This article, written by the American Ground Water Trust was originally published in
THE AMERICAN WELL OWNER, 1999, Number 4

RADON IN DRINKING WATER

Will you glow in the dark if there is radon in your water? In August 2000 there are likely to be new federal rules about radon in public drinking water. Almost anything related to radioactivity causes concern for most of the public. What about America's 15 million private wells? Should well owners be concerned? The basic message is this:

- radon is primarily a breathing related problem rather than a drinking water problem,
- the scientific community is not certain about the levels of danger (if any) from low levels of radon exposure,
- in any event, it is not too difficult to remove radon from drinking water.

What is Radon?

Radon is a colorless, tasteless and odorless radioactive gas formed during the weathering of rocks containing radioactive elements uranium or radium. Radon can occur where there are crystalline igneous or metamorphic rocks (or rocks and soils made from crystalline fragments). According to studies by the U.S. Environmental Protection Agency (EPA), radon levels in ground water have been found to be highest in New England and the Appalachian uplands of the Middle Atlantic and Southeastern States. Local areas in the Rocky Mountains, California, Texas and the upper Midwest also have radon levels in ground water that are above the overall average for the United States. Local variations in geology will greatly affect the level of radon in air and ground water. For example, not all locations in New England will have high radon levels and not all locations along the Gulf Coast will have low radon levels.

Radon gas may enter a home from the soil through cracks in the foundation or basement. If there is radon in a home's well water, small amounts may escape when water is used in the home. National Academy of Science (NAS) findings are that radon escaping from water would make up less than about 2 percent (on average) of a home's overall radon gas-in-air concentration; therefore, ground water represents only a small portion of the total health risk from radon.

Radon and Health

Radon's negative health effects come primarily from breathing radon gas. It is known that smokers are much more likely than non-smokers to be affected by breathing air with radon present (surely yet another good reason to stop smoking!).

The amount of radon in any particular home or building will depend on many factors, for example the amount of geologic radon nearby, the construction materials and foundation design, air circulation and ventilation, and in-home water use. The risk to any particular person will also depend on their exposure frequency and duration. The statistics are controversial, but it is believed that radon exposure may result in an increased risk of lung (inhalation) and stomach (ingestion) cancer. Radon has been attributed to almost 22,000 lung-cancer and 20 stomach-cancer deaths annually in the U.S. The National Academy of Science reports that there is no evidence to suppose that there are reproductive or genetic health risks related to radon.

The EPA has set an advisory "action level" of 4 picoCuries per liter (pCi/L) for indoor air levels of radon. In October 1999, the EPA proposed Maximum Contaminant Levels (MCL) for radon levels in water that are scheduled for final decision in August 2000. The MCLs will be enforceable for public water supplies. The proposal requires that in states where aggressive indoor air radon protection programs exist, the MCL for radon in water will be 4,000 pCi/L. In states without strong indoor air radon protection programs, the MCL for radon in water will be 300 pCi/L.

Radon Treatment Equipment

Aeration can remove 99% of radon in water. Aeration treatment equipment sprays water or mixes it with air, and then vents the air from the water. The air vent pipe should lead the vented air to escape above the home's roof level. Water should be treated where it enters a building. Point-of-use (POU) devices, such as those installed on a tap or under the sink, will only treat a small portion of the water used in a home or building and are therefore not effective in reducing air-borne radon that is released during showers. Most types of aeration systems will cause a loss of heated or air conditioned air, which could increase utility bills. Water well radon removal aeration systems should be serviced on an annual basis.

Another method for removing radon from water is by using granular activated carbon (GAC) filters. Activated carbon filters can remove 99% of radon in water, but require relatively large amounts of carbon and long contact times to achieve this efficiency. Radon attaches to the carbon and leaves the water free from radon. One disadvantage with the carbon filter is that it may need special handling when ready for disposal because of the potential build up of radioactivity in the filter as the radon is removed from the water. For this reason, radon treatment using carbon filters is not recommended by some state authorities. Carbon filters will also adsorb (not absorb) organic material, iron and manganese from the water. Once the carbon bed is saturated it will not effectively remove radon or any other contaminants.