

Radon in Well Water

Air Stripping is an Effective Removal Technology



Radon is Frequently Found in Ground Water

Radon, symbol Rn, atomic number 86, is a colorless, odorless gas at ambient conditions. It is the heaviest element of the Noble Gas family. As such it is extremely stable and unreactive chemically. But it also is highly radioactive. Its half-life is only 3.8 days. Both Thorium, symbol Th, atomic number 90 and Uranium, symbol U, atomic number 92, have no stable isotopes. So both are radioactive but only weakly so. They decay by release of an alpha (α) particle (a Helium nucleus) to form Radium, symbol Ra atomic number 88, which is highly radioactive. Thorium has a half-life of over 14 billion years and the most common isotope of U has a half-life of over 4 billion years. (See complete decay path of U-238 below.) But Radium has a half-life of only 1600 years and its decay product is Radon (specifically Rn-222). So as a result ground water that is in contact with both Th and U, even in trace amounts, such as in coal bearing formations and granite bedrock, will contain some level of dissolved Radon. And exposure to Radon gas is strongly associated with increased risk of lung cancer per the US EPA. Radon decays quickly by releasing ionizing alpha and beta (β) radiations which are known to cause damage to DNA in living tissues.

Therefore – removal of Radon from drinking waters sourced from wells that have dissolved Radon is an extremely important public health issue.

Air Stripping of Radon From Water

One option to remove Radon from water is to air strip the output of the well. The water is passed down through a packed bed tower, commonly packed with **Jaeger Tri-Packs®**. As the water flows down the tower, air is forced upward. Therefore the air/water flow is counter-current. As Radon is extremely unreactive chemically, it readily transfers out of the water into the air. Efficiency of 99%+ Rn removal from the water is easily achieved in a properly designed air stripper.

What Raschig USA Can Supply to the Project

Air Stripper Design: Given the water flow and the temperature of the water, we can suggest tower diameter, air/water ratio (hence, the air flow volume), the pressure drop across the packing (so sizing of the fan/blower will be straight forward). Also tower internals such as packing support grid, hold down grid if needed, liquid distributor if needed and lastly the mist eliminator as well can be supplied to the project.

For more information and design assistance, please contact us at:

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Radioactive Decay Chain of U-238 to Stable Lead

Element / Half Life of that Isotope ► Type of Radiation to Form Daughter Isotope

U-238 / 4.5 billion years ► α

▼ Th-234 / 24.1 days ► β

▼ Pa (Protactinium)-234 / 1.2 minutes ► β

▼ U-234 / 2,500,000 years ► α

▼ Th-230 / 8,000,000 years ► α

▼ Ra-226 / 1600 years ► α

▼ **Rn-222 / 3.8 days ► α and β (The bad guy in well water.)**

▼ Po (Polonium)-218 / 3 minutes ► α

▼ Pb (Lead)-214 / 26.8 minutes ► β

▼ Bi (Bismuth)-214 / 19.8 minutes ► β

▼ Po-214 / 162 years ► α

▼ Pb-210 / 22 years ► β

▼ Bi-210 / 5 days ► β

▼ Po-210 / 138 days ► α

Pb-206 ***Stable***

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