

Following the April 14, 2009 public meeting in Bainbridge Township, the Ohio Department of Natural Resources (ODNR) recognized that questions remained regarding circumstances surrounding the English #1 well incident and that residents still had a number of legitimate safety concerns.

There were also competing theories regarding what happened and whether residents remained at risk. ODNR assembled a panel of five technical experts to provide an unbiased review and ensure that future decisions were made with the highest level of confidence.

The expert panel consisted of Professor Scott Bair, Ohio State University (hydrogeology, petroleum engineering); Professor David Freeman, Marietta College (petroleum engineering, hydrofracking); Dr. Ralph Haefner (groundwater chemistry, statistics); Ms. Martha Jaguki, U.S. Geological Survey (hydrogeology, water chemistry); and Professor John Senko, University of Akron (geomicrobiology, water-rock interactions).

The panel was charged with determining how the natural gas migrated into the Bainbridge Township area water wells, the extent of the gas invasion, water quality issues, and the future impact of the natural gas invasion in freshwater aquifers. The panelists chose to apply a scientific method to test the two differing hypotheses.

The four main issues they reviewed were:

1. Did overpressurization of the English #1 gas well fracture geological formations?
2. Did the fracturing create a perpetual source of invasive natural gas?
3. Do the wellhead LEL (Lowest Effective Level) readings reveal subsurface conditions?
4. Did methane gas, metals and “black goo” contaminate the water wells?

Below is a summary of the expert panel’s findings:

1. ***The expert panel is in agreement with ODNR— the overpressurization of the surface-production casing annulus of the English #1 gas well caused natural gas to migrate upward along the natural vertical joints and horizontal bedding planes in the bedrock surrounding the base of the cemented surface casing.***

This explanation is consistent with the rate of gas propagation and the distribution of the natural gas across the investigation area in December, 2007 and January, 2008, as based on the wellhead LEL measurements. The expert panel rejected the other hypothesis of the far-reaching, deep, network of conical fracturing caused by the annulus overpressurization as this hypothesis does not adhere to well-documented field observations of hydraulic fracturing. It is not consistent with state-of-the-profession equations routinely used by petroleum engineers, and grossly exceed mass balance constraints on propagation of hydraulic fractures.

2. The expert panel accepts the hypothesis of ODNR that overpressurized natural gas escaped from the English #1 gas well for a limited time, and therefore, represents a one-time, pulse source of gas that will slowly dissipate.

The other hypothesis is not accepted because of the direct, visual evidence in the downhole videos demonstrating that the gas source zone is dissipating upward, gas pressures in the water wells are decreasing, and therefore gas is not being replaced by a high-pressure gas from a deeper subsurface source.

3. The expert panel rejects the hypothesis that temporal patterns in wellhead LEL readings demonstrate the creation of three different types of fractures.

There is no direct subsurface geologic evidence that these fractures exist. The temporal patterns in the wellhead LEL values can be explained by applying well-documented and established concepts published in textbooks to the specific geologic conditions in the area. The expert panel accepts the ODNR hypothesis that wellhead LEL readings are non-diagnostic in terms of characterizing subsurface geologic conditions.

4. The expert panel found that groundwater in the area of the English #1 well was not degraded, contaminated or polluted by the natural gas invasion.

There is little difference in water chemistry between the “outside” well water samples taken at public water-supply wells and the “inside” well water samples taken at residential wells in the investigation area that may have been exposed to natural gas (methane). The non-parametric statistical analysis of the well water sampled “inside” the investigation area and “outside” the investigation area indicate a 95 percent confidence level. The only parameter with a statistically significant difference is barium, which has lower values in the “inside” well water samples than the “outside” well water samples. All of the other water-quality parameters— pH, alkalinity, sulfate, nitrate, chloride, arsenic, calcium, total iron, total manganese, and sodium— demonstrate that there is no statistical difference at a 95 percent confidence level between the “inside” and the “outside” water well samples.

A complete copy of the report can be found on ODNR’s website at:
<http://ohiodnr.com/mineral/bainbridge/tabid/20484/default.aspx>

If you have questions about this report, please contact Tom Tugend, Deputy Chief, ODNR, Mineral Resources Management at 614-265-7058 or thomas.tugend@dnr.state.oh.us.

The Ohio Department of Natural Resources understands that this situation has greatly and negatively impacted a number of residents in Bainbridge Township, causing frustration and apprehension. We hope that the information in this report, in addition to the installation of the new waterline, will help residents feel more confident about the safety of their homes and water.