

# Water Testing Parameter Descriptions

**How certain substances enter your well  
and their effects**



## Table of Contents

<b>Arsenic</b> .....	<b>Page 4</b>
<b>Copper</b> .....	<b>Page 5</b>
<b>Fluoride</b> .....	<b>Page 6</b>
<b>Hardness</b> .....	<b>Page 7</b>
<b>Herbicide</b> .....	<b>Page 8</b>
<b>Iron</b> .....	<b>Page 9</b>
<b>Lead</b> .....	<b>Page 10</b>
<b>Manganese</b> .....	<b>Page 11</b>
<b>Mercury</b> .....	<b>Page 12</b>
<b>Nitrate</b> .....	<b>Page 13</b>
<b>Pesticides</b> .....	<b>Page 14</b>
<b>Sodium</b> .....	<b>Page 15</b>
<b>Total Coliform and E. Coli</b> .....	<b>Page 16</b>
<b>Volatile Organics (VOS)</b> .....	<b>Page 17</b>
<b>pH</b> .....	<b>Page 18</b>

# Arsenic

---

## **Did You Know?**

- Arsenic is tasteless, colorless, and odorless.
- In past tests, the NJDEP found arsenic above the maximum contaminant level in 20% of all wells.
- Wells in Morris County have reported high levels of Arsenic.

## **About Arsenic:**

Arsenic is an element that exists throughout the environment and is found in soil and sedimentary deposits. Arsenic may change chemical forms in the environment, but it does not degrade. In the United States it was historically a common additive to pesticides and is now used as a wood preservative in treated lumber.

## **Reasons to Test:**

- Arsenic has previously been found in high levels in New Jersey's private wells.
- If you are using a well for the first time.

## **How Does Arsenic Enter Your Well?**

Arsenic enters your well through rainwater and runoff that contains pesticides, fertilizers, and residue from wood preservatives. It is also found naturally in the ground layers in northern New Jersey.

## **Health Effects:**

- Certain cancers (including skin, lung, liver, and bladder)
- Cardiovascular diseases
- Diabetes
- Gastrointestinal issues

## **Maximum Contaminant Level (MCL):**

- (5) parts per billion (PPB).

## **Solutions:**

Short-term:

- **DO NOT**:
  - Boil water. Doing so only increases arsenic concentrations in the water. Water evaporates, but arsenic does not.
- **DO**:
  - Use bottled water for drinking, cooking, and preparing baby formula.
  - Test again – the first test may be inconclusive, and a follow-up test will confirm results.

Long-term:

- Connect to a public drinking supply.
- Install a new well or deepen an existing one.
- Install a water treatment system.
  - Point-of-entry (POET) system for household use.
  - Point-of-use (POU) system for kitchen tap water.

# Copper

---

## **Did You Know?**

- Copper has no odor or taste when dissolved in water.
- Signs of corrosion in your plumbing and piping fixtures (such as frequent leaks, rust-colored water, stained dishes, and discolored laundry) may indicate high water levels of copper.

## **About Copper:**

Copper is a metal. It occurs naturally in ores and natural deposits, as well as plants and animals, including humans. It is released into the environment through farming, ranching, mining, and industrial operations. It enters waterways in wastewater released into rivers, streams, and lakes, and leaches into water reserves through cracked and corroded plumbing systems. Small amounts of copper are essential for good health, but exposure in large doses creates a toxic effect.

## **Reasons to Test:**

- If your home was built before 1986 or within the last 5 years, as it may contain copper plumbing or fixtures.

## **How Does Copper Enter Your Well?**

Copper leaches into water through cracks and faulty seals in plumbing fixtures, brass faucets, fittings, and copper piping. Over time, the chemical reaction between the water and plumbing results in corrosion. Corrosion occurs when metal dissolves or wears away.

## **Health Effects:**

- Gastrointestinal distress
- Liver and kidney damage
- Respiratory tract irritation

## **Maximum Contaminant Levels (MCLs):**

- 1.3 parts per million (ppm).

## **Solutions:**

Short-term:

- *DO*: flush water for 2-3 minutes, or until it is cold, before using water for drinking, bathing, and cooking if your faucets have not been used for several hours.
- *DO NOT*: boil water! Hot water dissolves copper quickly, which makes it enter water in higher concentrations.

Long-term:

- Replace copper piping with newer materials.
- Treat water with a neutralizing filter.

# Fluoride

---

## **Did You Know?**

- In small quantities, fluoride prevents tooth decay and fortifies bones. The ADA recommends a water-fluoride level of 0.7-1.2 parts per million.
- In areas where fluoride levels in public water supplies are chronically low, the FDA advises municipalities to fortify their water supply with fluoride.

## **About Fluoride:**

Fluoride is a natural element. It comes from the element fluorine, which is found in rocks, water, and soil. Fluoride is absorbed by water as it passes through the earth's surface. Therefore, most water contains some amount of fluoride.

## **Reasons to Test:**

- Fluoride does not produce any signs and indications, and testing is the only way to determine its presence.
- If you have small children, as excess fluoride can lead to bone and teeth issues.

## **How Does it Enter Your Well?**

Fluoride enters wells through water passage. Water deposits small amounts of fluoride as it flows through the earth's surface. Over time, these levels accumulate in wells. Fluoride content varies by region, and the Southwest and other dry, arid locations typically have higher fluoride levels in their water.

## **Health Risks (excess fluoride)**

- Calcification of ligaments
- Dental fluorosis
- Skeletal fluorosis
- Tooth decay
- Tooth discoloration

## **Maximum Contaminant Level (MCL):**

- 4 parts per million (ppm).

## **Solutions**

Short-term:

- DO NOT boil water! Doing so only increases concentrations of fluoride in the water.
- DO: Have the pH level of your water tested. That will determine the best treatment method to reduce levels of fluoride in your well.

Long-term:

- Reverse osmosis
- Activated alumina
- Distillation
- Using bone charcoal, electrodialysis, and deionization may also be effective, depending on pH level of your water.

# Hardness

---

## **Did You Know?**

- According to the Water Quality Association, hard water is the most common complaint among private well owners.
- U.S. Geological Surveys show hard water occurs in 85% of the U.S.

## **What is Hard Water?**

Water hardness is determined primarily by the levels of two contaminants – calcium and magnesium—that are present in a water source. Hardness is measured in grains per gallon (GPG).

## **How Do You Know if Your Water is Hard?**

Hard water is relatively easy to detect. It may cause clogged pipes or appliances. Mineral deposits of hard water may form in coffee makers, dishwashers, faucets, and other appliances. Water flow may be restricted or slow with hard water. Additionally, high levels of calcium and magnesium in water can reduce lather and suds in soaps and detergents and cause them to leave residue.

## **Health Effects**

No negative health effects are associated with hard water. However, softening your water provides economic benefits by improving water flow, reducing abrasion to clothing and dishes, and making appliances work more efficiently.

## **Hardness Level (GPG)**

- Low: 1.0-3.5 GPG
- High: 10.5 GPG

## **Solutions**

- Purchase a water softener, such as and ion exchange softener.

# Herbicides

---

## **Did You Know?**

- Herbicides are primarily used in agricultural areas.
- The two most commonly used herbicides are glyphosate and atrazine.

## **What are Herbicides?**

Herbicides are synthetic, toxic chemicals used to kill unwanted vegetation. They are found in weed killers and crop sprays, such as Roundup, Ultra, Rodeo, and Pro. Herbicides are used heavily in industrial agricultural settings and by individuals around their homes.

## **Reasons to Test:**

- If you live in an area with known problems, or if you live close to a farm or crop fields.
- If your well has high levels of nitrate.
- If herbicides have been used around your well.
- If agriculture was practiced in the past around your property.

## **How do They Enter Your Well?**

Herbicides enter well water through contaminated runoff from farms, forest management areas, and large crop fields. They may also enter through personal use on your own property.

## **Health Effects**

- Kidney damage
- Reproductive problems

## **Maximum Contaminant Levels (MCLs)**

- 700 Parts Per Billion (ppb).

## **Solutions**

Short-term:

- Connect to a public water supply.
- Repair any damaged well components.

Long-term:

- Reduce herbicide levels using a granular activated carbon treatment method.



# Iron

---

## **Did You Know?**

- Signs of iron in well water include discolored laundry or plumbing appliances, rust stains, and a bitter or metallic taste upon consumption.
- The human body requires small amounts of iron for proper health.

## **About Iron**

Iron is a naturally occurring element. It primarily takes one of three forms upon entering wells: bacterial, ferric, or ferrous. Signs of bacterial iron include slime buildup in piping and plumbing, and slimy accumulations on softeners and filters. Ferric iron gives water a reddish color, which occurs when water is exposed to oxygen. Ferrous iron, in contrast, appears in water with no oxygen. It forms in deeper wells and requires testing to determine its presence, since it does not provide any physical indication of its presence.

## **Reasons to Test**

- You notice signs of high iron levels, including rust and slimy accumulations.

## **How Does it Enter Your Well?**

Iron enters wells through contaminated rainwater and snowmelt. As water seeps through iron-rich soil and rock, it picks up small amounts of iron, which is then deposited in wells.

## **Health Effects**

Iron poses little risk to human health but wells high in iron may contain harmful bacteria. Some pathogens require iron to grow and survive, and your well should be tested for those organisms if it has high iron levels.

## **Maximum Contaminant Levels (MCLs):**

- 0.3/mg/L

## **Solutions:**

Short-term

- Connect to a public water supply.

Long-term

- Ferrous Iron:
  - Install a water softener.
- Ferric Iron:
  - Install a sediment filter.
- Bacterial Iron:
  - “Shock” treatment (chlorination of the well and water system).

# Lead

---

## **Did You Know?**

- Many homes over 50 years old contain lead piping, a common source of water contamination.
- 80%-90% of lead exposure comes from air, food, and soil (EPA).
- 10%-20% of lead exposure comes from drinking water (EPA).

## **About Lead**

Lead is a soft, gray metal. In the early 1900s, it was used in household piping systems and plumbing fixtures. Prior to 1960, it was used widely in paint products and added to gasoline. Lead is a corrosive substance and typically enters into drinking water from plumbing and fixtures. Due to widespread use, lead is found virtually everywhere, including food, water, air, and soil. Lead solder and piping, and brass faucets and fixtures are common interior sources of lead.

## **Reasons to Test:**

- Your home was constructed prior to 1930 or has lead pipes in its interior plumbing.
- Your well is over 20 years old.

## **How Does Lead Enter Your Well?**

Contaminated rainwater and runoff and plumbing and piping that contains brass and lead.

## **Health Effects:**

- Acute poisoning
  - Symptoms: stomachache, poor appetite, nausea, and vomiting
- Anemia
- Birth defects and low birth weight
- Brain, kidney, and liver damage
- High blood pressure

## **Maximum Contamination Level (MCL)**

- 15 parts per billion. (ppb)

## **Solutions:**

Short-term:

- *DO*: run cold water for 15-30 seconds prior to drinking. That helps flush lead out of the water.
- *DO NOT*: drink, cook, or prepare food using hot water. Lead content is highest in hot water.

Long-term:

- Remove lead at the tap
  - Point-of-use (POU) devices, such as reverse osmosis or distillers.
- Reduce corrosion at point sources where water enters the home.
  - Point-of-entry (POET) devices, such as calcite filters.

# Manganese

---

## **Did You Know?**

- Signs of manganese in well water include metallic taste, stains, and water tinted red, yellow, or brown.
- Manganese is an important nutrient and is added to medications and supplements to prevent and treat anemia, manganese deficiency, and osteoporosis.
- Manganese softens aluminum and other metals, and is used to produce glass bottles, soft beverage cans, and food cans.

## **About Manganese:**

Manganese is an essential element that is found in soil, air, water, and certain foods - including fruits, vegetables, and legumes. It is a common additive to many paints, fertilizers, fungicides, and livestock feed. Manganese is also found in some chemicals, including gasoline and solvents, and is used to manufacture iron and steel.

## **How Does it Enter Your Well?**

Manganese enters wells primarily through contaminated runoff. It seeps into underground water supplies from paints, fertilizers, fungicides, livestock feed, and other organic material that dissolves into the ground.

## **Health Effects**

- Neurotoxicity
- Reproductive issues
- Restlessness
- Sleeplessness

## **Maximum Contaminant Level (MCL)**

- 0.05 parts per million (PPM).

## **Solutions**

### Short-term

- *DO*: drink bottled water.

### Long-term

- Long-term treatment depends on the levels of manganese in the water, but should be removed using a point-of-entry (POE) method, such as:
  - Filtration system
  - Aeration
  - Ozonation
  - Catalytic carbon
- Connect to a public water supply.
- Water treatment with filtration systems is generally recommended as the optimal solution.

# Mercury

---

## **Did you Know?**

- Mercury is used commercially to prevent mildew in outdoor paints.

## **About Mercury**

Mercury is a shiny, silver-white metal found in small amounts in the earth's crust. At room temperature, metallic mercury is an odorless liquid that can slowly evaporate into the air. It can combine with other elements to form inorganic and organic compounds. Mercury is used for a wide variety of purposes.

## **How Does it Enter Your Well?**

Mercury can enter your well through storm water runoff from industrial and agricultural areas, and from improperly disposed household products, such as paints. It is also a naturally occurring element in the ground layer. It is found more commonly in wells in southern New Jersey.

## **Reasons to Test:**

- If you have young children or are pregnant, as they are at greatest risk of the harmful effects of mercury.
- You have symptoms such as irritability, nervousness, changes in vision or hearing, or difficulties with memory.

## **Health Effects:**

- Damage to the brain, nervous system, and kidneys.

## **Maximum Contaminant Levels (MCLs):**

- 2 parts per billion (ppb).

## **Solutions:**

Short-term

- DO NOT boil your water, as this will release the mercury into the air for you to inhale.
- DO switch to bottled water.

Long-term:

- Install a Granulated Activated Carbon (GAC) system.
- Install a reverse osmosis unit.

# Nitrate

---

## **Did You Know?**

- People who live near farms and feedlots are at the highest risk for contamination.

## **About Nitrate:**

Nitrate is a chemical compound that forms from the breakdown of organic materials, such as plants, animal manure, and sewage. This compound occurs naturally in soil, water, plants, and food. It frequently enters runoff from farms, golf courses, and other areas with high levels of fertilizer.

## **Reasons to Test:**

- Nitrate is a known contaminant in northern New Jersey wells.
- If you live close to farms or feedlots, which are the biggest sources of contamination.

## **How Does it Get into Your Well?**

Cracks in casing, damaged septic tanks, and faulty seals.

## **Health Risks:**

These contaminants pose significant health risks to pregnant women and children, and may also cause:

- Blue Baby Syndrome
- Certain cancers
- Gastrointestinal issues
- Methemoglobinemia (a form of anemia)

## **Maximum Contaminant Levels (MCLs):**

- (10) parts per billion (PPM).

## **Solutions**

Short-term:

- DO drink bottled water until test results are negative (especially women and children).
- DO NOT boil water! Doing so only increases the concentration of nitrates.

Long-term:

- Repair well casing and seals.
- Install a deeper well.

# Pesticides

---

## **Did you Know?**

- There are hundreds of pesticides produced in the United States.
- Pesticides vary in toxicity and impact to human health.

## **About Pesticides**

Pesticides are synthetic chemicals. They are used in many industries and private residences. Pesticides consist of several groups, including herbicides, insecticides, and fungicides. They are often sprayed on farm fields, fruit orchards, lawns and gardens, and golf courses.

## **How do They Enter Your Well?**

Pesticides enter well water through contaminated runoff and storm water from farms, golf courses, lawns, and fields. Pesticides that are improperly disposed of can seep through the soil and into groundwater, and rain and snow that contains pesticides can also deposit these contaminants in your well.

## **Reasons to Test:**

- If you live near an area with a high pesticide use, such as a farm, orchard, or golf course.
- If your well has high levels of nitrates and nitrites, it may have elevated pesticide levels too.

## **Health Effects:**

- Birth defects
- Nervous system disruption
- Reproductive issues

## **Maximum Contaminant Levels (MCLs):**

- Depends on pesticide. Your well test results will advise you.

## **Solutions:**

Short-term

- Drink bottled water.

Long-term:

- Install a Granulated Activated Carbon (GAC) system.
- Install a reverse osmosis unit.

# Sodium

---

## **Did You Know?**

- Sodium produces a variety of important health benefits in small doses.
- Sodium is a vital component of the human diet but having too little or too much in the body leads to significant health consequences.

## **About Sodium:**

Sodium is a naturally occurring element. It is an essential nutrient and is found everywhere on the earth's surface. Sodium naturally accumulates in plants, water, and food. In the United States, it is harvested and stored in mines for industrial use.

## **Reasons to Test:**

- If you or a family member is on a low-sodium diet or suffers from cardiovascular issues.
- Following winter, when roads have been heavily salted.

## **How Does it Enter Your Well?**

Sodium primarily enters wells through erosion and water seepage. It can reach ground and surface water supplies through runoff from agricultural facilities, and from residential, commercial, and industrial activities such as road salting and mining.

## **Health Effects**

- Circulatory problems
- Heart disease
- Hypertension

## **Maximum Contaminant Level (MCL):**

- 50 parts per million (50ppm).

## **Solutions**

Short-term:

- Avoid drinking tap water if the cause is water softening equipment.
- Install a bypass faucet or discontinue treating the tap water with softeners.

Long-term:

- Reverse osmosis.
- Distillation.
- Hire a professional to inspect the well if the elevated sodium levels are a result of saltwater intrusion rather than water softeners, as treatment methods will be different.

# Total Coliform and E. coli

---

## **Did You Know?**

- Coliform bacteria and E. coli are essential for digestion and proper functioning of the human digestive system.
- Most strains of these coliforms generally do not cause illness, but their presence may indicate the existence of harmful bacteria in your well that can cause illness.

## **About Total Coliform and E. coli:**

Total coliform and E. coli are living organisms. These bacteria occur naturally in the environment, and often reside in the digestive tracts of humans and animals. Coliform occurs naturally in soil, plants, and water, and fecal coliform and E. coli come from human and animal waste.

These bacteria are generally harmless, but their presence may indicate the existence of other harmful pathogens in your well. Since other bacteria are hard to isolate and test for in well water, total coliform and E. coli are used as water quality indicators to determine the presence of other, more harmful bacteria.

## **How do Coliform Bacteria and E. coli Enter Your Well?**

These microbes may enter well water through runoff from farms, when carried by contaminated storm water, or leakage from a septic leach field. They may also seep through well casings, enter through cracked well pipes, wires, or the well seal.

## **Health Effects**

- Gastrointestinal issues:
  - Nausea, vomiting, diarrhea

## **Maximum Contaminant Level (MCL)**

- Test results should be negative for coliform and E. coli.

## **Solutions**

Short-term:

- Drink bottled water or boil water for at least 5 minutes prior to use.
- Repeat the test to confirm results.

Long-term

- Disinfection
  - Varies depending on specific pathogen, but usually involves treating systems with chlorine, ultra-violet light, or ozone.



# Volatile Organics (VOs)

---

## **Did You Know?**

- VOs enter the body through the skin, ingestion, and inhalation.
- Most VOs have no taste or scent, testing is the only way to determine if they are in your well.

## **About VOs:**

VOs are chemicals added to fuels, solvents, degreasers, and dry-cleaning products. They are contained in air, water, and soil. Unlike many contaminants found in wells, VOs are entirely synthetic. They do not biodegrade easily and can be transported long distances from their initial point sources through air and water.

## **Reasons to Test:**

- If you live near a gas station (within 1-2 blocks or 500-1,000 feet), commercial or industrial operation, landfill, or agricultural activities.
- If you have reason to believe you or your neighbor may have a faulty oil storage tank.
- If your water has the taste or odor of gasoline or solvents.

## **How do They Enter Your Well?**

VOs enter well water via pesticides, fertilizers, and runoff from agricultural facilities and storm water. They also infiltrate wells after leaching from gas storage tanks, landfills, and discharge from factories.

## **Health Effects:**

- Anemia
- Cardiovascular ailments
- Certain types of cancer
- Reproductive issues
- Respiratory irritation
- Skin irritation

## **Solutions**

Short-term

- Drink bottled water.

Long-term

- Point of Use Treatment (makes water safe for drinking and cooking).
  - Granular activated carbon (GAC) filter.
    - Reduces VOC levels in drinking water.
- Point of Entry Treatment (makes water safe for laundry, bathing, cooking, and drinking).
  - Distillers.
  - Packed tower aeration (PTA).

# pH

---

## **Did You Know?**

- According to the EPA, ideal drinking water pH should be between 6.5-8.5
- The pH scale is from 0-14, 7 being neutral. Above 7 is considered basic, and below acidic.

## **About pH:**

pH is a measure of how acidic or basic your water is. If your water is below 6.5, this indicates acidity which could cause problems in your home.

## **Reasons to Test:**

- If your water is acidic, it could be affecting your pipes. Acidic water had the potential to corrode the pipes it moves through. If you have pipes containing lead in your home, this could then leach into your drinking water.

## **Health Effects:**

- Drinking water with a slightly lower or higher pH will have no effect as your body maintains a constant pH equilibrium.
- However, if acidic water is causing lead to leach into your water, lead consumption health effects (page 10) would be applicable.

## **Solutions**

If lead is a problem: please refer to Lead on page 10.

If you don't have a lead problem:

- Install an acid neutralizing filter, a chemical feed pump system (which injects neutralizing solution into your water), or a special ion exchange unit.

(The results of pH testing may not be completely accurate. Once collected, your water sample will begin to neutralize in its container. While this test will not be able to give the exact pH of your water, it will give you an idea of whether its basic or acidic. If you have lead in your water and find acidity, it can indicate that lead is leaching through pipes in your house.)