

**Genni Kah**

**December 21, 2012**

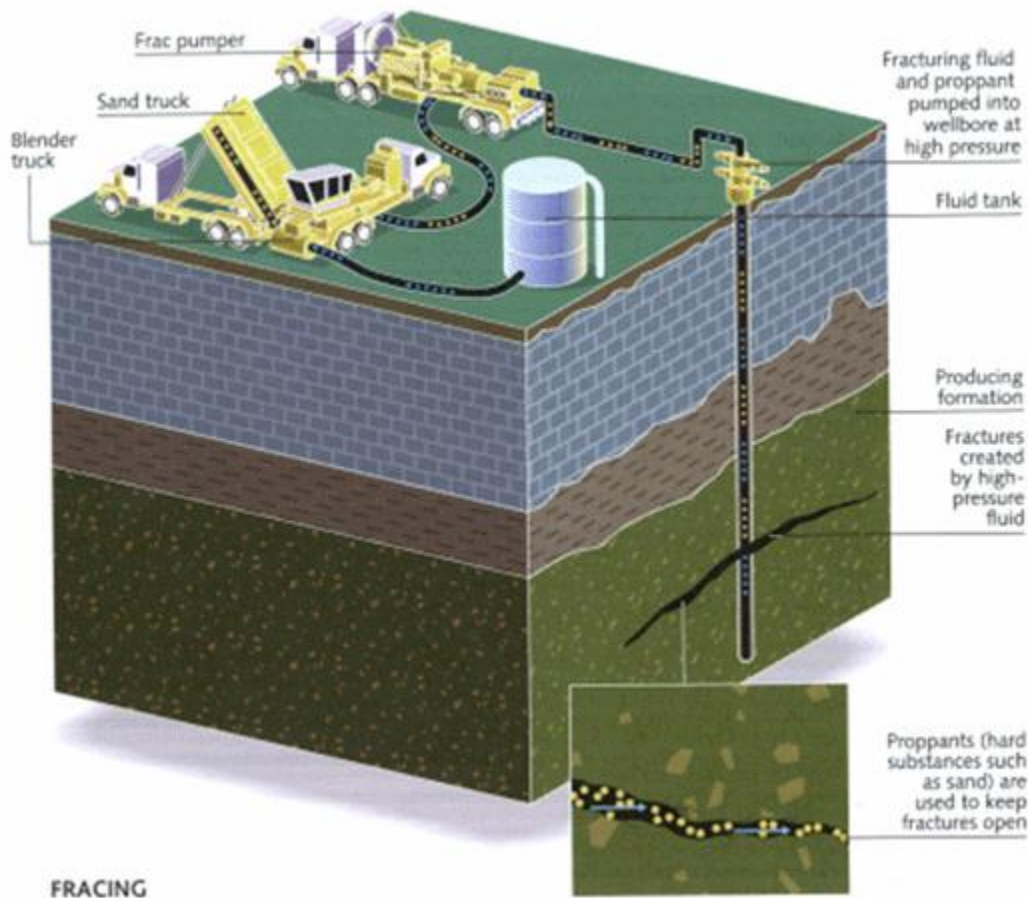
**Fracking Perfect**

I would have lived here,  
In this forever expanse of sky,  
The trees up ahead,  
The green grass underneath,  
It was perfect until they said goodbye.  
The wind rustled my leaves,  
And the red sky up ahead,  
Warned of a sad coming,  
So instead of staying,  
We had to leave instead.  
The trees chopped down,  
The grass withering in light,  
The unbearable heat of sun,  
The water being poisoned,  
It was all an uncomfortable sight.  
Then the ground shook,  
And the natural gas fled,  
The energy had come,  
And the humans were happy,  
For now, with money, they could be fed.  
But me, the flower,  
Felt the ground give a moan,  
And then I knew:  
We were all sitting  
On a death throne.  
As my petals withered,  
And I all but died,  
I looked out once more,  
At the scenery,  
And then I cried.  
Poison in the water,  
Death in my wake,  
Machinery punching the ground,  
And I couldn't help but wonder,  
How could this earth not break?  
It will someday, I'm sure of it,  
When no one stops the drill,  
But when can a measly  
Flower do to stop it,  
When the Earth is this ill?

“Earth provides enough to satisfy every man’s needs, but not every man’s greed”

*Mahatma Gandhi*

### **Hydrofracking for Natural Gas Contributes to Global Warming, Pollutes and Destroys our Environment**

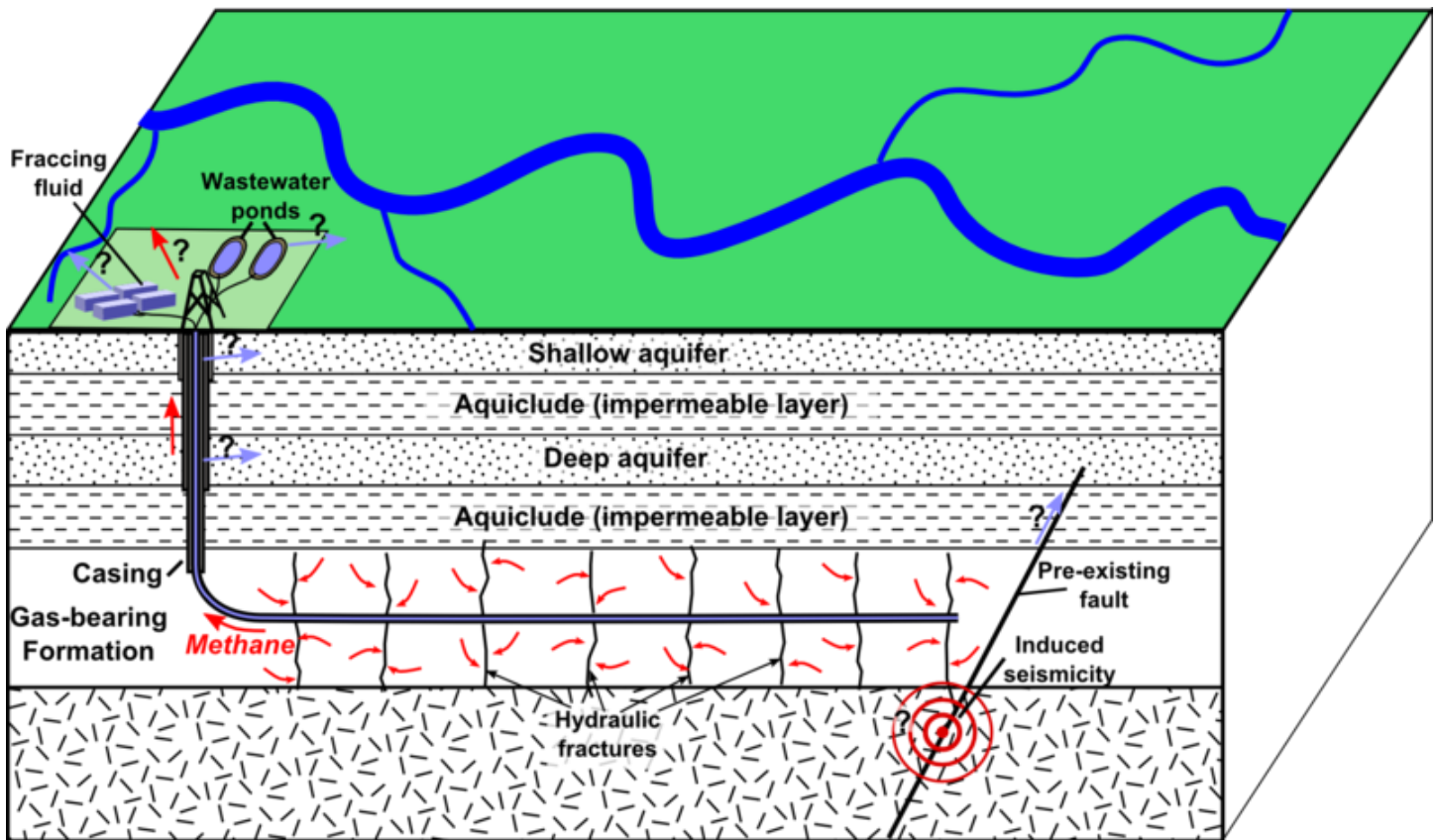


I grew up in a small country in South America called “Guyana,” the only English speaking country in South America. **Guyana is the native Amerindian name which meant “Land of Many Waters.”** It was a tropical climate, filled with nature, lush vegetation and an abundance of water. You did not even have to water the garden. With its tropical weather comprised of two rainy and two dry seasons, you could throw any seed into the garden and it would grow without much tending, because the land was very fertile and the weather was always warm.

As a child, whenever I took a shower or brushed my teeth, my parents always reminded me to conserve water so that we could save the planet. Global warming was instilled throughout my childhood to do my part and protect the environment for the next “upcoming” generation. But as I grew older, water became rationed by the government. This “Land of Many Waters” did not exist with this restriction. The water flowing through the pipes into the homes was timed, controlled and restricted. The government did not have enough money to pay for the electricity to pump the water to the homes in the brand new housing development. The water flow was strong enough to reach the outdoor garden pipes but not enough be pumped up to the faucets on the second floor. At nights, amazingly, the water pressure increased dramatically, when electricity was cheaper. We became accustomed to the water shutoff and adjusted ourselves to perform daily activities of filling multiple bottles of drinking water, big buckets and the bathtubs, in order to have enough precious water saved for non essential activities like flushing the toilets. We were forced to wake up early in the mornings to take our showers with running water. My parents woke up even earlier to take advantage of the flow and cooked our daily dinners every morning. In addition to being water rationed, the government also proceeded to turn off electric power to the homes for several hours each evening. At night the surrounding darkness was so pitch black with not a shining street light in sight. Books were read by lamps and candle lights. Televisions and air-conditioning was unheard of. I have fond memories of my father telling us stories while we sat on the balcony in the dark, patiently waiting for the electric power to be turned back on. Living in such a low-impact, energy reduced environment allowed us to foster literacy and build family relations.

When the chance came to migrate to the United States, Europe or some other foreign land, people left in droves. They wanted to get away from this poor country and travel to the land of the free, so that they could experience the abundance of food, water and electricity and not deal with any more restrictions and away from a country that was not advancing. We were not aware that moving to an industrialized country could increase carcinogen exposure greatly. Growing up like that taught me

to be flexible and always to be open to new ideas and innovations. Most Americans, sadly, have not experienced these types of restrictions. There is so much abundance of energy, waste of food, the latest I Phone, the fastest computer with everyone competing to be the biggest, the best and the fastest. The rest of the world looks on enviously as America seemed to have secured its future with the latest innovation in the natural gas exploration, "Hydrofracking or hydraulic fracturing". . Is the energy crisis, corrupt politics and economic problems going to cloud our leaders' judgment and continue to inflict more damage to our environment and water supply? Natural gas is a low polluting fossil fuel that always existed and is used to produce electricity to heat our homes. It is only in recent years that the drilling companies have developed newer techniques to unlock the enormous reserves. Many may see it as critical to help reduce America's reliance on oil and coal which produce millions of tons of toxic waste annually. Natural gas is naturally produced petroleum from organic molecules. Petroleum is a mixture of crude oil, natural gas and coal. Methane is the most abundant constituent of natural gas. It is cheaper and economical to retrieve natural gas through the "frocking, or hydrofracking" process.



Using a horizontal technique, hydraulic fracturing, using large amounts of water, combined with chemicals and sand, are pumped under high pressure into a drilled gas well to obtain natural gas from shale rock. Shale rock is rich in carbon and energy because it includes tiny bodies of primitive life. The term “hydrofracking” is derived from hydro means water and “frocking” is the process of fracturing the rock into pieces with machinery. The purpose of hydraulic fracturing is to form tiny fractures in the rock by using water to force the rock to open along tiny existing fractures. The gas companies drills horizontal holes in the rock formations which can be 5 miles in length. Fracking fluid is pumped into the horizontal holes at high pressures, fracturing the rock formations. Workers pump a high pressure mixture of water, sand and chemicals into an oil or gas well to fracture the underground rock. When the pressure is released and the water removed, the sand remains behind, propping open the newly created fractures and allowing gas to flow more freely into the well. About 60

percent of the fracking fluid is pumped back out and the natural gas begins to flow. The water contains dissolved methane, some of which escapes into the atmosphere.

Contrary to beliefs "hydrofracking" is not new. It has been around for over 60 years. *It was first used commercially used in 1903 and was first used in the United States in the late 1940s.*

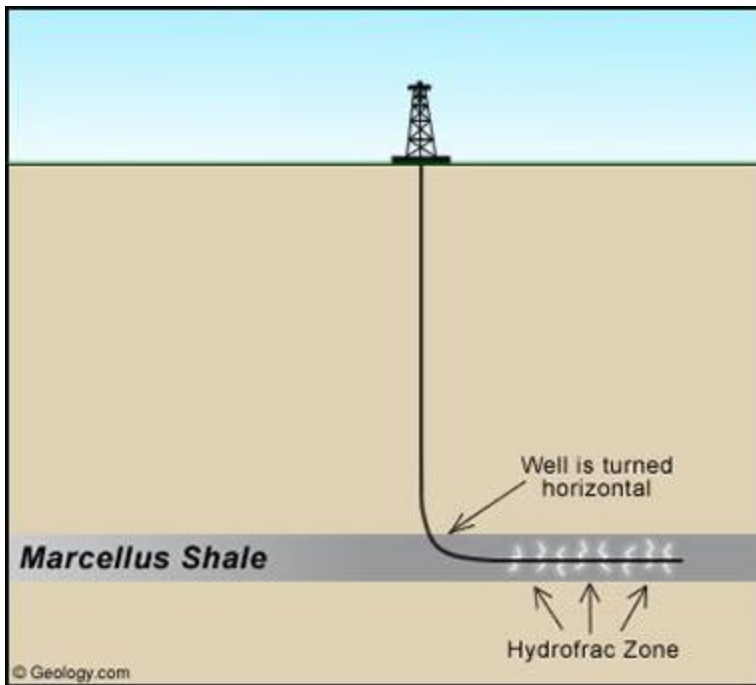
Hydrofracturing was first used in Kansas in 1947 by the Stanolind Oil Company which injected a mixture of acid and oil into a well to stimulate production of oil. A patent was issued the following year, and Halliburton Oil Well Cementing Company was given the exclusive rights to using the fracturing method. Halliburton added sand to the oil mixture and began fracturing wells. In 1953, water was introduced as a fracturing fluid, and various chemicals have been added over the years to increase the effectiveness of the fluid. Higher pressure with sand and concentrations means that more fractures are able to be opened and more gas will be released from the well. Some wells are fractured from eight to forty times during their lives. Most of the fracking from 1947 to 2005 were from petroleum wells. In 2005 the supply from the traditional gas wells were no longer keeping up with demand. In the early 1990s, a combination improvement in technology for fracturing the deeply buried shale rock formations and the rising price of fuels made hydrofracking economically viable. Energy has always been a high commodity. Experts had been predicting that the U.S. was running out of natural gas, but then shale gas began to flood the market, and prices plunged. As technology has advanced, our dependence on energy has increased with our main reliance on electricity which is obtained from the conversion of primary sources of energy such as coal, natural gas, nuclear power and other natural sources. It is estimated that there is enough shale formations in the United States that can supply the country for over 100 years and reduce the country's foreign oil imports and free the American people from higher oil prices.

Fracking is causing a boom in domestic energy exploration and energy companies are clamoring to drill. With the high unemployment rate in the America, lawmakers and the oil companies acclaim that the gas production is a viable source of jobs. One of the solutions that our leaders in New York

proclaim is "hydrofracking" will generate a great deal of jobs and lower the employment rate.

Hydraulic fracturing has become a controversial issue among conservatives, liberals and environmentalists. Gas companies claim that it slows climate change but most environmentalists feel that the entire hydrofracking process, not just burning, has too many carbon emissions, produces toxins like radon and toxic waste water, wastes good water, contaminates ground water, and wrecks nature because of the drilling and transportation that causes earthquakes. Environmentalists and concerned citizens concerned about global warming, are worried about the pollution and ground water contamination of our air and water because this new technology uses drilling fluids containing toxic chemicals including benzene, fluorine's, ethylene glycol and methanol which have been linked to liver, kidney, brain cancer, respiratory, skin disorders and birth defects. Concerns have been raised regarding the treatment of wastewater waste that is produced by the hydrofracking process as well as the toxic chemicals that are used.

The region of the current most controversy is the Marcellus Shale formation area in the New York and Pennsylvania borders discovered by geologists, which have Americans jumping on the "anti-fracking" bandwagon insisting that all "hydrofracking" be stopped now."



Oil riches can be traced back oil baron "John D.

Rockefeller" who acquired his massive oil fortunes in the 1800's from Pennsylvania's oil wells. "Mr. Rockefeller" still remembered today, for his vast wealth, *"envisioned the use of pipelines as an alternative transport for oil in 1877. Rockefeller gave up his dream of controlling the world's oil market as his company reached its peak, and oil production began to drop as foreign competition from Russia and Asia and new finds eroded his dominance."*

Russia and the Middle East are known to have the largest proved resources of natural gas on the planet but the Marcellus Shale, a mile-deep, rock-bound reservoir from New York, Pennsylvania and West Virginia is the Saudi Arabia of natural gas. Although drilling is expensive, the Marcellus Play could produce riches for the industry, landowners as well as billions of dollars in tax revenues in states. Peter Grannis, New York State's environmental commissioner calls the furor a "modern day gold rush."





Russia have been exporting vast quantities of oil to Europe and other countries for about \$10 per unit, but the current price in the U.S. is now about \$3 for the same quantity. Last year's unusually winter season which caused an increased supply of gas reserves caused the significant price drop. That kind of math got the attention of energy companies, and politicians, around the world. Wall Street bankers ecstatic about the latest oil rush, federal lawmakers in the thrall of industry money, and in hard pressed rural communities seduced by hollow promises of massive royalties, local prosperity and abundant jobs. The relative fortunes of the United States, Russia, and China and their ability to exert influence in the world -are tied in no small measure to global gas developments," Harvard University's Kennedy School of Government concluded in a report this summer.

**Can We Trust The EPA’s Pollution Tests**

*“It is horrifying that we have to fight our own government to save the environment.”* **Ansell Adams**

Newspapers and liberal bloggers want the public to believe that no studies have been completed but studies conducted by the EPA (Environmental Protection Agency) states that the current safeguards are completely safe. But can we rely on the EPA’s assurance? It is hard to forget that it was the EPA who pronounced the air at Ground Zero safe for rescue and construction workers

after the horrific disaster of September 11. I was one of those people who had taken the path train into the World Trade Center on September 11 on that fateful day. The *EPA that found no risk from hydraulic fracturing was the Bush-Cheney EPA, and Bush and Cheney were advocates of drilling and fossil fuels.* [1]. Houston based Halliburton and other energy companies enjoyed great support in the Bush White House and the Republican-controlled congress. Hydrofracking was created by the Halliburton loophole, was exempted from the Safe water drinking Act in the Energy Policy Act of 2005. Hydrofracking is not regulated by the Environmental Protection Agency and states across the US vary in how they address the issues.

### **Environmental Effects of the Pollution and Contamination of our Precious Water Supply**

If Russia and Brazil and other countries have so much natural gas, is it really a good export for America if it will ultimately damage the environment? Hydrofracking risks extend all over the country. The oil industry and the government agencies use the term “fracking” only as it relates to the actual process of pumping fluids into the ground to break apart rock. They do not include what happens while drilling, constructing the well, setting off explosions, dealing with blowouts or well fires, storing wastewater in open containment basins, vapors emitted from condensate tanks, open flaring to burn off gasses, transporting waste, injecting waste water into deep disposal wells or at any point in the future when the wells may leak. They also do not include the homes with explosive levels of methane as well as a house explosion linked to inadequate cementing of well casings.

Pennsylvania is the only state that has allowed drillers to discharge much of their waste through sewage treatment plants into rivers. Hydrofracking is regulated by the Bureau of Oil and Gas Management (BOGM). BOGM requires all oil and gas well operators to detail water management plans, provide a list of what chemicals are used, draft contingency plans for possible contamination and follow detailed standards for the storage of wastewater and flow back. More than 1.3 billion gallons of wastewater was produced by Pennsylvania wells over the past three years was sent to

treatment plants not equipped to remove many of the toxic materials in drilling waste. At least 12 sewage treatment plants in three states accepted gas industry wastewater and discharged waste that was only partly treated into the water supply. John H. Quigley states “in shifting away from coal and toward natural gas, we are trying for cleaner air, but we are producing massive amounts of toxic waste water with salts and naturally, occurring, radioactive materials.” Gas has seeped into underground drinking-water supplies in five states which include Colorado, Ohio, Pennsylvania, Texas and West Virginia.

Sys-tem	Ohio	N. Virginia and West Virginia	Western Maryland	Western Pennsylvania	Northwestern New York	International Stage
Middle Devonian	Olentangy Shale	Harrell Shale	Harrell Shale	Harrell Shale	Genesee Fm.	Frasnian
	?	Tully Limestone		Tully Limestone	Tully Limestone	Givetian
	Prout Limestone	Mahantango Formation	Mahantango Formation	Mahantango Formation	Moscow Shale	
	Plum Brook Shale				Ludlowville Shale	
					Skaneateles Shale	
	Delaware Limestone	Marcellus Shale	Marcellus Shale	Marcellus Shale	Marcellus Shale	Eifelian
	Columbus Limestone	Huntersville Chert	Needmore Shale	Selinsgrove Limestone	Onondaga Limestone	
Lower Dev.	Bois Blanc Limestone			Needmore Shale	Bois Blanc Fm.	Emsian

Gas producers are generally left to police themselves when it comes to spills. The Pennsylvania regulators do not perform unannounced inspections to check for signs of spills. Gas producers report their own spills, write their own spill response plans and lead their own cleanup efforts

Methane is the largest component of natural gas. Methane levels were 17 times higher in water wells near the sites. Methane is flammable and poses a risk of explosion and causes massive Ozone production – a 200 mile radius from the source. Methane in very high concentrations it can cause asphyxiation. When one farmer (who had leased their land to the oil company), turned on their kitchen faucet, out poured flaming tap water. There was enough methane from ejected from her pipes to light a match. The Pennsylvania Department of Environmental Protection did not connect

the flaming water taps to fracking; they blamed poor well construction and over-pressurization. The movie “Garland” also depicts the residents who were able to light their drinking water on fire [7]. *“Methane is initiated during fracturing and while only a small amount of gas is recovered, the migration continues at least a thousand times longer”*, says Professor Durand.

Representatives from energy companies like Shell and Chesapeake Energy said that they were producing far less wastewater because they were recycling much of it. But even with recycling, the amount of wastewater produced in Pennsylvania is expected to increase since it is projected that more than 50,000 new wells are likely to be drilled in the next two decades. Fracking produces more dangerous waste and many companies have not been following the proper waste disposal procedures. Fracking is causing environmental concerns about the way it takes in fresh water from lakes, rivers, aquifers and municipal drinking water systems and ejects contaminated water filled with salt, heavy metals and pollutants that it cannot be reused for drinking, irrigation or anything else. The water must be disposed of through injection in wells as it is unsuitable for disposal into freshwater lakes and rivers. The Environmental Protection Agency (EPA), state regulators and drillers have been aware of the existence of the toxic wastes and dangers to the environment and health, but have not intervened. There are those that say that in order to limit our dependence on foreign oil, achieving that goal should be focusing on job creation and investment in sustainable energies like solar, tidal and wind. “There are business pressures” on companies to “cut corners,” John Hangar. “It’s cheaper to dump wastewater than to treat it.’ It should not come at the expense of our precious water supply.” There are no regulations in place to protect the polluted drinking water. A single oil well can produce up to 1 million gallons of wastewater, which when left underground can migrate into aquifers. Studies show that radioactivity in this waste water can never be fully diluted in rivers and other waterways.

The problem has been the way the companies have been disposing the waste matter generated from the drilling. Chemicals that go down the well could eventually contaminate ground

water. Waste water eventually comes back up. Pennsylvania is the only state that has allowed drillers to discharge much of their waste through sewage treatment plants into rivers.

The number of gas wells has doubled to 493,000 since 1990 with 90% using hydrofracking. More than 1.3 billion gallons of wastewater was produced by Pennsylvania wells over the past three years and was sent to treatment plants that were not equipped to remove many of the toxic materials in drilling waste. At least 12 sewage treatment plants in three states accepted gas industry wastewater and discharged waste that was only partly treated into the water supply.

US Geologists started investigating after a significant increase in earthquakes in the Midwest region of Ohio. They are studying the seismic activity to determine if it is natural or manmade and if it is related to the fracking waste water disposal. Research has shown that deep-earth fluid injection can cause a significant in seismic activity. *After a series of earthquakes in northeastern Ohio, including a 4.0 Quake in Youngstown on New Year's Eve, state regulators ordered natural gas drillers to suspend development of several deep-injection wastewater wells and issued a new set of standards for frack-water disposal [32].* Despite that, Ohio continues to accept fracking waste from other states at recent quadrupled rates. A conversation with US.Geologist, Andrew Kyle who feels that "leaching" could potentially contaminate New York's water supply, derived from snow melt and reservoirs but he believes that "fracturing caused sinkholes to occur because of the void left underground after the water was retrieved. This causes the earth underneath to collapse, creating earthquake like symptoms, due to the repositioning." He does not think that hydrofracking is responsible for major earthquakes.

"Beyond the impact on water supplies, hydrofracking generates air pollution---large amounts of soot, volatile organic compounds, and ozone--which aggravates asthma and other respiratory disorders, and has been linked to increased risk of stroke, heart disease, various types of cancer and preterm birth," said Sandra Steingraber, PhD, at the PSEHE forum.

***“What we are doing to the forests of the world is a mirror reflection of what we are doing to ourselves and to one another” Mahatma Ghandi***

Oil field workers are exempt from certain safety rules, leading to a higher rate of accidents than other industries. In one state alone, police found that 40 percent of the 2,200 oil and gas industry trucks inspected were in such serious disrepair they had to be taken off the road. The Centers for Disease Control and Prevention reports that fatality rates for oil workers are, seven times the national average. Silica releases dust into the air which 99 percent of the workers breathe. Workers need to be properly protected from overexposure to silica are at risk of developing silicosis, a lung disease. Silica also causes lung cancer and has been associated with other ailments like tuberculosis, chronic obstructive pulmonary disease and kidney and autoimmune disease. “Sandra Steingraber”, author of “Living Downstream” believes that “90 to 95 percent of cancer is created by encounters with carcinogens during a person’s lifetime”. Doctor Steingraber tells her story about her bladder cancer exposure from the age of 20. Exposure to suspected carcinogens from chemicals introduced into the environment can cause irreparable damage. The World Health Organization (WHO) research shows that industrialized countries have far more cancers than countries with little industry and 80 percent of all cancers are influenced by our environment.

***“There’s so much pollution in the air now that if it weren’t for our lungs there’d be no place to put it all” Robert Orben***

Physicians in Pennsylvania and Ohio are bound by a “gag rule” which prevents doctors from sharing information about symptoms, diagnoses and disease clusters related to fracking chemicals even with other doctors and public health officials. Some doctors are not sure if the laws permit them to inform patients either. It is common for the health care field to discuss and consult with each other about the possible problems that can affect various populations. Dr. Helen Podgainsky says that the

new law not only “hinders preventative measures for our patients, it slows the treatment process by gagging free discussion.”

## **Politics of Energy**

New York residents are suing Spectra Energy for their plan to expand the pipeline between New York, New Jersey and Connecticut, which could expose residents to radon gas. Green Party candidate, Peter LaVenita slammed Governor Andrew Cuomo’s administration for to allow 50 hydrofracking wells to operate across New York in 2013. “I challenge Andrew Cuomo to drink fracking fluid instead of clean water for the next year if he truly believes it is safe.” Cuomo is looking lift the hydrofracking ban as he seeks to shutdown the Indian Point nuclear plant which supplies New York City and Westchester with 25% power. The Cuomo administration turned its back on an off-shore wind project in the Great Lakes. Solar and wind energy costs in the US has escalated making natural gas much cheaper. Solar energy and windmills programs should be expanded to reduce our greenhouse gas production. Change Wind corporation claims that their turbines make less noise and don’t hurt birds. On the other hand, others have complained about the visual impact of windmills. In Newport, Rhode Island, the backdrop of the palatial waterfront mansions along the famous Cliff Walk route. Would the millionaires allow a windmill farm to be built along their craggy coast which could potentially lower the value of their real estate? I doubt that very much. Peaceful Newport would be ruined by noisy windmills and reduced crowds means declining tourism could affect the town’s revenues.

Congressional candidate Donald Hassig believes that government has allowed hydrofracking to take off because it generates great profits for corporations in the industry. “Corporations are out of control and they are harming everything in America beyond what is acceptable.”

Many hydrofracking wells are located in otherwise depressed regions of the country which need employment opportunities to buoy the local economy. Consequently states are already jockeying to be the next “hydrofracking capital” with Pennsylvania being the current frontrunner.

### **Energy is the oxygen of the economy**

Clearly there is an economic benefit to the gas and there’s value from the standpoint of the national energy policy. *In the United States, for example, the American Petroleum Institute estimates that the industry supports more than nine million jobs directly and indirectly, this is over 5 percent of the country’s total employment. In 2009 the energy industry supported a total value added to the national economy of more than U.S. \$1 trillion, representing 7.7 percent of U.S. GDP [30].* The World Economic Forum report states that the United States has slipped from fifth position in 2011 Global competitive index to seventh in the latest 2012-2012 report, when compared to the rest of the world. Every year, the United States is losing its dominance as the world’s superpower. *Energy is the oxygen of the economy [9].* Energy increases the vibrancy and sustainability of the entire economy.

What if the United States generates enough gas to supply the entire country and build pipelines that can supply the rest of the world and shake its dependence on oil imports? This might bring back the United States back on top into the forefront. *National policies to improve energy efficiency can reduce oil imports, improve the reliability of the U.S. electric grid, and save consumers money, reduce air pollution, creates jobs, and reduces prices. [18]* These are the lies that we are fed by the oil companies who spend big advertising bucks to plead their case. But fracking is only going to be beneficial if it is done wisely and minimizes the impact to all natural resources.

### **Inform the public and impose solutions to deal with the current situation**

This past weekend at christening in New Jersey, I started the conversation about my paper with Jack Van Dyke, not knowing that he was an Exxon worker. Mr. Van Dyke worked as a pipe fitter



at the Exxon plant in New Jersey. He informed me the company was investigating “electric fracking” but could not divulge any further information. He waved a plastic spoon and said “this spoon has carcinogens which are toxic, if heated. It just depends on what you use it”. He obviously felt that Exxon was doing the right thing since they were generating jobs and he could feed his family. His father in law, sitting next to him, however, agreed with me that the oil companies were causing damage to the environment.

Hydro racking should ultimately be banned unless states are regulated and the oil companies follow the laws or risk heavy fines if they are caught dumping waste into the groundwater or find low carbon dioxide options that do not pollute the environment now or in the future.

**“I always tried to turn every disaster into an opportunity” *John D. Rockefeller***

I scored an interview with biology professor and geochemist, Robert Jackson in North Carolina, during the Thanksgiving holiday. I was nervous but after reviewing the syllabus and reviewing some of the suggestions on how to garner questions and answers on the topic, I felt more comfortable. Mr. Jackson feels that water samples of the private wells should be performed prior to drilling to obtain a baseline, during drilling and after drilling. He also felt that companies should provide full disclosure of what is included in the fracking fluids. That will force companies to use lesser toxic chemicals. Wells should be drilled 1000 to 2500 feet away from the drinking water. Enforced casings should be installed to prevent/reduce leaks. A tracer be put into the fracking fluid to prove contamination, he said. Sometimes it is hard to prove that a leaking radiator occurred especially if it is a private well. Public wells are routinely inspected for contaminants. Private wells are not inspected frequently. Mr. Jackson told me that states like Wyoming, Texas and Colorado are forcing full disclosure. “Companies in a hurry to build a rig, cut corners, make mistakes and that is where contaminations have occurred. Oil companies should be following best management practices

and regulations should be making more and more inspections.” Permits should be issued by the state with limitations. The EPA or a watchdog group could be involved with the regulation of the water supply and air quality and force the companies to pay revenues to the state if the inspections are compromised and add the collection of revenue as hostage. Hydrofracking should not be performed in populated areas to prevent exposure to harmful contaminants.

The Sierra Club’s Website reveals that Pennsylvania does not enforce oil and gas regulations. Lawsuits have emerged in Pennsylvania, Texas, West Virginia and New York to force environmental remediation by hydrofracking operators and recover damages to compensate for bodily injuries and property damage.

“Recycling waste water from hydrofracked wells can help greatly with this problem”, says Yves Pollart, Vice president with Rettew Flowback Inc. (RFI) Hydrofracking consumes 5 to 10 million gallons per well. 20 percent flows back up to the surface which must be disposed. “700 to 1000 truckloads just to carry away the water from a typical job,” Sumner said. Companies that treat water from hydrofracking operations to make it reusable are now seeing their own boom as energy producers try to reduce the costs and environmental impact of existing ways of handling the water. The resulting water can be made as clean as drinking water; however that is not usually the goal. The treatment techniques are effective enough that recycled water can be re-used over and over again for future jobs. The savings in consumption of fresh water, potential pollution of underground water supplies, possible prevention of earthquakes caused by injection and the financial benefits of treating water on-site so it does not have to be trucked in and out make recycling a highly attractive proposition for energy companies, environmentalists, regulators and transportation authorities charged with maintaining roads.

**“We do not inherit the earth from our ancestors; we borrow it from our children”**

### ***Native American Saying***

We ourselves can contribute to the greenhouse gas reduction by reducing our air conditioning consumption. In Switzerland, air-conditioning is illegal. My private tour of the Frank Gehry building at the Novartis campus in Basel, Switzerland is a modern example of how the American architect conformed to the Swiss government's prohibition of air-conditioning while incorporating a teepee style vent that cools and warms the building naturally. The Swiss believe that it is only 3 months out of every year that the weather is warm, so deal with it and contribute to saving the environment for the next generation, which would greatly reduce our energy consumption.





The government could build better infrastructures to make mass transit more accessible instead of building more roads and highways, especially for the suburban areas. Consumers can walk or take public transportation instead of driving our cars which would keep Americans active. My girlfriend's Swiss husband prefers to take the tram to work instead of driving his car as his contribution to saving the environment. We can all do our part to help reduce our dependence on oil and fight for our rights as citizens of America to protect the land for the next generation like my parents asked me to do when I was a child in a third world country.

### **Impose a Carbon Tax - The Solution**

As the US and the rest of the world expand in population, energy consumption will increase. The best solution I think is to employ Australia's method of a carbon tax to reduce the emissions that are contributing to global warming. Carbon is present in natural gas, coal and petroleum. It is

released as carbon dioxide, CO<sub>2</sub> that traps greenhouse gas. A carbon tax with rebates can be distributed among households and businesses and is a direct tax on the carbon content of the fossil fuels (coal, oil and natural gas) and will force to move to a lower carbon emission. The polluter would pay the higher tax. Monthly per person rebates can be available so that everyone can afford the energy that they need and we can eventually shift to cleaner energy. The US can also seek carbon fees with rebates from other countries, especially Russia and China who are heavily against carbon taxation. Support for the carbon tax is growing steadily among public officials, economists, scientists, policy expert, business leaders and ordinary citizens. A higher carbon tax will force the oil companies to re-invest in solar, wind and alternative energy, which will bring down their current high prices and are known to reduce greenhouse gases.

When I first started this research, I had no idea what hydrofracking was about. This research has opened my eyes, brought awareness and has been a topic of many discussions during my research. Likewise I feel that the public needs to be aware and more and more needs to be done to make the public aware of the dangers to our environment and demand accountability. More protests around the world are forming to educate the public about the dangers. More rules and regulations need to be adopted immediately across the states to enforce rules for the oil companies. Hydrofracking is a violent assault against our great earth. It is being pursued by greedy people who only care about their own obscene profit margins. The bottom line is that if we continue to allow them to get away with what they are doing, we are doing a disservice to our earth and future generations.

***The most alarming of all man's assaults upon the environment is the contamination of air, earth, rivers, and sea with dangerous and even lethal materials. This pollution is for the most part irrecoverable; the chain of evil it initiates not only in the world that must support life but in living tissues is for the most part irreversible. In this now universal contamination of the environment, chemicals are the sinister and little-recognized partners of radiation in changing***

***the very nature of the world—the very nature of its life*** Rachel Carson, marine biologist and author

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