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Opening talk at Temple Univ. forum on Marcellus drilling.

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DCS

THIS SYMBOL \*\* ( ) with a number in the parenthesis indicates the corresponding slide that goes with that section of text. ... slide 1 was used by Tracy Carluccio (Delaware RiverKeeper Network) in her talk about the Delaware Basin and the DRBC

\*\* (2) First, I have a confession to make - I have an addiction ... This does color my experience as it may be incurable and I have to indulge on a daily basis ... I AM a water drinker.

Are there any others here? ... I thought there might be ...

Looking at water from this slightly askance view does make you think ... , WAIT, that's not an addiction - water is a necessity.

Personally and for our communities.

What is our community? What is local? How we define these concepts will effect how we perceive the issue of unconventional shale gas drilling. If we look at water we must take a very wide perspective. Water flows, it does not stay still. We are all in the same pond. With that in mind lets look at how this gas drilling will effect Philadelphia's drinking water. Your water comes from the Delaware and the Schuylkill Rivers. The watersheds that provide the rivers' water overlay the Marcellus shale where natural gas (or ngas) is currently being sought after.

What is there to be worried about?

Scale of Development and implications of the scale

Stages of Development

-Drilling

-Fracturing

-Gas Processing

-Waste Handling

Each stage of the process produces air, water and other contamination

Today we will primarily look at effects on WATER

water supply, aquifer water, ground water, the Delaware River, and your drinking water Keep in mind that the ngas industry has exemptions to major parts of many protective laws. A good portion of these exemptions were put in with the 2005 Energy Act.

Everything I say here today I have ample references for and can supply these references to you - just ask.

\*\* (3) OK . Scale of Development This is the area of the future Jonah gas field in 1986 - mostly undisturbed sage - grassland - the area shown is about 7 miles across - it is in Wyoming near Yellowstone National Park and is in the Greater Yellowstone Eco system which did support 100,000 strong herd of elk, prong horn, and mule deer as well as the endangered sage grouse

\*\* (4) this is in 1999 - well spacings are about 1 per 80 acres

\*\* (5) this is in 2006

\*\* (6) same area in 2006 - the wells are on 3 to 5 acre pads - most of these pictured were built in about 7 years. The spacing here is "infilled" down to about one well every 40 acres - the wildlife population in this area has now decreased over 45% The "infill" is slated to continue and be at one well per 10 acres in some areas.

\*\* (7) Impacts - the drilling and fracturing use chemical mixtures mixed into millions of gallons of water and complicated machinery. Human error both deliberate and inadvertent that have major environmental consequences have resulted. Spills, releases, blowouts, explosions all happen. the process is intrinsically

contaminating to air and water, very industrial and complex. When combined with lack of oversight the impacts not only occur, they multiply. John Hanger, PA DEP head said this past March, that there would be inevitable environmental damage including possible contamination of water supplies, but it was going to be worth it. I wonder, worth it to who?

... in addition to that addiction to water i mentioned, I also like to eat.

The result of the soil being contaminated by chemical drilling muds, fracturing chemicals and materials released from the formation and other layers is that the food chain is compromised.

\*\* (8) for a fairly complete explanation of the gas drilling processes please see the video of a 25 minute talk I gave in Endicott NY last year on DamascusCitizens.org - on the right hand side of the homepage. Each of the steps shown here produce pollution. The fact that the industry was able - in the 2005 Energy Act - to have gas drilling wastes declared "special" does not make them less toxic. These Halburton loopholes- as Dr. Colborn calls them - alleviated the industry's liability for the damages they knew would be caused by their activities. Hydraulic fracturing to break up the shale layer introduces 20 tons of chemicals for every million gallons of water used - can include benzene, methanol, biocides, and many more. The companies don't have to say what they are using. The initial drilling is done into the raw earth - so you have the initial drilling circulating drilling muds and cuttings in direct contact with aquifer layers. The well are then cased, at least partly along the vertical sections and never along the horizontal sections. Casing errors and miscalculations happen. Drilling and fracturing need large scale materials handling, waste disposal and many pipe connections. At each step there can and are failures. PA DEP says there is a 2 to 5% failure rate , in Dimock Cabot's failure rate is 11% based on what we know today. And Cabot, though verified by the PA DEP as having so far contaminated a 9 square mile area where there is no longer drinkable water, is still being given more drilling permits in that same area and in other areas. The very existence of natural fractures connecting the formation layers to aquifer layers and the surface have been verified by the U S Geological Service, other geological study entities and by the gas and oil industry itself - as Shell, as one example, has bragged about being able to spot from the air those places that ngas is escaping from natural fractures as an indicator for where they should explore.

\*\* (9) Just connecting the layers can do major damage - Of concern is what is introduced and what is released from the deep underground. Drilling releases fluids with very high salt concentrations, toxic quantities of trace elements, heavy metals and radioactivity. This slide shows an aquifer and surface water contamination event in north Texas involving the Trinity-Woodbine Aquifer that continues to this day. By the way, in the area near the Jonah gas field you saw earlier, there is a plume of contaminants that stretches 28 miles.

\*\* (10) this is a list of fracturing materials - available on [ogap.org](http://ogap.org) and in DamascusCitizens Research Paper on the lower right of our homepage. The materials in this list are in other lists now available. These materials are in the fluids that return to the surface but also are forced long distances underground as a result of the extreme pressures of hydraulic fracturing . The unknown and unpredictable connections of natural faults and natural pre-existing fractures that are a part of the geology of this whole area means that connections can be made with aquifers and with springs and with the surface causing contamination. There is quite a collection of examples of this happening in Pennsylvania and other states. Some of the most extensive lists of chemicals used in drilling can be found on Dr. Theo Colborn's website, [EndocrineDisruption.com](http://EndocrineDisruption.com). There are also analysis of materials from about a dozen well sites - mostly in PA in the dsGEIS - in chapter5, and see appendix13 for a layout of NORMs - Normally Occurring Radioactive Materials - from those gas wells.

\*\* (11) This slide shows part of the cover page and a section of the intro of a paper delivered to the Society of Petroleum Engineers in 2008 - basically the same paper was delivered last year and will again this year, judging by the published abstract. The paper does not cover effects from fracturing per se, but effects from all other aspects of drilling ... I READ THE quoted section on the slide.

\*\* (12) New York City has had a study done of the impacts gas drilling could have on its watershed. Released Dec 23, 2009, in time to be entered as comment to the NY review of its gas drilling impact study - dsGEIS. Everything in that report except for the aqueducts also applies to Philadelphia's water supply. Yes, NYC's water is unfiltered and Philadelphia's is filtered, but bear in mind that there are no methods to remove all of the possible contaminants to drinking water standards once they are in the water supply.

\*\* (13) Also in Pennsylvania there are 7,554 orphaned and abandoned gas and oil wells and an unknown status for 184,500 gas and oil wells. There is a plugging program in PA that plugs 30 to 40 wells a year, but it is not even known where the approximately 184,500 unknown wells are. Each one of these provides a direct existing connection between geological layers, which when placed under the 5 to 7 thousand pound per square inch pressures for several days of the fracturing process are a recipe for disaster.

\*\* (14) This slide about one of the very rare actual health effect studies done in a drilled area - around DISH, Texas there are many gas wells - looks like the Jonah gas field - and there are the associated compressor stations to those wells. The residents spent a sizable portion of their yearly budget to do air sampling and a report was compiled - it is on their website - [TownofDISH.com](http://TownofDISH.com) - and this health survey was also done at their own initiative. I urge you to look at it. Also now that in the Barnett shale - DISH is in the Barnett shale - about 25 miles north of Fort worth - the asthma rate for children is 25% - for the whole state of Texas it is 7%.

\*\* (15) Philadelphia along with much of New Jersey can thank the Delaware River for its water. All in the Delaware River Basin must look to the Delaware River Basin Commission for permits to drill or frac in the basin. ... except it seems, if the gas wells are called "test" wells by Pennsylvania - even though the "test" wells are given permits by PA DEP to "drill and operate". The one "test" well in Wayne county - Robson - has caused contamination and been given a notice of violation.

\*\* "(16)Fracking is not economically viable without being subsidized through externalization of its environmental costs" said Al Appleton, former NYC Water Commissioner and watershed expert

Remember PCBs in the Hudson River have travelled 200 miles. What happens in the Upper Delaware will come here. Plus the "wastes may be trucked here or dumped.

There is legal (called "brine" spreading and "treatment" plants(actually just dilution)) and illegal dumping of waste fluids happening now where there is active drilling in western PA and in the Susquehanna Basin. All water in the basin flows to the river.

Dunkard Creek is dead now, a hazard zone; 38 miles including 161 species.

Pittsburgh and the rest of the 385 thousand people who get their drinking water from the Monongahela River in western PA have had "bottled water" alerts three times in a year from gas drilling related contamination. And the PA DEP has not tested for VOCs, benzene, surfactants, toxic metals or radioactivity, they only talk about TDS, a category that is as specific as saying, "stuff" is in your drinking water. Bio-accumulation, endocrine disruptors, toxic mineral build ups, radiation in drinking water all are facts of shale drilling. John Hanger says, " the hazards are worth it for the economic gain" But what is clean water worth? Can you and your children live a healthy life without clean water?

We are all water drinkers.

Thank you.