

Town of Bristol
Focus Panel

June 28, 2012

Honeoye Central School Auditorium

Dr. Anthony Ingraffea, Civil and Environmental Engineering Professor at Cornell University

The Richmond Focus Panel hosted Dr. Ingraffea to speak to the Focus Panels and Town Boards of Richmond and Bristol, and people of the communities this evening. His presentation was on Unconventional Gas Drilling: Science, Myth, and Realities.

Dr. Ingraffea holds a Ph.D. in Rock Mechanics, with a particular focus in rock fracturing mechanics. He has been teaching at Cornell University since 1977. Between the years of 1982-2001, Dr. Ingraffea collaborated with the gas industry in his research on hydraulic fracturing.

He started out by stating it is very difficult to get gas out of shale and within the last 5 years four technologies have been combined in order to achieve this type of drilling.

1. Directional Drilling
2. High Volume of Hydro fracturing Fluid
3. Slick water
4. Multi-well pads and cluster drilling

He went on to say the process should be known as “refracturing” because the drilling is directed at pockets of shale that have been already naturally fractured over the course of time and the gas is found in the pockets of the fractures. Directional Drilling is necessary in this process because the gas is not located in just one place. There are places in the U.S. where the lateral drilling arms are as long as 15,000 feet. Slick water is comprised of four main ingredients: a friction reducer such as polyacrylamide, biocides such as bromine prevent organisms from clogging the fissures; surfactants such as butanol keep the sand suspended, and scale inhibitors such as hydrochloric acid and ethylene glycol. Slick water is combined with large amounts of sand and high volumes of water and then is forced down the well-bore to refracture the shale. One unconventional shale gas “HVHF” well requires 100 times the volume of water as a traditional vertical well. There have been 44, 000 gas wells fractured in New York State to date using a low volume method typically using around 80,000 gallons of water per well. The first 1,000 unconventional shale gas “HVHF” wells will require more water than all of the previous 44,000 wells combined.

Dr. Ingraffea expressed a concern for the speed with which the Gas Companies are moving ahead to extract the gas from the shale compared to the speed that technology for improving the processes involved with HVHF is improving. He said the technology for unconventional shale gas “HVHF” drilling is only about 5 years old at present there are 5,200 wells in Pennsylvania and 70 Oil and Gas Companies doing the drilling. The technology is still in its infancy and no one drilling company has significant experience. The 5,200 represent 5% of the expected 150,000 to 200,000 wells to be drilled in Pennsylvania. There have been many violations according to the DEP including 121 violations of well failure in 2011 alone. (See more violations from PA DEP Website by clicking on the following sequence: PA DEP, oil and gas,

Marcellus, violations, waste production, gas production) With regard to health impacts there is no way to prevent the hazards only decrease the probability of them with improved technology.

Throughout the presentation, Dr. Ingraffea dispelled several myths about unconventional gas drilling:

Myth #1: Fracking is a 60 year old, well-proven technology.

Truth: Traditional vertical wells have been hydraulically fracked in this country since the late 1940's, but this process is very different than horizontal fracking in shale. It wasn't until 1991 that the first horizontal drilling took place, and then 2002 was the first multi-stage slickwater fracturing. High Frack Fluid Volume was added in 2007 along with the idea to use multi-well pads and clustering. This completed putting the four technologies together to create HVHF shale gas drilling. Unconventional development of gas using high-volume fracking process is NOT a 60 year old, well-proven technology. It is still being developed.

Health Impact: Insufficient time to conduct scientific research of impacts due to the recent development of the process and inevitable accidents because it's a new process.

Myth #2: Fluid migration from faulty wells is a rare phenomenon.

Truth: Cement goes down the well as liquid; gas can break this down. Steel pipes and casing can fail. Cement may not cover everything. According to the gas industry's own data, 6.2% to 7.2% of the unconventional "HVHF" wells drilled in Pennsylvania have failed in the first few years: Of 15,000-16,000 traditional wells surveyed, about 5% of the wells fail/leak within the first five years, increasing exponentially so that after 28 years, 60% of the wells could be leaking.

Concerning methane migration, statistically virtually nothing is known. Methane exists in all wells, but at extremely low levels. Less than 0.5 mg./L are considered safe. Of the wells tested in Pennsylvania, 95.6% of the wells had methane concentration <7.0 mg/L

The truth is that fluid migration from faulty wells is a well-known, chronic problem with an unexpected rate of occurrence.

Health Impact: Contamination of USDW {underground source drinking water} with drilling fluid, frac fluid, and released hydrocarbons.

Myth #3: The use of multi-well pads and cluster drilling reduces surface impact.

Truth: Traditional wells have their own pad and infrastructure. Unconventional "HVHF" wells have several wells per pad and share the infrastructure. Each unconventional well in Pennsylvania is averaging 5.5 million gallons of water per well. This water needs to be trucked in, stored on site, and managed along with flowback fluids.

(Dr. Ingraffea showed several pictures of Pennsylvania drill pads which showed many cars, trucks, storage tanks, storage ponds, ditches around the pads, compressors, and all the other machinery used for unconventional “HVHF” drilling. This is “Heavy Industry” and pictures showed the industry can put a pad virtually anywhere.

Health Impact: Long term noise pollution, light pollution, noxious emissions, higher spill probabilities of frac fluid, venting and accidental emissions of produced gases.

Myth #4: Natural gas is a clean fossil fuel.

Truth: Methane is a significant greenhouse gas. Every 1% of methane gas that leaks is like burning gas twice.

(Here, Dr. Ingraffea offered his opinion that it is a good idea to move away from fossil fuels; technology exists to make New York State fossil fuel free, and we can be the leaders in that to produce long-term jobs and environmental benefits.)

Dr. Ingraffea opened up the presentation to questions from the focus panels, town board members, and the public. A series of questions and answers ensued.

1. Concern for the integrity of the cement and casings used for the wells. He said the long term impact is decades out and if an aging well fails there is a chance of methane migration and hydrocarbons escaping upwards in the well. The probability is unknown. The care taking of a well on the other hand is ongoing and the inspections need to go on forever. It will become the states responsibility after the oil and gas companies move on. He did say the wells being built today and forward are of a higher quality than in the past. There are 30,000 abandoned wells in NYS to date and a reputable drilling company would not drill in the area of such a well where it could affect the integrity of the new well. The more sophisticated drilling companies have micro seismic technology to determine the locations of such wells, fault lines and other geography of the area they are drilling in.

2. Permitting of unconventional”HVHF” gas wells in NYS? It was stated that NYS would need to increase the # of inspectors for the permits and that raises the question of where these people will get their training to be qualified to inspect the wells and various aspects of the drilling operations involved with the process.

3. What is the life expectancy of a HVHF well? According to the Chesapeake Gas Company a well in Pennsylvania has a life span of about 5 to 10 years with the volume of gas being taken from the well decreasing over the life of the well. At the 5 year mark they can decide whether to refracture the well or plug it and move on.

4. If Dr. Ingraffea had control of public policy in NYS at this time would he want the drilling to start in NYS? He said he would not permit "HVHF" Shale Gas exploration at this time with the current technology known. He feels the risks outweigh the benefits. His concern is natural gas contains methane and it is a potent greenhouse gas and at present there is not enough need to develop more fossil fuels here. He went on to say that he is part of a group of scientists, engineers, private investors, and some celebrities that are preparing to present a Comprehensive Plan to the Governor to further the development of alternative renewable energy sources in NYS. They plan to do this in the near future.
5. Is he impartial to this issue? He said he has zero financial gain for his presentations (122 since 2009) regarding the topic and does them as part of his commitment to Cornell and their Outreach Education Program. He went on to say that he has worked for the Gas industry in the past developing research and data and the majority of the money he has received has been used to provide for his graduate students to do their research.
6. Are permit applications open to public viewing? He said they are available to be looked at in Avon, the local DEC office.
7. Is water being taken from NYS to Pa. for use in the drilling process? He does not know the answer to this.
8. Is residual waste water and drill filings being brought into NYS landfills, he did not know the answer to this but someone in the audience said they thought there were two or three accepting the waste products. Dr. Ingraffea said this should be easy enough to find out as it is public knowledge.
9. Is it possible to use preexisting vertical wells: he said under a program called Drill Deeper an operator (Gas Company) can come in and use such a well as long as the well has been determined to withstand the additional pressures involved with HVHF.

The question and answer period was wrapped up by Dr. Ingraffea saying he is concerned with the structure of the rock formations below the ground and how it will withstand the disturbances the HVHF will do to it.

The Richmond Focus Panel thanked him for coming and the evening was concluded.

Respectfully submitted,

Sandy Riker
Secretary Town of Bristol
Focus Panel