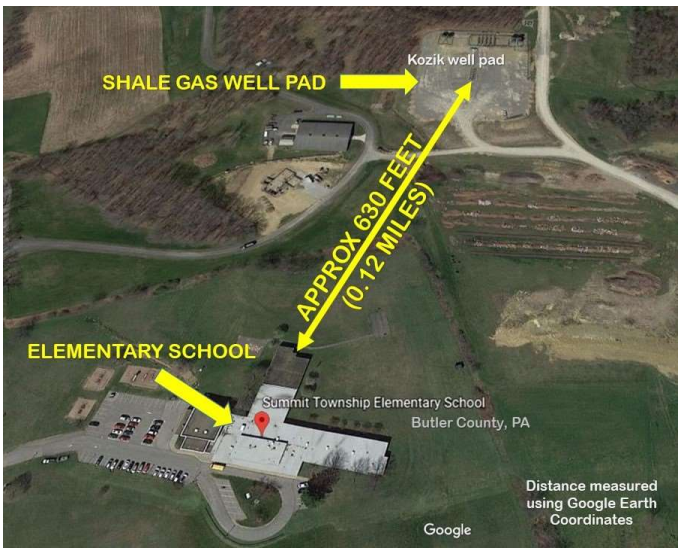
EHP ENVIRONMENTAL HEALTH PROJECT SOUTHWEST PENNSYLVANIA

Setback Distances, Public Health and Shale Gas Development

Based on the growing number of health impact studies related to shale gas development, setback distances from gas infrastructure should be increased to ***AT LEAST 0.6 mile*** *(3281 feet).*

Shale gas facilities release emissions into the air. These emissions contain methane as well as toxic substances including formaldehyde, and volatile organic compounds (VOCs) such as benzene and toluene. Air currents carry the emissions away from facilities into surrounding communities. In addition, methane is explosive. Accidents involving explosions have occurred at shale gas facilities including well pads, pipelines and compressor stations. In order to protect public health, setback distances need to be adjusted for facilities to address both emissions and explosion dangers. Appropriate setback distances are also important related to water sources and pipelines, but are not addressed here.



A **setback distance** is the distance a shale gas facility is required by law to be from a structure or building.

As of 2018 in PA, setback distance is 500 feet for horizontally-drilled well pads from the well bore to the edge of an existing building, and 750 feet for compressor stations and processing plants. Allowances for the distance to be as little as 300 feet for well pads apply in residential districts if the 500 feet restriction cannot be met. (*PA Title 58 Oil and Gas Section 3304*)

Studies indicate that negative health effects increase the closer one is to shale gas facilities (see Resources):

- Negative birth outcomes from 0.6-1.8 miles of shale gas development including low birth weight (5.8 lbs and less), and higher rates of small-for-gestational-age (SGA).
- Babies born to mothers living less than a mile from wells were 25 percent more likely to weigh less than 5.8 pounds at birth.
- Increase in number of babies born with congenital heart disease and possibly neural tube defects is related to both the number of wells in the vicinity and the distance from them to the mother's homes.
- Worsening asthma symptoms are linked to nearness of shale gas facilities.
- Self-reported symptoms, including headaches, fatigue, upper and lower respiratory complaints, skin rashes, and mental health concerns (anxiety and depression) are seen up to 5 miles from well pads.
- Health symptoms reported by residents, such as headaches and wheezing, were more frequent the closer the resident lived to wells.

Courtesy of Marcellus Outreach Butler

Low birth weight, small for gestational age, and pre-term birth, listed above, should not be taken lightly. They may lead to serious future consequences in growth and development including: diabetes, heart disease, high blood pressure, intellectual and developmental disabilities, obesity, and death.

Stress, anxiety and other mental health symptoms also increase the closer one is to shale gas development. Residents have reported anxiety/stress/anger/depression related to air, water, noise, light pollution, current or existing health issues, and the possibility of having to move. More appropriate setback distances could reduce impacts of these factors.

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In a 2016 EHP study, ***The Problem of Setback Distance for Unconventional Oil & Gas Development: An analysis of expert opinions***, 89% of participants agreed that setbacks from shale gas infrastructure should not be less than ¼ mile [1320 feet]. Many participants felt that additional studies are required to accurately determine a safe setback distance, but a 1-1 ¼ mile setback distance received 50% support. The experts also agreed that greater setback distances should be considered for buildings that house vulnerable populations, such as schools, day care centers, and hospitals.

"Based on historical catastrophic events, thermal modeling, vapor cloud modeling, and air pollution data, these [setback] distances do not appear sufficient to protect public health and safety." (M. Haley et al.)*

In 2014, the University of Maryland conducted a comprehensive study of the potential public health effects of shale gas development prior to the state's ban on fracking: ***Potential Public Health Impacts of Natural Gas Development and Production in the Marcellus Shale in Western Maryland***. Based on emissions and possible explosions at shale gas sites, the study recommends **no less than a 2000 feet setback** for well pads as well as compressor stations not using electric motors. (When burning raw gas or gas that has not been processed, toxic emissions are higher.)

A well explosion in Belmont County, OH, in February 2018, resulted in a 1 mile evacuation radius impacting 30 homes. The damaged well took 3 weeks to cap, releasing methane and related emissions into the air. Return frack fluid also poured from the damaged well, threatening local waterways.

It is difficult to determine a safe setback for accidents involving explosions and fireballs. What can be observed, however, are evacuation zones from previous shale gas accidents. In ***Adequacy of Current State Setbacks…,*** *(M. Haley et al.*)*, of the incidences studied, the average evacuation zone was 0.8 miles or 4224 feet.

Setbacks should account for the number of people to be evacuated, the time it would take to evacuate, and the route of evacuation.

These studies suggest that current setback distances fail to protect the public from both emissions of toxic air pollution and extreme heat due to a possible explosion from shale gas facilities. Additionally, these minimal setbacks do not take into account the time needed to evacuate high occupancy buildings (schools, hospitals, malls, etc.).

Based on the literature available today, it is reasonable that health effects from shale gas development occur more frequently the closer to the source. In addition, different shale gas infrastructure produces different volumes of emissions. For example, processing plants and compressor stations emit more frequently and in greater volume than do wells. This should be considered in determining setback distances.

Recommendations to Regulatory Agencies to Better Protect Public Health:

- Establish **a setback distance minimum of 0.6 mile (3281 feet or 1 km) from smaller shale gas facilities**, such as wells, that emit 100 to 500 grams/hour.
- Establish a **setback distance minimum of 1 ¼ miles (6600 feet or 2 km) from gas processing plants and large compressor complexes** whose emissions exceed 1000 grams/hour.
- Establish a **setback distance minimum of 1 ¼ miles (6600 feet or 2 km) for schools/daycares, hospitals, nursing homes,** and other high-occupancy buildings that house vulnerable populations and/or are difficult to evacuate.

Resources:

http://advances.sciencemag.org/content/3/12/e1603021
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0202462
http://www.legis.state.pa.us/cfdocs/legis/LI/Public/cons_index.cfm
http://www.marcellushealth.org/final-report.html
http://www.theintelligencer.net/news/top-headlines/2018/03/xto-well-in-powhatan-point-capped-after-20-days/
https://ehp.niehs.nih.gov/1306722/
https://ehp.niehs.nih.gov/1307732/
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