounts to 1,440 gallons of water per day. The average family of four uses approximately 400 gallons per day.
- The minimum yield is five gallons or more per minute to accommodate all water uses typical of a suburban or rural family home.
- Planned use should also be taken into consideration. For example, the well yield may not be adequate for a large family, but may be sufficient for an elderly person living alone.
- With proper storage equipment, low producing wells can be a reliable water source.
- The yield test will generate lots of water that must be discharged to an appropriate location. Take care not to let the water flow towards or back into the well being pumped. Try to direct the water to a stream, pond or wetlands.

FHA

- For properties that are served by wells, FHA loan rules now say, "When an Individual Water Supply System is present, the Mortgagee must ensure that the water quality meets the requirements of the health authority with jurisdiction. If there are no local (or state) water quality standards, then water quality must meet the standards set by the EPA, as presented in the National Primary Drinking Water regulations in 40 CFR 141 and 142."

  Again, FHA loan rules depend heavily on the local ordinances in this area. Where local ordinance doesn't exist, or when federal law supersedes local ordinances, those standards will apply.

FHA Well Water and Termite Treatment

- The use of well water includes many potential side issues. Properties served by wells may have unique pest control issues as discussed in HUD 4000.1: "Soil poisoning is an unacceptable method for treating termites unless the Mortgagee obtains satisfactory assurance that the treatment will not endanger the quality of the water supply."

A Note about Shared Wells

- Shared wells must serve connecting or adjacent properties. Properties sharing a private well should not be across the street or multiple lots away from the well location. For FHA or VA insured properties, evidence of water rights and a recorded shared well agreement (generally filed with the deed) must be provided for acceptance of the well as the primary source of water. In addition, it is important to get a written list of all other requirements from the Underwriter as FHA and VA have very specific inspection requirements for shared wells.

FHA Standards for Shared Wells

- The Mortgagee must confirm that a Shared Well: serves existing Properties that cannot feasibly be connected to an acceptable public or Community Water supply System;
- Is capable of providing a continuous supply of water to involved Dwelling Units so that each existing Property simultaneously will be assured of at least three gallons per minute (five gallons per minute for Proposed Construction) over a continuous four-hour period. (The well itself may have a lesser yield if pressurized storage is provided in an amount that will make 720 gallons of water available to each connected existing dwelling during a continuous four-hour period or 1,200 gallons of water available to each proposed dwelling during a continuous four-hour period. The shared well system yield must be demonstrated by a certified pumping test or other means acceptable to all agreeing parties.);

FHA Standards for Shared Wells

- Provides safe and potable water. An inspection is required under the same circumstances as an individual well. This may be evidenced by a letter from the health authority having jurisdiction or, in the absence of local health department standards, by a certified water quality analysis demonstrating that the well water complies with the EPAs National Interim Primary Drinking Water Regulations;
- Has a valve on each dwelling service line as it leaves the well so that water may be shut off to each served dwelling without interrupting service to the other Properties; and
- Serves no more than four living units or Properties.

FHA Testing Requirements

Contaminant	EPA MCL (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water
Total Coliform (includes fecal coliform & *E. coli)*	zero presence	Indicate whether potentially harmful bacteria may be present	Coliforms are naturally present in the environment.
Nitrates, Total	10	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.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Lead	Action Level = 0.015	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits

National Primary Drinking Water Regulations

EPA

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[2] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Acrylamide	TT[4]	Nervous system or blood problems; increased risk of cancer	Added to water during sewage/ wastewater treatment	zero
Alachlor	0.002	Eye, liver, kidney, or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
Alpha/photon emitters	15 picocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
Antimony	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.006
Arsenic	0.010	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards; runoff from glass & electronics production wastes	0
Asbestos (fibers >10 micrometers)	7 million fibers per Liter (MFL)	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003
Barium	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	2
Benzene	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills	zero
Benzo(a)pyrene (PAHs)	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	zero
Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries	0.004
Beta photon emitters	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	zero
Bromate	0.010	Increased risk of cancer	Byproduct of drinking water disinfection	zero
Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	0.005
Carbofuran	0.04	Problems with blood, nervous system, or reproductive system	Leaching of soil fumigant used on rice and alfalfa	0.04

LEGEND: DISINFECTANT, DISINFECTION BYPRODUCT, INORGANIC CHEMICAL, MICROORGANISM, ORGANIC CHEMICAL, RADIONUCLIDES

EPA 816-F-09-004 | MAY 2009

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[2] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Carbon tetrachloride	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities	zero
Chloramines (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort; anemia	Water additive used to control microbes	MRDLG=4[1]
Chlordane	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	zero
Chlorine (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort	Water additive used to control microbes	MRDLG=4[1]
Chlorine dioxide (as ClO_2)	MRDL=0.8[1]	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Water additive used to control microbes	MRDLG=0.8[1]
Chlorite	1.0	Anemia; infants, young children, and fetuses of pregnant women: nervous system effects	Byproduct of drinking water disinfection	0.8
Chlorobenzene	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories	0.1
Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposits	0.1
Copper	TT[5]; Action Level=1.3	Short-term exposure: Gastrointestinal distress. Long-term exposure: Liver or kidney damage. People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits	1.3
Cryptosporidium	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Cyanide (as free cyanide)	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories	0.2
2,4-D	0.07	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops	0.07
Dalapon	0.2	Minor kidney changes	Runoff from herbicide used on rights of way	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	zero
o-Dichlorobenzene	0.6	Liver, kidney, or circulatory system problems	Discharge from industrial chemical factories	0.6
p-Dichlorobenzene	0.075	Anemia; liver, kidney, or spleen damage; changes in blood	Discharge from industrial chemical factories	0.075
1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero

LEGEND: DISINFECTANT, DISINFECTION BYPRODUCT, INORGANIC CHEMICAL, MICROORGANISM, ORGANIC CHEMICAL, RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[2] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Fluoride	4.0	Bone disease (pain and tenderness of the bones); children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories	4.0
Giardia lamblia	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Glyphosate	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use	0.7
Haloacetic acids (HAA5)	0.060	Increased risk of cancer	Byproduct of drinking water disinfection	n/a[3]
Heptachlor	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide	zero
Heptachlor epoxide	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor	zero
Heterotrophic plate count (HPC)	TT[7]	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment	n/a
Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
Hexachloro-cyclopentadiene	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
Lead	TT[8]; Action Level=0.015	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
Legionella	TT[7]	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
Lindane	0.0002	Liver or kidney problems	Runoff/leaching from insecticide used on cattle, lumber, and gardens	0.0002
Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, and livestock	0.04
Nitrate (measured as Nitrogen)	10	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.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10

LEGEND: DISINFECTANT, DISINFECTION BYPRODUCT, INORGANIC CHEMICAL, MICROORGANISM, ORGANIC CHEMICAL, RADIONUCLIDES

National Primary Drinking Water Regulations EPA 816-F-09-004 | MAY 2009

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[2] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
1,1-Dichloroethylene	0.007	Liver problems	Discharge from industrial chemical factories	0.007
cis-1,2-Dichloroethylene	0.07	Liver problems	Discharge from industrial chemical factories	0.07
trans-1,2-Dichloroethylene	0.1	Liver problems	Discharge from industrial chemical factories	0.1
Dichloromethane	0.005	Liver problems; increased risk of cancer	Discharge from industrial chemical factories	zero
1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
Di(2-ethylhexyl) adipate	0.4	Weight loss, liver problems, or possible reproductive difficulties	Discharge from chemical factories	0.4
Di(2-ethylhexyl) phthalate	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories	zero
Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	0.007
Dioxin (2,3,7,8-TCDD)	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories	zero
Diquat	0.02	Cataracts	Runoff from herbicide use	0.02
Endothall	0.1	Stomach and intestinal problems	Runoff from herbicide use	0.1
Endrin	0.002	Liver problems	Residue of banned insecticide	0.002
Epichlorohydrin	TT[4]	Increased cancer risk; stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals	zero
Ethylbenzene	0.7	Liver or kidney problems	Discharge from petroleum refineries	0.7
Ethylene dibromide	0.00005	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries	zero
Fecal coliform and *E. coli*	MCL[5]	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 may 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.	Human and animal fecal waste	zero[6]

LEGEND: DISINFECTANT, DISINFECTION BYPRODUCT, INORGANIC CHEMICAL, MICROORGANISM, ORGANIC CHEMICAL, RADIONUCLIDES

Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
1,1,1-Trichloroethane	0.2	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories	0.2
1,1,2-Trichloroethane	0.005	Liver, kidney, or immune system problems	Discharge from industrial chemical factories	0.003
Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero
Turbidity	TT[7]	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites, and some bacteria. These organisms can cause short term symptoms such as nausea, cramps, diarrhea, and associated headaches.	Soil runoff	n/a
Uranium	30µg/L	Increased risk of cancer, kidney toxicity	Erosion of natural deposits	zero
Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories	zero
Viruses (enteric)	TT[7]	Short-term exposure: Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
Xylenes (total)	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories	10

LEGEND: DISINFECTANT; DISINFECTION BYPRODUCT; INORGANIC CHEMICAL; MICROORGANISM; ORGANIC CHEMICAL; RADIONUCLIDES

NOTES

1 Definitions
- **Maximum Contaminant Level Goal (MCLG):** 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 and are non-enforceable public health goals.
- **Maximum Contaminant Level (MCL):** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- **Maximum Residual Disinfectant Level Goal (MRDLG):** The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Maximum Residual Disinfectant Level (MRDL):** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Treatment Technique (TT):** A required process intended to reduce the level of a contaminant in drinking water.

2 Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).

3 Health effects are from long-term exposure unless specified as short-term exposure.

4 Each water system must certify annually, in writing, to the state (using third-party or manufacturers certification) that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05 percent dosed at 1 mg/L (or equivalent). Epichlorohydrin = 0.01 percent dosed at 20 mg/L (or equivalent).

5 Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10 percent of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.

6 A routine sample that is fecal coliform-positive or E. coli-positive triggers repeat samples—if any repeat sample is total coliform-positive, the system has an acute MCL violation. A routine sample that is total coliform-positive and fecal coliform-negative or E. coli-negative triggers repeat samples—if any repeat sample is fecal coliform-positive or E. coli-positive, the system has an acute MCL violation. See also Total Coliforms.

7 EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:
- ***Cryptosporidium*:** 99 percent removal for systems that filter. Unfiltered systems are required to include Cryptosporidium in their existing watershed control provisions.
- **Giardia lamblia:** 99.9 percent removal/inactivation
- **Viruses:** 99.9 percent removal/inactivation
- ***Legionella*:** No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated, according to the treatment techniques in the surface water treatment rule, *Legionella* will also be controlled.
- **Turbidity:** For systems that use conventional or direct filtration, at no time can turbidity (cloudiness of water) go higher than 1 nephelometric turbidity unit (NTU), and samples for turbidity must be less than or equal to 0.3 NTU in at least 95 percent of the samples in any month. Systems that use filtration other than the conventional or direct filtration must follow state limits, which must include turbidity at no time exceeding 5 NTU.
- **HPC:** No more than 500 bacterial colonies per milliliter
- **Long Term 1 Enhanced Surface Water Treatment:** Surface water systems or ground water systems under the direct influence of surface water serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (e.g. turbidity standards, individual filter monitoring, Cryptosporidium removal requirements, updated watershed control requirements for unfiltered systems).
- **Long Term 2 Enhanced Surface Water Treatment:** This rule applies to all surface water systems or ground water systems under the direct influence of surface water. The rule targets additional Cryptosporidium treatment requirements for higher risk systems and includes provisions to reduce risks from uncovered finished water storages facilities and to ensure that the systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts. (Monitoring start dates are staggered by system size. The largest systems (serving at least 100,000 people) will begin monitoring in October 2008 and the smallest systems (serving fewer than 10,000 people) will not begin monitoring until October 2008. After completing monitoring and determining their treatment bin, systems generally have three years to comply with any additional treatment requirements.)
- **Filter Backwash Recycling:** The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.

8 No more than 5.0 percent samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or E. coli. If two consecutive TC-positive samples, and one is also positive for E. coli or fecal coliforms, system has an acute MCL violation.

9 Although there is no collective MCLC for this contaminant group, there are individual MCLCs for some of the individual contaminants:
- **Haloacetic acids:** dichloroacetic acid (zero); trichloroacetic acid (0.3 mg/L)
- **Trihalomethanes:** bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)

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Contaminant	MCL or TT[1] (mg/L)[2]	Potential health effects from long-term[3] exposure above the MCL	Common sources of contaminant in drinking water	Public Health Goal (mg/L)[2]
Nitrite (measured as Nitrogen)	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1
Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes, and tomatoes	0.2
Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood-preserving factories	zero
Picloram	0.5	Liver problems	Herbicide runoff	0.5
Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero
Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines	0.05
Simazine	0.004	Problems with blood	Herbicide runoff	0.004
Styrene	0.1	Liver, kidney, or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners	zero
Thallium	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	0.0005
Toluene	1	Nervous system, kidney, or liver problems	Discharge from petroleum factories	1
Total Coliforms	5.0 percent[8]	Coliforms are bacteria that indicate that other, potentially harmful bacteria may be present. See fecal coliforms and *E. coli*	Naturally present in the environment	zero
Total Trihalomethanes (TTHMs)	0.080	Liver, kidney, or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[9]
Toxaphene	0.003	Kidney, liver, or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07

LEGEND: DISINFECTANT; DISINFECTION BYPRODUCT; INORGANIC CHEMICAL; MICROORGANISM; ORGANIC CHEMICAL; RADIONUCLIDES

NATIONAL SECONDARY DRINKING WATER REGULATION

National Secondary Drinking Water Regulations are non-enforceable guidelines regarding contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, some states may choose to adopt them as enforceable standards.

Contaminant	Secondary Maximum Contaminant Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	Noncorrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

FOR MORE INFORMATION ON EPA'S SAFE DRINKING WATER:

visit: **epa.gov/safewater**

call: **(800) 426-4791**

ADDITIONAL INFORMATION:

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