Evaluating Radon Presence In Groundwater Seeps In High Radon Potential Zones

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Introduction

In this study we aimed to determine the amount of radon present in high radon potential zones, and to evaluate the risks posed by the radon.

Radon is a radioactive gas that can be found in naturally occurring geologic deposits. When groundwater interacts with these deposits it retains the radon gas and often can carry that radon into the surface water of the local watershed. Radon, like all other radioactive substances, has an exponential decay rate called a “half-life”. The “half-life” is the period of time it takes for half of the substance in question to disappear.

In this study we collected water samples from a local high radon potential zone in Manchester, Connecticut to determine the amount of radon present in the water samples.

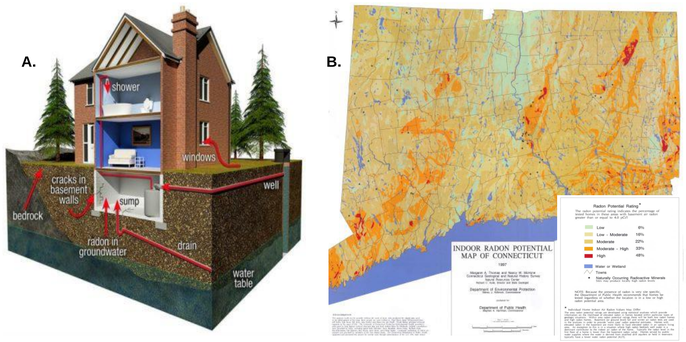

Figure A. - diagram showing how radon in groundwater enters a home directly;
Figure B. - a map of Connecticut showing radon potential zones; the key shows the scale of the high to low potential represented by the color variations.

Results

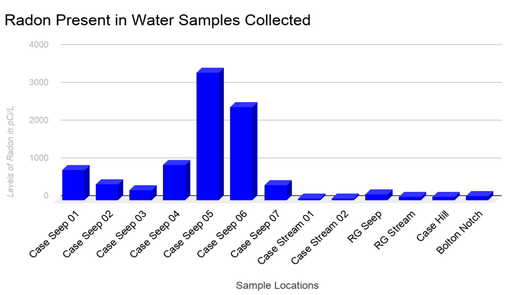

fig. A (left) a bar graph depicting the results of the testing for radon. it represents the amount of radon found in each water sample collected in the study

Figure C.

Conservation Ambassador Program

Materials & Methods

Using the radon potential map we determined an ideal location to begin our sampling. A large portion of the Case Mountain area in Manchester, CT showed as high in radon potential, so we chose to focus on this high radon potential zone as our sample area.

In the field we used an IR Flir camera to locate groundwater seeps. Seeps, in the winter, usually show up as warmer than surface water. Using IR technology, the process of locating groundwater seeps is far more efficient than trying to find them without that technology.

Once collected, the water samples were tested for radon content using the Durridge Rad7 radon monitor, which determines the amount of radon in the sample. This then needs to be corrected for time to determine the amount of radon present in the sample at the time of its collection, as radon decays over time.

Figure D. - a map depicting the area we searched for sampling locations along with the plotted coordinate points for each location. The size of the plotted points on the map (depicted in orange) correlate to the levels of radon found in the samples collected in that location. The larger the point, the larger amount of radon that was found to be in that sample.

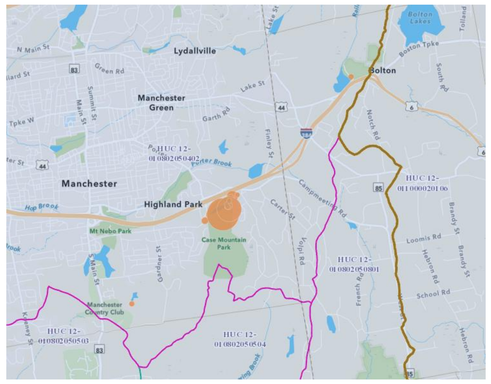

Fig. D. Sampling locations

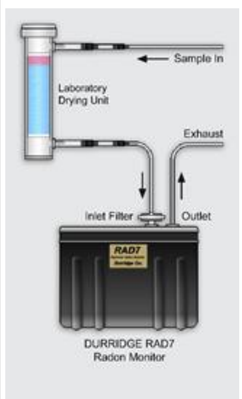

Fig. E.

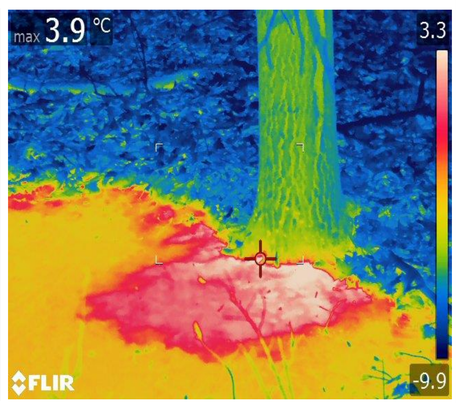

Fig. F.

Figure E. shows a diagram of the Durridge Rad7 radon monitor and how it operates;
Figure F. is an Infrared image of a seep that was sampled in this study, displaying the temperature difference of groundwater coming to the surface

Discussion

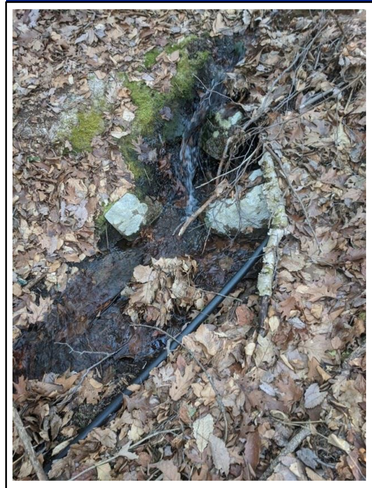

fig. A (left) one of the samples we took in this study was a spring approximately a quarter mile uphill from the Case Reservoir, feeding into it by the means of a small stream. In this stream, we observed a black plastic pipe leading from the location of the spring and lead down the length of the stream towards the reservoir. This suggests that the water in the spring was being piped to a new location for human usage, possibly even drinking water. and the use of the plastic PVC pipe suggests that this is a relatively newer developement, which would convey that they did not test the spring for radon, as the water coming from the spring read our highest radon levels of the entire study, at 3,388.67 pCi/L

Fig. G.

It would be useful to know the purpose of the pipe discussed in Figure G., given that the results of the study showed significantly large amounts of radon coming out of this spring alone. Radon is linked to about 14,000 cancer deaths each year, and the indoor levels of radon in the air are already dangerous at over 4 pCi/L (Oram, n.d.) The sample that correlates to Figure G. read at over 3,000 pCi/L. Those levels of radon could be dangerous to a person who is using that spring for drinking water.

References

Oram, B. (n.d.). Mr. Brian Oram, PG. Radon in water, air, and soil. Retrieved from https://water-research.net/index.php/radon

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