CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J1215

Project Title
Radon Emissions from Granite in Homes

Abstract

Objectives/Goals
Inside my home in Boston, we tested for the presence of Radon gas. I learned that this invisible, dangerous gas could eventually cause cancer to its inhabitants. This hazardous gas is produced as a byproduct of decaying uranium in the bedrock below the surface and may also be found in small amounts in many homes. Radon is linked to 12% of all lung cancer deaths, 20,000 deaths in the United States annually. I wondered if the countertops in our homes might actually be emitting enough radon to be harmful to our health. The purpose of this project was to measure the amount of radon gas that was emitted from a variety of granite samples. My hypothesis was that the radon emitted from the granite samples would measure below the EPA suggested maximum of 4 picocuries per liter of air (pCi/L).

Methods/Materials
More than 1000 hours of testing with over 60 different readings from 13 granite samples were performed. The 13 varieties of granite samples were tested first with a Ludlum model 3 Geiger counter with a model 44-7 probe to measure the levels of alpha and beta radiation along with the gamma rays. The samples were subsequently measured for radon emissions with a Safety Siren Pro Series 3 device.

Results
The mean, median, mode, and range for the results from the Geiger counter were: approximately 2.5, 2.3, 2.8 & 2.8 respectively (millirem per hour, ionizing radiation). The mean, median, mode, and range for the results with the radon gas detector were: approximately 4.1, 2.4, 2.4 & 14.9 respectively. The mean, median, mode, and range for the results with air flow allowing the radon to dissipate were: approximately 1.6, 2.2, 1.1 & 3.0.

Conclusions/Discussion
Of the 13 samples three results were beyond the EPA recommended allowable levels, but these results occurred during 48 hour tests in which the emissions were concentrated. With air flow around the granite sample during another 48 hour test, none exceeded the EPA recommended level. The granite samples were relatively small compared to the amount of granite used in homes. When a granite sample was tested over a period of time there was a variance in the readings of radon emissions. The spike of 30.4 pci/L, from one of the granite samples, indicates that different levels of radon are emitted over time. This shows that radon levels may be inconsistent and that the level of radon may have a considerable high or low depending on uranium content within the granite.

Summary Statement
The purpose of this project was to measure the amount of radon gas that was emitted from a variety of granite samples.

Help Received
Nick Chim at UCI lent the Geiger counter, Debbie Rodriguez provided the granites, support from Roxanne Hunker