7-2008

An Integrative Study Of The Sources And Effects Of Naturally Occurring Contaminants In Private Wells In North Carolina

Avner Vengosh et al.
Duke University

Abstracts of presentations given in Session 4 of the UCOWR conference.

4.3

An Integrative Study Of The Sources And Effects Of Naturally Occurring Contaminants In Private Wells In North Carolina

Presenter **Dr. Avner Vengosh**
Nicholas School of Environment and Earth Sciences, Duke University
Durham, NC USA
(919) 681-8050 vengosh@duke.edu

Co-Author(s)

Lori S. Bennear, Nicholas School of Environment and Earth Sciences, Duke University, Durham, North Carolina, USA, lori.bennear@duke.edu

Emily M. Klein, Nicholas School of Environment and Earth Sciences, Duke University, Durham, North Carolina, USA, ek4@duke.edu

Erika S. Weinthal, Nicholas School of Environment and Earth Sciences, Duke University, Durham, North Carolina, USA, weinthal@duke.edu

Marie Lynn Miranda, Nicholas School of Environment and Earth Sciences, Duke University, Durham, North Carolina, USA, mmiranda@duke.edu

Mark Wiesner, Pratt School of Engineering, Duke University, Durham, North Carolina, USA, wiesner@duke.edu

---

An Integrative Study Of The Sources And Effects Of Naturally Occurring Contaminants In Private Wells In North Carolina

Drinking water from private wells is currently unregulated in the United States. While the federal Safe Drinking Water Act and North Carolina's drinking water standards protect consumers of public water systems, there are no similar protections for the safety of private wells. Currently about two million residents in North Carolina are served by private wells and this number is rapidly growing. The purpose of this project is to evaluate the exposure of private well users to natural contaminants of arsenic, radon, and radium. The project investigates the mechanisms in which these natural contaminants are leached into groundwater, the available treatment techniques for removal of natural contaminants, the role of information as an environmental health policy tool that examines how households respond to information regarding inorganic contaminants, and the policy implications for an increasing population that uses groundwater with contaminant levels exceeding EPA regulations. Our data show that in western and central parts of North Carolina, ground water is tapped from shallow aquifers that are located along the contact between the underlying fractured bedrock and overlying weathered profiles leading to high levels of naturally occurring contaminants. Occurrences of contaminants are directly related to the local geology; Elevated radon levels were encountered in many wells located in the granitic rocks in the Blue Ridge Mountains and the Piedmont areas; high radium activities were identified in several wells in the Rolesville granite near Raleigh; and high arsenic concentrations exceeding the new EPA MCL of 10 ppb are associated with meta-volcanic rocks of the Carolina Belt. Our results show that a large fraction of the groundwater in the Piedmont area is in a reducing state, which prevents radium removal through adsorption onto oxides and controls the arsenic species distribution.