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RADON IN WATER
a short description
&
Frequently Asked Questions

It takes a large amount of radon in the water to raise the average radon levels in the air. As a rule of thumb it takes 10,000 pCi/l of radon in the water to raise the average radon levels in the house 1 pCi/l. When you use water, particularly when you aerate or heat it, any radon in the water comes easily out. Dishwashers, washing machines, showers and baths allow most of the radon in the water to enter the air. If the room is small and unventilated, the radon levels in the air will increase as the water is used. Running a shower or washing machine in an **unventilated room** can raise the radon levels 1/2% of the radon in water concentrations. If there was 5,000 pCi/l in the water there could be 25 pCi/l in an un-vented bathroom or laundry room while the water was being used. One's exposure to this level, however, would be for only a short period of time. This amount of radon diffusing out into the rest of the house would only increase the average indoor radon level by about 0.5 pCi/l. This means it would take 40,000 pCi/l to raise the average radon levels by 4 pCi/l throughout the house. This is a very general rule that will vary depending upon how much water a family uses, how large the house is, the house ventilation rate, and where the radon test is taken.

The health risk from radon in the water that gets into the air is the same as the radon that comes out of the soil. The risk of drinking water that has radon in it is considered only 11% of the risk of breathing the same amount of radon from the water that has escaped into the air. The National Research Council predicts if you drink water all your life that has 4000 pCi/L in it, the risk of cancer is 42 people in 10,000 for smokers and 10 people in 10,000 for never-smokers

The EPA water division has been mandated by Congress to set a standard of 300 pCi/L for Municipal Water Systems however states like Pennsylvania can use an alternate standard of 4000 pCi/l as the maximum contaminant because of their active radon program. At this point, however, **there is no radon in water standard for municipal water systems**. When that standard does arrive it will not be for residential use but only for municipal water systems, however it will be the default standard for residential use.

Radon can be removed from household water with charcoal filtration or aeration. An aeration system will remove greater than 99% of the radon but the cost is close to \$4000. A single charcoal system can remove up to 85% of the radon in water and costs about a \$950. A double charcoal system can remove up to 95% of the radon and costs about \$1450. Each approach has

pro's and con's. Contact the PA DER 800 237-2366 or our office for additional information about these approaches.

Radon in Water Frequently Asked Questions?

- How Do I Test for Radon in Water?
- Why be concerned with Radon in Water?
- Are there any government Radon in Water action levels?
- What are safe levels of Radon in Water?
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- What is an Aeration system?
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- Do I need to Pre-Treat the water?
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- Does Aeration systems become Radioactive?
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- Will an Aeration systems change my water?
- Does GAC treat other contaminants in the water?
- How much do these treatment units cost?

How Do I Test for Radon in Water?

Most professional radon testers will come to your house and pull a water sample to be analyzed. A less expensive way is to buy a radon in water test kit. You can order a test kit on line from this company. The test kit package you receive will have instructions how to fill the vial which comes in the package, with cold water. The water sample needs to be promptly mailed back to the lab for analysis. You should receive your results in about a week to ten days.

Why be concerned with Radon in Water?

Radon in your water will be released in your home every time water is exposed to the air. The amount of radon added to the air is dependent on how much radon is in the water, how much water you use and how much the water is aerated when you use it. Radon levels in the air will be raised from radon in the water when you shower, run the washing machine or use a dishwasher. Drinking water with radon in it is considered a very small risk.

Are there any government Radon in Water action levels?

The EPA has been trying to set guidelines for maximum levels of radon in water for municipal water systems for more than a decade. At one point they proposed a double standard that set a level of 300 pCi/l for states that had no radon in air program and 4000 pCi/l for states that have an active radon in air program. Some states have set their own recommendations. Connecticut recommends

lowering radon in water levels to below 5000 pCi/l. New Hampshire recommends levels below 4000 pCi/l. Pennsylvania has not set a recommended maximum level of radon in the water.

What are safe levels of Radon in Water?

When you take a shower or use the washer or dishwasher radon in the water is released into the air and the levels will rise. The radon will then diffuse throughout the house and then escape to the outside. In order to raise the average radon levels by 1 pCi/l in a house it is estimated that you need 10,000 pCi/l in the water. To raise the average radon levels by 4 pCi/l you would need 40,000 pCi/l if you this estimated ratio of 10,000 to 1. Any contribution of radon to the air from water needs to take into consideration there is likely to be some radon in the air from soil gas even if a radon in air mitigation system is installed. As the radon in water levels approach or exceed 20,000 pCi/l serious consideration should be given to having a water treat system installed.

Is there a health risk drinking Water with Radon?

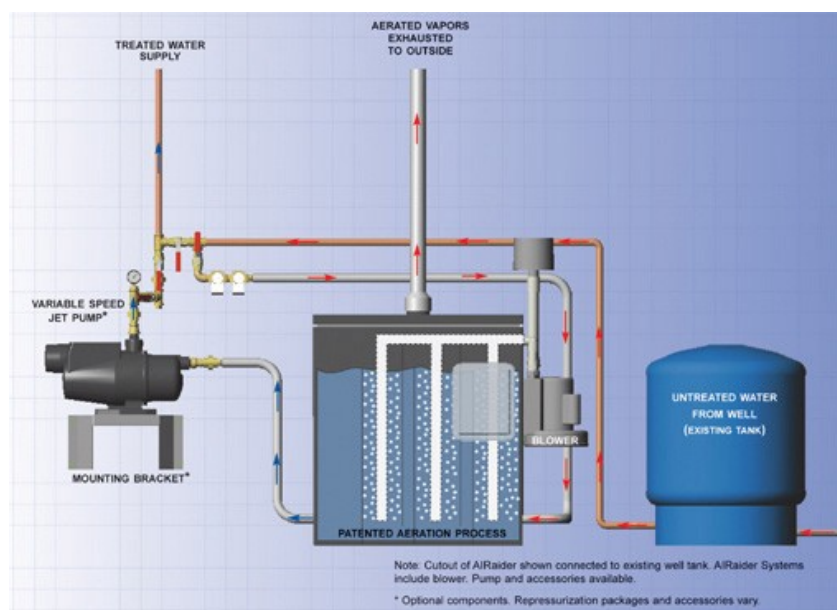
Where as radon in the air is estimated to cause as many as 20,000 additional lung cancers, radon in the water is only estimated to cause less than 10 additional stomach cancers per year in the USA. So the risk from ingestion is very small.

Should I be concerned if I have City or Municipal water?

Any city or municipal water that comes from lakes or rivers would have only minimum amounts of radon. If city or municipal water comes from ground based source such as a community well there could be significant radon in the water. The highest radon in water levels is assumed to come from private wells. Pennsylvania DEP checked the radon levels of municipal and city water systems throughout Pennsylvania and found that about 5.0% had levels greater than 3000 pCi/l

What is an Aeration system?

The best method for removing radon from the water is an aeration system. An aeration system is typically installed next to the well tank where your water supply first enters the house. The aeration system is installed after other water conditioners such as a water softener or neutralizer. The aeration system consists of a large plastic tank where the water has air injected into it. Radon will readily come out of the water if it is exposed to air. The air is then exhausted from the tank, up to the roof line as



required for sub-slab depressurization system venting. The water with 99% of the radon removed is then re-pressurized. All house water is treated. The system takes up about 2' by 4' of floor space.

What is a GAC system?

GAC stands for granular activated charcoal. GAC treatment is also typically installed next to the well tank where your water supply first enters the house. The GAC tank is installed after other water conditioners such as a water softener or neutralizer. A typical GAC tank is 4 ½ tall and 10" round. The tank is filled with coconut based activated carbon. As all the house water bases through the carbon, radon gets trapped in the millions of pores inside the carbon. Fresh carbon can hold the radon atoms until 90% of them decay. The carbon will also capture other contaminants which is beneficial but it shortens the life of the carbon bed. If the water is initially free of contaminants the carbon bed can last for years. If the water has lots of contaminants then the carbon bed will need to be replaced after a few months which would be very costly.



Do I need to Pre-Treat the water?

Any sediment in the water will need to be pre-filtered. In addition the water should be tested for hardness, iron and pH as well as any other contaminants that are common in the area.

Do kitchen charcoal filters or RO units remove Radon in Water?

The kitchen sink water filters can remove radon from the water which would reduce the small risk attributed to drinking water. The radon entering the air from use of the dishwasher, washing machine, showering etc. will continue to raise the indoor radon levels which is the primary risk.

Do GAC filters become Radioactive?

GAC tanks capture radon atoms in the water and hold them until most have decayed away. As they decay they emit gamma radiation. Walking by a GAC tank would not present any risk. A GAC tank however should never be located within a few feet of where a person spends hours at a time. The carbon in the tank needs to be replaced before it becomes saturated with Lead 210, a by-product of radon. GAC systems should only be used for water that has up to 20,000 pCi/l in the water. In order to be at the maximum allowable Lead 210, a carbon tank needs to be efficiently filtering radon in water in a four person house for about 5 years. If there is half as much radon in the water or half as much water usage then it would take twice as long to get to the same level or about 10 years.

Does Aeration systems become Radioactive?

Aeration systems do not become radioactive when they work and there is no long term accumulation of radioactive elements.

Will my Water Pressure change if I install a removal system?

GAC systems will reduce water pressure by only a few pounds. An aeration system will change the water pressure to whatever the capacity of the aeration system produces. In many cases the aeration system can produce higher water pressure than previously existed with a well system.

Do Aeration or GAC systems need maintenance?

The aeration system should have the solenoid valves checked and serviced once per year. The system may also need to be cleaned once a year depending on the sediment and hardness of the water. This cost is typically around \$100 to \$150 per visit. A GAC tank will need to have the carbon replaced on a regular basis. This may need to be every year at a cost of \$300 to \$400.

Will an Aeration systems change my water?

An Aeration system will tend to raise the pH by as much as 1.0 point. This may reduce the need for a neutralizer. Dissolved minerals in the water such as iron or magnesium can be activated by the aeration and may need to be treated as part of the installation cost.

Does GAC treat other contaminants in the water?

GAC can capture numerous contaminants and pollutants. This is a real benefit of installing a GAC system. The taste of the water can also be improved. These contaminants at the same time will shorten the life of the carbon and require more periodic replacement.

How much do these treatment units cost?

A single tank GAC unit typically costs around \$900 to \$1000 installed. A double GAC tank system to improve the system efficiency costs around \$1500 to \$1600. An aeration system costs around \$3800 to \$4500 depending upon the source of electrical power and venting requirements.