

## The Cumulative Community Impact of the Massive Industrialization of Shale Gas Drilling

The industry<sup>i</sup> admits that “most of the significant onshore oil and gas reserves have been exploited . . . . The significant recoverable reserves . . . . are probably limited to *less convenient* locations .” Shale is one of those “*inconvenient places*”. High Volume Horizontal Hydro Fracture (HVHFF) is the only way to obtain “significant recoverable” petroleum from that shale.

Human ingenuity has invented drills that penetrate a mile deep and can turn directionally to drill 2 miles horizontally. Fracturing shale down and out three miles of pipe takes 3,000,000---9,000,000 gallons of water, tons of sand and thousands of gallons of chemicals. This water, sand and chemicals must be forced under 10,000 psi to 15,000 psi<sup>ii</sup> to fracture the shale and force the tiny natural cracks open to allow the gas trapped in tiny natural cracks in the shale up the pipe.

In PA, about 1800 shale gas (Marcellus) wells were drilled between January 2007 and September 2010, with perhaps as many as 3,000 drilled to date. At present only a handful of shale gas wells have been drilled in Ohio. Therefore, we must learn from other states, even as we recognize there are some differences in geology and geography.

In an informal report, a resident of Carroll County, Ohio stated that 95% of that county has been leased. If all of Portage County (OH) were to be leased, here’s what would happen:

Portage County is 507 square miles (324,480 acres). Typical drilling units are 640 acres (1 square mile), with one well pad per drilling unit. Therefore, 507 well pads could be built in Portage County. A typical well pad is 3-8 acres, on which 4-10 wells can be drilled. The industry touts less surface land disturbance, not mentioning the community impact: For each well, 3,000,000 to 9,000,000 gallons of water must be used (about as much as a town of 2000 uses in a year<sup>iii</sup>), tons of sand and either 1% or 0.5% chemicals--- 30,000 to 90,000 gallons of chemicals. It takes 800-1000 truck loads to get the rig, sand, water, and chemicals to the well pad. Each well takes 30-40 days to drill. With 507 well pads, it will be years and years of truck traffic in our county.

“Flowback” or “produced” water (the chemical-laden water for fracking) returns to the surface and must be removed and disposed. Presently the safest way PA has found is to ship it to OH into Class II Injection wells. It is 5-10x saltier than sea water, and contains chemicals which are toxic in parts per billion, as well as radioactivity.<sup>iv</sup>

Pipelines must connect these wells<sup>v</sup>; they typically have right-of-ways 50 feet wide and (unless restricted by terms of a lease), will run as directly as possible through forests, pastures, etc.. <sup>vi</sup> Along those pipelines, compressor stations are required about every 40-100 miles, <sup>vii</sup> or approximately one compressor station for every 20 wells. Here’s a link

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that gives you an idea what compressor stations are like:

<http://www.youtube.com/watch?v=gW4zSayf9O4> .

Shale is naturally radioactive and that radioactivity comes up in the “flowback” or “produced” water that comes up with the gas for the life of the well. In addition, this radioactivity scales on the pipes, making the pipes radioactive. Dr. Resnikoff says that in five years, these pipes may need to be dug up and disposed of.<sup>viii</sup>

Drill cuttings must be disposed of. Currently they are typically disposed of in landfills. The current reports state the radium-226 (similar to the radon that might be in a basement) is at safe levels. However, there are no studies of the cumulative effects when there are thousands of these wells in a comparatively small area and thousands of tons of cuttings must be disposed of.<sup>ix</sup>

Finally, air pollution. The thousands of trucks use diesel fuel as do compressor stations; wells produce “fugitive gas emissions”<sup>x</sup> Theo Coburn discusses the chemicals typically used in HVHH gas drilling and the air pollution associated with the gas production. There are other sources as well. (<http://www.endocrinedisruption.com/home.php> )

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<sup>i</sup> <http://events.nace.org/library/corrosion/OGExploration/Introduction.asp> and [http://www.bape.gouv.qc.ca/sections/mandats/Gaz\\_de\\_schiste/documents/DM151.1.pdf](http://www.bape.gouv.qc.ca/sections/mandats/Gaz_de_schiste/documents/DM151.1.pdf)

<sup>ii</sup> Note that a firehose typically sprays at 400-500 psi. Bombs explode at 10,000 psi.

<sup>iii</sup> Of course when humans use water, it can be cleaned and it can re-enter the water cycle. At present, the safest thing to do with drilling waste water is to bury it underground (in Class II injection wells) and hope it never migrates back into the water cycle.

<sup>iv</sup> <http://www.citizenscampaign.org/campaigns/hydro-fracking.asp>

<sup>v</sup> <http://www.propublica.org/article/underground-industry-gas-pipelines-are-big-business-but-lightly-regulated>

<sup>vi</sup> <http://extension.psu.edu/naturalgas/news/2010/04/pipelineinfo>

<sup>vii</sup> <http://www.naturalgas.org/naturalgas/transport.asp>

<sup>viii</sup> <http://shaleshockmedia.org/2011/10/18/radiation-problems-due-to-hydrofracking/>

**Dr. Marvin Resnikoff** is an international consultant on radioactive waste issues. A nuclear physicist and a graduate of the University of Michigan. His recent research focus has been on the risk of transporting and storing radioactive waste and the health impact of radioactive waste from oil and uranium production. Dr. Resnikoff has also co-authored four books on radioactive issues, including *Deadly Defense* and *Danger Below*, both regarding contamination at DOE facilities. In June 2000, he was appointed by DOE secretary Bill Richardson to a Blue Ribbon Panel on Alternatives to Incineration.

<sup>ix</sup> <http://marcellusdrilling.com/2011/02/two-landfills-in-south-central-pa-approved-by-dep-to-accept-marcellus-shale-drill-cuttings/> or

<http://www.earthworksaction.org/pubs/OGAPMarcellusShaleReport-6-12-08.pdf>

<sup>x</sup> <http://www.citizenscampaign.org/campaigns/hydro-fracking.asp>