HydroQuest

HydroQuest
P.O. Box 387
Stone Ridge,
NY, 12484
845-657-8111
URL: hydroquest.com
hydroquest@yahoo.com

RE: Technical Justification in Support of Requiring Cabot to Immediately Resume Water Deliveries to Adversely Impacted Residents of Dimock, PA [Public statement made at a press event in held in Dimock, PA on Dec. 6, 2011]

My name is Paul Rubin. I am a hydrogeologist and President of HydroQuest – an environmental consulting firm. I am here to discuss my professional hydrologic concerns relating to the water supply of residents of the Carter Road area.

First, let's dispel the question as to whether or not groundwater between gas wells and homeowner wells has become and remains contaminated. It has and will continue to be. Worse yet, it is likely that the contaminant level will rise slowly to a peak and then subside slowly over decades or centuries. Groundwater flow rates in bedrock aquifers can be either very rapid or very slow, depending on available pathways. But, before we discuss this, let's take a look at some recent Dimock area water quality data.

Existing Contaminant Thresholds & Premature Determination of Clean Groundwater

Unfortunately, the State's determination as to whether groundwater is contaminated or not has been by comparison with a pretty small and select number of chemicals that have PA Maximum Contaminant Level (MCL) standards. Recently, Cabot provided a set of water analyses for review. Apparently, this data forms the basis of the State's determination that Dimock groundwater is now safe to drink. It also must form the basis of the preliminary conclusion reached by EPA that echoes the State determination. Let's hope that EPA retracts this preliminary assessment after they have had more time to review the chemical data. As the data stands now, there are five major problems with reaching the conclusion that Dimock groundwater is not contaminated. These are: 1) there is no location map or key to inform the reader as to where all the assorted sample sites are, 2) many area wells known to be adversely affected were not sampled, 3) visually obvious MCL violations were ignored, 4) the conclusions reached have failed to factor in the hydrogeologic setting and groundwater flow, and 5) **Cabot's own data reveals existing contamination in excess of State MCL drinking water quality standards**.

Recent Example Violations of Maximum Contaminant Level (MCL) Drinking Water Quality Standard Thresholds

Looking first at the **Sautner well**, Cabot's recent data **shows the iron level to be 5000 ug/l, some 16.7 times the MCL of 300 ug/l**. **Three other sample locations** in Cabot's recent data set also **reveal iron concentrations ranging from 3.7 to 5.3 times the MCL standard** (e.g., Roos well). **Five sample locations, including Sautner, were found to have manganese concentrations of up to 4 times the PA MCL drinking water standard for manganese of 50 ug/l.**

Importantly, Cabot had two sets of water samples analyzed for certain chemical parameters, including metals – complete with two sets of data findings. One set was analyzed for total metals. This is exactly how the water flows from the tap – just as the Sautner's drank it in the past. The second sample set was filtered through a very small, 0.45 micron, filter membrane to remove some of the metals. This did reduce metal concentrations below the MCL standard in some of the wells, but three still failed to meet State SMCL standards for manganese. PA state code does not call for unnatural filtration of water before reporting the results. This is not realistic and certainly does not reflect the natural, unfiltered, groundwater residents enjoyed for years before gas drilling operations began. Not surprisingly, it appears that this special analytical approach formed much of the basis of the State's determination to have Dimock residents now drink well water that is contaminated and violates PA State Safe Drinking Water Regulation standards. This is not reasonable and should be retracted.

There are other contaminants also documented in recent sampling efforts. For example, Cabot's recent sampling of unfiltered **Sautner well water detected 10 ug/l of lead, twice the MCL of 5 ug/l.**

It is worth taking a look at some nearby residential wells that were apparently not sampled by Cabot in their recent sample round and thus apparently not factored into the determination to stop Dimock water deliveries. Recent sampling was conducted on Nov. 22 for the firm of NapoliBernRipkaShkolnik & Associates. **The Carter well was found to have lead and manganese at levels of 5 and 2.6 times State MCL levels and iron at 5.7 times the PA State MCL standard.** These are all obvious violations of PA Safe Drinking Water Regulation standards.

Let's take a look at water from the **Scott Ely well** that Cabot and the State of PA have determined is now suitable for ingestion. Prior to gas drilling activities, Scott Ely's groundwater was clear, potable, and did not require filtration. This is it here now in this one gallon jug (hold up water sample). As I tell you only some of what is in it, consider whether you would allow yourself and your family to drink and bathe in it. Within the last two weeks, this water sample **was found to have lead and manganese at 5.8 and 10 times State MCL levels and arsenic at 15 times the State MCL level**. Data received within the last few hours **revealed an aluminum concentration of 28 mg/l, some 140 times the State MCL**. This is cause for great concern. Aluminum is a potent neurotoxin that may be linked to dementia, including Alzheimer's like health symptoms. Similarly, **iron was detected at 34 mg/l, some 113 times the State MCL Safe Drinking Water standard**. While all analyses have not been completed, preliminary findings also indicate the presence of low level hexanes, octanes, and decanes. However, the high pH of the water indicates the presence of SIGNIFICANT other frack-related chemicals that are both unknown and untested –chemical compounds that do not have MCLs – chemicals that potentially present long-term chronic exposure to toxins and carcinogens.

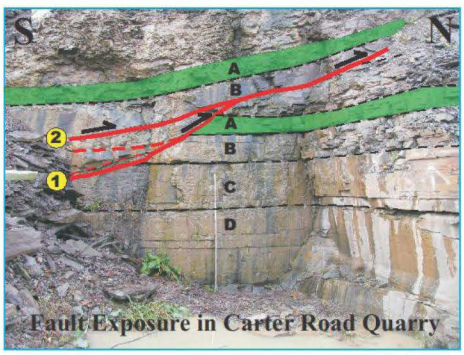
The **pH** of the water has repeatedly been **found to be** around 9.5 – a very basic water, some **10 times the normal outer MCL State drinking water standard range** of pH 8.5 and, quite likely, 100 times that of a more normal Dimock groundwater pH. This is highly unusual and extremely troubling. Something is VERY wrong with this water. Here, you can see it as it now comes out of the well – the **color** of chocolate milk, **five times the maximum allowable PA MCL Safe Drinking Water standard** (75 vs. 15 color units) **for color**. Even after weeks, it still does not settle out.

Clearly, when we begin to examine only some of the water quality data available, even excluding a host of other chemicals I won't address at this time, we are left wondering how it is possible that a determination to start drinking this water could possibly have been made. This decision must be reversed immediately. From both health and liability standpoints, this is not acceptable.

Scott Ely Well Water

Hydrogeologic Characterization

Now, let's take a look at the larger hydrogeologic picture here in Dimock. This starts with an understanding of whether contaminants can physically move from gas wells to homeowner wells? The answer is yes, they already have and will continue to do so. The key here is to understand that for this to occur there must be open, hydraulically efficient, pathways that both groundwater and contaminants can follow. To a great extent, these pathways here are along fractures and faults. Here are two figures that show major fracture directions and fault offset bedrock layers as found in a bedrock quarry along Carter Road. (Show and discuss them.)



Fractures and faults are important contaminant transport pathways

It is along these pathways that natural gas, metals, surfactants, and other contaminants have already moved from upland areas down gradient to homeowner wells. This demonstrates that pathways are open now and moving gas field contaminants. These pathways will continue to function far into the future. They will not magically seal up and contaminant migration will cease. This is not how hydrologic flow systems operate. Only the regulators view the issue of well contamination in gas fields as ending on a few year basis. This is unrealistic.

Hydrogeologically, we need to consider slow groundwater flow rates. Some contaminants may arrive rapidly via fractures, while others may arrive over decades or centuries. Contaminants we see in the early years following drilling may only reflect the first arrivals. Thereafter, contaminant levels will rise slowly to a peak and then subside slowly. In time, these contaminants will reach down valley locations where larger population centers commonly use groundwater for supply purposes. While chemical concentrations may not always exceed MCLs, long-term chronic exposure to numerous unknown and untested chemicals presents a great health risk. Again, no standards exist and no testing has been conducted for many of the toxic and carcinogenic chemicals injected underground during the hydrofracking process. In the absence of gas company specific fluid tracers that should be mandated in all drilling fluids and in the face of numerous unknown chemicals, homeowners with contaminated wells here in Dimock are left in a most unfortunate and compromised position.

Chronic, Low-Level, Chemical Exposure & Water Treatment Limitations

Chronic exposure to low-level fracking chemicals is too great a medical risk to expect. Furthermore, I would not consider it wise for any water treatment company to state that their systems are capable of removing the many hundreds of untested and undocumented chemicals that may be present. The liability associated with providing a water treatment system that may not be capable of removing numerous undocumented and untested contaminants would not be something I would consider assuming if I were a company's CEO. The risk to homeowners and water treatment companies simply is not warranted. Homeowners should not put their trust in claims made by water treatment companies to purify such water.

Until such time as gas companies voluntarily use tracers or are forced to use company specific tracers that can readily be tested in homeowner wells, it is not wise for homeowners to potentially expose themselves to untested chemicals, even if a few that have been tested for appear to temporarily pass MCL standards. The likelihood of restoring contaminated gas field aquifers is essentially zero, especially since a sizable contaminant source area will remain within gas wells, readily available for transport to freshwater aquifers WHEN well sealant materials fail (see http://hydroquest.com/Hydrofracking/ [Aquifer Protection Expert Fact Sheet Front]). Water deliveries should be continued until such time as a water line is installed from a safe, potable, source.

Community Spirit and a Call For Civility

Lastly, it has come to my attention that some neighbors and residents of the Dimock area have not been supportive of adversely affected Carter Road area residents. I have shared only some of the many existing groundwater contaminant problems with you. These are only too real, as are the potential risks associated with ingesting and bathing in this water. I would never expose my sons or my daughter to Carter Road/gas field water for either drinking water or bathing purposes.

As you look at Scott Ely's water here and have heard of only some of the contaminants actually present in this water, consider if you would drink it and expose your family to it. Given the hydrogeologic situation and some water quality data, it is important to note that the State of PA has mistakenly declared adversely affected well water as safe to drink. It is time to consider that perhaps until now you have not truly understood the present and long-term contaminant situation. It is the holiday season. It is a time to mend fences and support your community, as you yourselves would wish if you were in their shoes. Thank you.

Conclusions

Water in many Carter Road area wells is not safe to drink. Chemical results, including Cabot's own recent sample data, document contamination of aquifer water. Some of this data, and new data, have been presented today. Natural gas and chemical excursions document open hydraulic pathways between gas and homeowner wells. Clearly, it was premature to stop water deliveries to adversely impacted Dimock residents, thereby leaving them exposed to contaminant levels in excess of PA Safe Drinking Water standards, as well as numerous other fracking chemicals that may be present but have not been tested for. This is also true of other adversely impacted residents who have not, but should also receive safe water deliveries. Immediate and chronic low-level exposure to gas industry chemicals constitutes an emergency situation.

Because groundwater flow rates are slow, chemical exposure is likely to continue for decades, centuries, or far longer. Since the gas industry does not use tracers that could readily be added to fracking and drilling fluids, residents have no means of determining which of hundreds of toxins they may be exposed to on a daily basis, much less whether common water treatment systems are effective in treating proprietary and untested chemicals. For these reasons, these people's well water is not safe to drink. Thus, I strongly recommend that Cabot's water deliveries be resumed immediately and continued until an alternate, safe, drinking water supply is piped to their homes.

HydroQuest
P.O. Box 387
Stone Ridge, N.Y. 12484
845-657-8111
hydroquest@yahoo.com

Paul A. Rubin
Hydrogeologist
HydroQuest

"*The dangers to our waters are, in fact, extreme. The damage may not show up for years, the ruination of our water may at first be invisible and in the end irreparable.*" Cyla Allison, Ph.D., Eight Rivers Council, West Virginia