



# OHIO DEPARTMENT OF HEALTH

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Ted Strickland/Governor

Arvin D. Jackson, M.D./Director of Health

September 10, 2008

Mr. Scott Kell  
Deputy Chief  
Division of Mineral/Resource Management  
Ohio Department of Natural Resources  
2045 Morse Road, Building H  
Columbus, OH 43229

Dear Scott,

I am providing you with this letter in response to your request for the Ohio Department of Health (ODH) to review private well sample data collected by ODNR in the spring of 2008 as part of its investigation into the impacts of a December, 2007 natural gas release from a oil and gas well in Bainbridge Township, in southwestern Geauga County. ODH was asked by ODNR to review these sample results and make determinations as to whether or not the water in these wells, based on these sample results, was safe to drink.

You provided Health Assessment Section (HAS) staff with a disk containing two sets of sampling results for 73 residential wells, plus water supply wells servicing a police station, the township hall, two schools, and a commercial building, all located just west or south of the village of Bainbridge, in Bainbridge Township. These wells were sampled in February and March, 2008. Well water was analyzed for general water quality parameters (alkalinity, conductivity, hardness, pH, total dissolved solids, nitrates, and sulfates), metals, volatile organic compounds (VOCs), and methane. One set of data was analyzed by the ODNR-Cambridge Lab (water quality & metals) and the Ohio Department of Agriculture Lab (VOCs). The other set of data was collected from the same wells at the same time and included the same analytical parameters but was analyzed by Biosolutions, L.L.C. The following evaluation and comments are based on the HAS review of these specific data.

Of the 78 wells sampled, 45 had measureable levels of dissolved methane in the water. Many of the 78 wells sampled had iron, manganese, and less commonly aluminum and total dissolved solids, at levels exceeding U.S. EPA Secondary Maximum Contaminant Levels (SMCLs). The US EPA established these SMCLs as non-mandatory water quality standards for 15 chemical parameters to assist public water suppliers in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These SMCLs are not based on health-related criteria. An exceedence of a SMCL does not indicate that the water poses a health threat to the resident.

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DIVISION OF MINERAL  
RESOURCES MANAGEMENT



Trace levels (single-digit parts per billion) of the VOCs bromodichloromethane, chloroethane, chloroform, chloromethane, dibromochloromethane, and toluene were detected in five wells in the study area, but, at these levels, pose no health threat to residents.

Thirty-seven of the wells sampled had sodium levels exceeding the 20 parts per million US EPA Drinking Water Advisory for individuals on a 500 mg/day restricted sodium diet.

Nine of the wells sampled (7989 and 8010 Bainbridge Road; 17839, 17855, 17860, 17889, 17922, and 18006 English Drive; and 7916 Scotland Drive) had elevated manganese at levels exceeding the US EPA Life-Time Health Advisory Standard for manganese in public water supplies (LTHA= 300 ppb). A "LTHA" is the concentration of a chemical in drinking water that is not expected to cause any non-cancer adverse health effects over a lifetime of drinking the water.

Another well sample (17970 Kingswood Drive) detected barium at levels exceeding the US EPA Maximum Contaminant Level (MCL) for barium in public water supplies (2,500 ppb vs MCL=2,000 ppb)

One well sample (17839 English Drive) detected arsenic right at the US EPA Maximum Contaminant Level for arsenic in public water supplies (MCL= 10 ppb).

**Note:** A Maximum Contaminant Level is the highest level of a chemical that is allowed in a public drinking water supply. It is derived from health-related criteria coupled with a measure of the feasibility of treatment to reduce the levels of the chemical in the water supply. Chemical levels (other than nitrate) in private water supplies in Ohio, including a majority of the wells sampled by ODNR in this investigation, are not regulated by federal or state law. The Ohio Department of Health, however, does use the federal drinking water standards as guidance to advise residents on the safety of their water supply.

Review of ODNR well logs for private wells in Bainbridge Township in the area of concern indicate that most wells are drilled into sandstone bedrock at depths of greater than 100 feet and are cased down to the bedrock surface. The intervening unconsolidated clays and lesser amounts of sand and gravel range in thickness between 15 and 90 feet and generate "confined" conditions in the bedrock aquifer. Typical wells have groundwater yields in the range of 10 to 30 gallons per minute. Information provided by wells sampled as part of the Ohio Environmental Protection Agency's Ambient Groundwater Quality network (Ohio EPA, 2006) indicate that waters in these sandstone aquifers are often highly mineralized, containing naturally-occurring metals including arsenic (ND-78 ppb); barium (10-2,080 parts per billion); iron (50-36,500 ppb); and manganese (10-1,910 ppb); plus sodium (5-774 parts per million), sulfates (up to 3,750 ppm), and total dissolved solids (up to 2,480 ppm).

These data suggest that the levels of metals detected in this sampling, including arsenic, barium, iron, manganese, and sodium, are likely the result of natural geochemical conditions in

local sandstone aquifers. It should be noted that the highest levels of these metals in the sampled well water occurred in wells that did not have detectable levels of dissolved methane. As such, HAS strongly advises residents with manganese levels in excess of US EPA Life-time Health Advisory level (=300 ppb ) to use in-home water treatment systems (i.e. Cation-exchange water softener systems) to reduce the levels of manganese in their drinking water. Long-term exposure to very high levels (>1,800 ppb) of manganese in drinking water has been associated with adverse health effects in a limited number of human health studies.

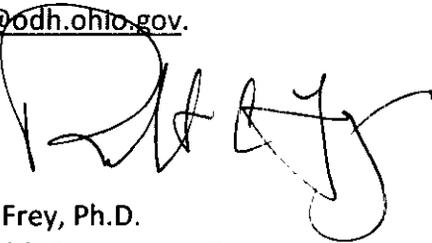
HAS would advise resampling of the one well on Kingswood Drive that detected barium at a level above the federal drinking water standard. If this concentration is confirmed by additional testing, HAS would recommend installation and operation of a in-house water treatment system (i.e. Cation-exchange water softener system) to reduce barium levels in the drinking water.

The Residential Water & Sewage Program within the Bureau of Environmental Health at ODH advises Ohio residents with private wells that have arsenic levels at or exceeding the US EPA Maximum Contaminant Level (=10 ppb) to use in-home water treatment (oxidizing resin, continuous chlorination, or potassium permanganate in conjunction with reverse osmosis or anion-exchange systems) to reduce arsenic in well water to levels below the federal drinking water standard. Information with regard to arsenic treatments systems can be found at their website: <http://www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx>.

Information regarding these in-home water treatment systems and registered water treatment purveyors can be obtained by contacting the Geauga County Health Department at (440) 285-2222 or the Residential Water & Sewage Program in the Bureau of Environmental Health at ODH at (614) 466-1390.

If you have any additional questions or concerns with regard to our review of these well sampling data, don't hesitate to contact me at (614) 466-1069 or email me at [bob.frey@odh.ohio.gov](mailto:bob.frey@odh.ohio.gov).

Sincerely,



Robert C. Frey, Ph.D.  
Chief, Health Assessment Section  
Bureau of Environmental Health

Cc: Rebecca Fugit  
Gene Phillips  
Robert Weisdack