

# Treating NJ Well Water



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# Treating NJ Well Water

## Common Issues


- **Hardness**
- **Iron/ Manganese**
- **Hydrogen Sulfide**
- **pH**
- **Coliform/E-Coli**
- **Lead**
- **Arsenic**
- **Gross Alpha**
- **Installation**



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- **Hardness**
  - Generally refers to the Calcium and Magnesium content expressed as  $\text{CaCO}_3$
  - Causes scale buildup in plumbing, appliances, water heaters and steam boilers
  - Treated through use of a Cation Exchange salt based water softener which replaces hardness ions with sodium ions at a near proportionate rate replacing aggressive minerals with a passive one
  - Soft water is fine for consumption except in cases where people are on salt free diets using no salt in food prep and salt free foods and beverages at which point Reverse Osmosis should be used to remove the added sodium or potassium chloride should be used in place of salt as a regenerant

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- **Iron/ Manganese**
    - Iron can be present as Ferric (suspended), Ferrous (dissolved) or organic (Iron Bacteria) with different treatment requirements depending on the type present
    - Ferric Iron is normally treated with mechanical filtration using a system with a pore size small enough to trap the smallest particle and should be the first in line
    - Automatic backwashing filtration can be used as well for larger particles (20 microns +)
    - A softener can be used to remove ferrous iron and will operate efficiently. If a softener is used it is advisable to pre-treat Ferric Iron as it will enter the media bed but not leave in regeneration thereby destroying the media bed over time
    - Air injection oxidizing filters are also used but are not always reliable in terms of ongoing results.



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- **Hydrogen Sulfide**
    - H<sub>2</sub>S is a dissolved gas in water that gives off a “rotten egg” odor
    - Being a gas it cannot be “filtered” out
    - The gas needs to be precipitated into a solid which can then be removed
    - The most efficient method is through use of a chlorine injection system with a retention tank
    - The chlorine is injected into the stream which then goes into the retention tank so the chlorine can oxidize the gas into a suspended solid which is heavier than water and drops to the bottom of the retention tank
    - The tank should have a manual blow down valve so that solids can be periodically purged
    - It should be noted that any iron or manganese present should be removed prior to injection
    - A carbon filter can be installed on the tank outlet to remove the residual chlorine
    - Aeration systems are also used in place of chlorine injection

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- **pH**

- Potential Hydrogen or “pH” is the measurement of the acidic Vs. base content of water
- It is measured between 0-14 with 0 being most acidic and 14 being most base
- On the extreme ends of the scale both can be corrosive especially to copper piping and fixtures
- The NJDEP acceptable levels are 6.5-8.5 however a balanced level of 7.0 is desirable in most cases
- Low pH can be treated with either an Acid Neutralizer, a tank filled with Calcium Carbonate media, and sometimes with the addition of Magnesia Oxide if needed to elevate lower pH
- If there is hardness present in the water it will elevate the hardness, and as such should always precede a softener (except in cases where Langlier Index is used as a corrosivity factor)
- A second method is with a chemical feed system that proportionately injects an alkaline solution using soda ash (sodium carbonate).
- Because of the nature of treatment it does not add hardness to the water and is in some cases a preferred method of treatment, especially on influent pH levels below 6.3
- In cases of high pH (above 8.5) an anion exchanger that regenerates with salt should be used. Care must be taken with these systems as they will remove all the base properties of the water which can result in a low pH problem. A pilot should always be done first to estimate the actual pH that will come from an anion unit. Once installed there should be a test port on the outlet that can be sampled from, and if needed the bypass can be throttled accordingly to achieve the desired pH



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- **Coliform/E-Coli**
  - When encountered on residential applications especially in a new home purchase, it is always recommended that the homeowner employ a certified well service company to chlorinate the well, and then retest
  - These bacteria can be treated in a few different ways
  - The first, most common method is through Ultra-Violet Sterilization whereby the bacteria are killed by the introduction of UV light into the stream
  - For maximum effectiveness and long term reliability a UV should have the bulb in a quartz sleeve, as well as have an internal manual wiper, bulb intensity monitor and an automatic shut off that will turn off water to the home if the intensity of the bulb is low enough to impact the systems ability to disinfect
  - Water that is turbid, or contains iron should be properly treated before the UV, and a 5 micron prefilter should always come standard with a UV installation
  - Chlorine injection, designed in the same manner as that previously shown for H<sub>2</sub>S removal, can also be used to kill bacteria (as long as the local and county health departments approve of it as an accepted methodology)
  - Unlike H<sub>2</sub>S a carbon filter should not be used post the injection system so that a chlorine residual can be maintained for constant kill
  - It should be noted that the installation of any method used for bacteria remediation should be immediately followed with chlorination of the entire domestic plumbing system, hot and cold as well as any water using appliances to kill any bacteria that have colonized

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- **Lead**

- This can be tricky as many times the detected lead is a result of low (or high) pH dissolving lead solder in domestic plumbing systems. That said pH testing should always be the first step in determining whether lead is actually in the water
- In older homes there may be lead pipes that are buried in walls, or sometimes older faucets that are not constructed with lead free brass are present. In such cases testing should be done at individual points of use
- Lead can be treated at the POE or POU based on the cause
- If there is a pH issue it should be corrected and then the lead should be retested
- In the case of lead being present in the influent supply a water softener followed by carbon block filtration is recommended
- If the lead is a POU issue carbon block filters should be used at each point of use
- Reverse Osmosis is also a good method of lead reduction but is limited to the RO drinking water faucets only and may not be a good fit for multiple points of use
- It should be noted as well that all testing for lead should be done by a State Certified NEELAC approved testing lab, that has no vested interest in the result of the testing, beyond providing an accurate result



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## • Arsenic

- Arsenic can be treated in a number of ways based on the influent water chemistry. An excellent resource in the NJ Arsenic Awareness site which can be found at <http://njarsenic.superfund.ciesin.columbia.edu/>
- The most accepted POE method is Granular Ferric Oxide (GFO), a media that has proven to be the most effective over a long time span with a possible media life of 350K Gal per Ft<sup>3</sup> of media @ an influent arsenic reading of <10 ug/l
- The system should be configured with a sediment pre-filter followed by two GFO tanks in series, followed by a sediment post filter. (in some towns a water meter is required on the outlet of the system). There should be test ports on the inlet, outlet and between tanks for future sampling
- GFO will remove Arsenic 3 & 5 however the presence of 3 will reduce the life span of the media. It is always advisable when testing to segregate the two types. If 3 is present an oxidizing system should be installed in front of the Arsenic system to convert the 3 to 5 and extend the media life
- If Uranium has been found in the water, as well as arsenic the treatment would differ slightly as an anion exchanger regenerated with salt would be the first step. The media will remove the uranium as well as the arsenic (depending on influent amount). The Anion exchanger would be followed by a single GFO tank as a polisher again with test ports at the entry, exit and between tanks and a sediment post filter. Also if the pH is lowered a simple neutralizer may be required to re-balance the pH after treatment
- POU: Reverse Osmosis does a fair job but does not remove Arsenic 3, and GFO cartridges do a superior job. That said we do not recommend POU solutions for arsenic as water can be consumed from multiple locations in a home


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## • Gross Alpha

- When tested GA is reported as a total number however the major components of the reading are Radium and Uranium, so we always advise homeowners to have their lab test separately for both. Radon, while not a part of Gross Alpha, is tested separately and if present should be in the treatment stream as well.
- The treatment methodologies for the individual components are...
- Radium, a cation exchange water softener
- Uranium, an anion exchanger
- Radon, an air stripper
  - Note: Carbon tanks are also used instead of stripper but can become "hot" and as such should not be placed in the basement portion of the home that is directly below heavily used portions of the home
- Once complete testing has been done any or all of the systems can be provided as needed based on the test results
- The normal order is softening first, followed by anion exchange, followed by air stripping
- It should be noted as in the arsenic portion that the anion exchanger may substantially lower the pH and post treatment may be required on the outlet of the anion exchanger to re-balance the pH
- As with all the systems mentioned, they must be properly maintained for optimum results



# Treating NJ Well Water

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- **Installation procedures**
    - Installations should be done by qualified companies licensed to do plumbing in NJ
    - They should also be licensed NJ contractors
    - A permit must be filed anytime a domestic line is modified and an inspection by a town plumbing official must be completed
    - All local codes must be followed especially with regard to the disposal of any effluent to code approved air gap drains
    - Dis-similar metals should not be connected (IE: installing in copper on a galvanized line) unless Di-Electric fittings are used at the points of connection
    - If The incoming service is copper, and Pex or Schedule 40 CPVC are being used to install the systems, thereby breaking the ground, a jumper should be installed between the break points to maintain a proper ground
    - Once installed the customer should receive an explanation of the system, treatment stream, written warranties and required ongoing maintenance procedures as well as the costs of any regenerants required for proper operation of the system

# Thank you for joining us!



## **Watershed Tools for Local Leaders** Spring 2019 Seminars

### **Private Wells and Public Water Supply: Testing & Treatment Basics for Healthy Communities**



Mara Tippett, RHA  
Deanna Doster, Garden State Laboratories  
Joe DiBella, Jayson Company

**Tuesday, March 5**

3-5 pm

Hunterdon County Library HQ  
314 State Route 12, Flemington, NJ

For more info. please email: [mtippett@raritanheadwaters.org](mailto:mtippett@raritanheadwaters.org)

### **Climate Resilient Municipalities: Controlling Stormwater, Protecting Streams & Maintaining Water Quality**

Dr. Chris Obropta, Rutgers University  
Dr. Kristi MacDonald and Bill Kibler, RHA

**Thursday, May 16**

2-4pm

Clarence Dillon Library  
2336 Lamington Rd., Bedminster Twp.

For more info. please email: [kmacdonald@raritanheadwaters.org](mailto:kmacdonald@raritanheadwaters.org)



Seminars are free, donations are appreciated.

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