The Network for Public Health Law

Ideas. Experience. Practical answers.

ENVIRONMENTAL HEALTH – HYDRAULIC FRACTURING

Fact Sheet

The Impact of Hydraulic Fracturing on Communities

This Fact Sheet focuses on the immediate impact of fracking on the communities near the fracking site. These impacts start as the site is being prepared for fracking, continue throughout the fracking process and have an acute effect on the neighboring community. Our Environmental Impacts Fact Sheet addresses broader impacts that are of concern well beyond the community adjacent to a fracking site.

Water Usage

Hydraulic fracturing (fracking) of a single shale well requires between 2 and 4 million gallons of water.[1] In the Marcellus Shale field, each well is estimated to require 3.8 million gallons of water.[2] Usage of such large volumes of water may stress drinking water supplies and result in lowered water tables, decreased stream flows and reduced volumes of water in surface water reservoirs.[3]

Roads and Truck Traffic

The demand for large quantities of water (est. 3.8 million gallons),[4] chemicals (15,000 to 60,000 gallons)[5] and equipment at drilling sites results in excessive truck traffic on rural roads that were not designed for such a purpose. A report from Denton, Texas found that a single well site could require 364 truck trips – the equivalent of about 3.5 million car trips – for the transportation of water alone.[6] In Lycoming County, Pennsylvania, another study reported that 77 tractor trailer truck loads were required solely for the drilling equipment.[7]

Overall, the Environmental Protection Agency (EPA) estimates that total truck traffic for an individual well in the Marcellus Shale region ranges from 300 to 1,300 truck trips.[8] However, since a site may contain up to eight wells,[9] the number of total truck trips may reach 8,900 (~1,112 per well) for each well pad.[10] Further, these trips are confined to a window of four to five weeks.[11] The amount of truck traffic typically exceeds the quantity and type anticipated during road construction and may result in deteriorated road conditions, interference with traffic flow and annoyance to the community.

Environmental Footprint of Well Pads

Well pads present both aesthetic and environmental issues. Although horizontal drilling techniques allow for the drilling of numerous wells at a single well site, thereby reducing the total number of well sites, well pads often span four to six acres. These large footprints are required to account for the substantial amounts of water and chemicals required during the fracturing process and to store wastewater.[12]

To accommodate these well pads, large areas of trees must be cleared prior to oil and gas extraction. As the density of well pads increase, deforestation causes an increase in both soil erosion and the risk of habitat fragmentation for local wildlife. Well pads also require access roads, commonly dirt roads, which lead to increased dust that adversely impacts local air quality.[13]

On well sites that utilize evaporation pits for the temporary storage of flowback, toxic chemicals and oil contained in flowback may contaminate ground and surface water.[14] Chemicals can escape the pit if no lining or an improperly constructed lining is used. Fluids may also spill over during periods of heavy rain or other severe weather events.[15] In addition, volatile organic compounds (VOCs) and other pollutants contained in the flowback evaporate and contribute to local air contamination.[16] Lastly, evaporation pits are linked to increases in wildlife mortality.[17]

Occupational Risks

EPA noted that the oil and gas extraction industry has an annual occupational fatality rate eight times higher than the rate for all U.S. workers.[18] Moreover, the annual fatality rate increased proportionally with increased drilling activity, which may reflect a greater number of inexperienced workers, excessive work hours or the use of older equipment with fewer safeguards.[19] Fracking also carries inherent occupational risks such as blowouts, chemical spills, vehicle accidents and exposure to fumes.[20] To date, the acute and chronic exposure of workers to fracking chemicals has not been determined.

Noise

Moderate to significant noise impacts are experienced within 1,000 feet of a well site during the drilling phase.[21] Since drilling operations and truck traffic typically occur 24 hours a day, the noise impacts can be a nuisance to nearby residents. The sources of noise during the drilling phase include the operation of tractors, backhoes, cement mixers, truck traffic and rig operations such as compressors and pipe handling.[22] A study addressing the impacts of low frequency noise typically associated with compressors identified the following common symptoms: annoyance, stress, irritation, unease, fatigue, headache, adverse visual functions and disturbed sleep.[23] Unfortunately, landowners impacted by noise are left with little recourse because they are typically engaged in voluntary lease agreements with the well operator that may protect the drillers from liability.[24]

Seismic Activity

Fracking activities have been suggested as the cause of low-magnitude earthquakes in Arkansas and Texas.[25] In 2008 and 2009, the town of Cleburne, Texas, experienced several clusters of weak earthquakes (3.3 or less on the Richter scale) for the first time in its history; the seismic activity occurred after an increase in drilling into the Barnett Shale. A study by researchers at the University of Texas and Southern Methodist University did not establish a conclusive link between drilling and the increased seismic activity, but the study did indicate that the injection of wastewater into disposal wells may have been responsible.[26] More recently, a geologist with the Arkansas Geological Survey stated there were over 1,000 earthquakes between September 2010 and April 2011 in the north-central cities of Greenbrier and Guy,

Arkansas.[27] After an earthquake of magnitude 4.7 on February 27, 2011, the Oil and Gas Commission of Arkansas ordered the emergency shutdown of two natural gas wells near the fault line.[28] There were more than 80 seismic events with a magnitude 2.5 or greater in the month before the emergency shutdown, compared with only 20 in the month after.[29] In July 2011, the Oil and Gas Commission of Arkansas enacted a permanent moratorium on the injection of wastewater in a 1,150 square-mile area in central Arkansas.[30]

SUPPORTERS

Robert Wood Johnson Foundation

The Network for Public Health Law is a national initiative of the Robert Wood Johnson Foundation with direction and technical assistance by the Public Health Law Center at William Mitchell College of Law.

This document was developed by Kathleen Dachille, director of the Network for Public Health Law Network - Eastern Region at the University of Maryland Carey School of Law, with assistance from student attorneys in the Public Health Law Clinic—Beau Burton, Sanjay De, Molly Madden and Helena Mastrogianis. The Network for Public Health Law provides information and technical assistance on issues related to public health. The legal information and assistance provided in this document does not constitute legal advice or legal representation. For legal advice, please consult specific legal counsel.

[1] U.S. EPA, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* 19, (2011), http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft_SAB_020711-08.pdf [hereinafter *EPA Draft Plan*].

[2] *Id.*

[3] *Id.* at 20.

[4] *Id.*

[5] *Id.* at 24.

[6] *Marcellus Shale: What Local Government Officials Need to Know* 11, (Pennsylvania State College of Agricultural Sciences, 2008), *available at* http://pubs.cas.psu.edu/freepubs/pdfs/ua454.pdf.

[7] *Id.* at 11.

[8] *EPA Draft Plan* at 55.

[9] N.Y. Energy Res. & Dev., *Impacts on Community Character of Horizontal Drilling and High Volume Fracturing in Marcellus Shale and Other Low Permeability Gas Reservoirs* 26, (NTC Consultants, Sept. 16, 2009), *available at* http://www.nyserda.org/publications/03%20Chapter%203%20-%20NTC%202009-9-16.pdf.

[10] *Id*. at 22.

[11] *Id.* at 10.

[12] National Park Service, *Development of the Natural Gas Resources in the Marcellus Shale* 6 (November 2009), *available at* http://www.marcellus.psu.edu/resources/PDFs/marcellusshalereport09.pdf.pdf.

[13] *EPA Draft Plan* at 55-56.

[14] *Id*. at 37.

[15] Mark Zoback et al., *Addressing the Environmental Risks from Shale Gas Development* 11 (July 2010), *available at* http://www.worldwatch.org/files/pdf/Hydraulic%20Fracturing%20Paper.pdf.

[16] *Id.* at 12.

[17] U.S. Fish and Wildlife Service, *Wildlife Mortality Risk in Oil Field Waste Pits* 1 (U.S. Fish and Wildlife Service Region 6 Contaminants Information Bulletin, Dec. 2000), *available at* http://www.fws.gov/mountain-prairie/contaminants/papers/pitrisk.pdf.

[18] *EPA Draft Plan* at 56.

[19] *Id.*

[20] *Id.* at 57.

[21] New York State Dep't Env't Conservation, *Final Scope for Draft Supplemental Generic Environmental Impact Statement on Oil, Gas, and Solution Mining Regulatory Program* 20, (Feb. 6, 2009), *available at* http://www.dec.ny.gov/docs/materials_minerals_pdf/finalscope.pdf [hereinafter *New York State Dep't Env't Conservation*].

[22] *Id.*

[23] Roxana Witter et al., Colorado School of Public Health, *Potential Exposure-Related Human Health Effects of Oil and Gas Development: A Literature Review (2003-2008)* 26, (Aug. 1, 2008), *available at* http://www.ccag.org.au/images/stories/pdfs/literature%20review%20witter%20et%20al%202008.pdf

[24] *New York State Dep't Env't Conservation* at 21.

[25] Chris Bury & Ely Brown, *Are Arkansas' Natural Gas Injection Wells Causing Earthquakes?*, ABC News, April 21, 2011, http://abcnews.go.com/Technology/hundreds-arkansas-earthquakes-linked-natural-gas-injection-wells/story?id=13431093; *EPA Draft Plan* at 56.

[26] *Id.*

[27] Sarah Eddington, *Shutdown of Wells Extended in Arkansas Quake Study*, Bloomberg Businessweek, April 20, 2011, http://www.businessweek.com/ap/financialnews/D9MNL3BG0.htm.

[28] Katherina Yancy *, AR Geological Survey Data on Possible Cause of Earthquakes*, KATV, March 04, 2011, http://www.katv.com/story/14192109/ar-geological-survey-data-on-possible-cause-of-earthquakes.

[29] Eddington, *supra* note 28.

[30] Caroline Zilk, *Permanent Disposal-Well Moratorium Issued Decision Affects Northern Faulkner County Seismic Hot Spot*, Arkansas Online, July 31, 2011,

http://www.arkansasonline.com/news/2011/jul/31/permanent-disposal-well-moratorium-issued-20110731/