



Centre County Senior Environmental Corps Newsletter July 2017



Indicators of Fracking problems:

Conductivity and Total Dissolved Solids

A sudden increase in conductivity and TDS may be caused by increased barium (Ba) and strontium (Sr) from fracking operations.

Reference: **Water Research Center**

Mr. Brian Oram, Professional Geologist (PG) B.F. Environmental Consultants Inc.

Barium is used as a component in drilling mud. Barium concentrations in production water may be over 6000 mg/L. Since the solubility of barium chloride is over 30,000 mg/L, the barium is typically removed using a co-precipitation process by the introduction of base solutions or other salts that form a compound with a lower solubility.

Good news: Barium does not tend to bioaccumulate, i.e., does not build-up over time in your system, does not bind to most soils directly, but can form insoluble complexes or bind to organic complexes.

The background level of barium in PA's surface water and groundwater private well owners in Pennsylvania it would appear that the value is normally less than 2 mg/L with typical value of less than 1 mg/L.

There are areas in Pennsylvania where freshwater and private wells are naturally impacted by saline water. One well known example is Salt Springs in Susquehanna County. This saline seep has a barium level of over 160 mg/L and saturated levels of methane gas.

Reference: **Dickinson College**

Candie C. Wilderman professor of Environmental Science at Dickinson College.

Dickinson College Alliance for Aquatic Resource Monitoring (ALLARM) uses conductivity/TDS as indicator parameters that point to fracking extraction activities.

The composition of fracking flowback water varies quite a bit, two parameters are almost always found: barium and strontium. Simply put, if conductivity/TDS is high, ALLARM then tests for Ba and Sr, and if they are high also, we assume that the source of impact is Marcellus Shale flowback water.

Parameter	Median concentrations in flowback samples (mg/L)	PA water quality criteria (mg/L)	PA drinking water criteria (mg/L)	Potential health & environmental effects
Total Dissolved Solids	93,200	500	500	Variable; includes many chemicals
Barium	661	10	2	Increase in blood pressure
Strontium	821	0.050	none	Musculoskeletal toxicant

Our CCPaSEC volunteers should assess their monitored sites conductivity values in our database to compare current values under similar conditions of flow.

Please add a note to the data report of any sudden increase in conductivity exceeding 500 micro Siemens/cm (500µS/cm).

Reference: **Lock Haven University**

Dr. Md. Khalequzzaman Lock Haven University Geology & Physics

Companies doing Fracking drilling in the Beech Creek Watershed have postponed operations indefinitely but have installed piping. There was only one drilling operation in Snow Shoe in 2016.

Two Marcellus teams monitor nine of 23 remote sites in the Beech Creek Watershed each month to provide samples for LHU for analysis.

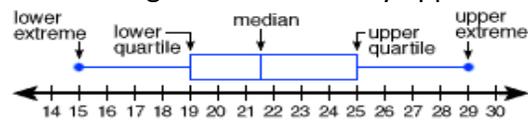
To date, the Lock Haven University results for barium have not indicated an unusual level, nor have we observed unusual measurements for conductivity and total dissolved solids.

The LHU maximum laboratory test for Total Suspended Solids in 2014 was 16 mg/L at Jonathan run.



Dr. Md. Khalequzzaman.

Whisker plots are ideal for comparing distributions because the centre, spread and overall range are immediately apparent.



LHU lab data from May 2010 to June 2017

