

Response to  
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# Southwest Pennsylvania Environmental Health Project Technical Reports

*“ATSDR found that reducing the tank pressure from 1,000 psi to 100 psi prior to venting resulted in a substantial decrease in the size of the threat zones for all conditions.”  
(p.5)*

## ATSDR Releases Review on Residential Exposures to PIG Launch Operation

*Pipeline inspection gauges*, better known as *PIG*’s, are devices that are pushed through pipelines to clean and sometimes monitor a stretch of pipe as they move through. The federal Agency for Toxic Substances & Disease Registry (ATSDR) provided a public health consultation to a community in Mt. Pleasant Township, PA because of its concerns about a *PIG launching station*. The data they collected is important because in July 2015 the operator of the pigging station took mitigation steps to reduce emissions at the launch site. Specifically, the company reduced pressure – thus emissions released when the hatch opens – by diverting the gas to a pressure jumping line before opening the hatch to begin pigging. The installation of the jumping line was intended to reduce the pipeline pressure from 1,000 psi to 100 psi (pounds per square inch).



*“If releases were limited to daylight hours, no concentrations in excess of the acute Minimal Risk Level (MRL) would be expected at the house northeast of the PIG launcher. Daytime concentrations in excess of the acute MRL could still occur at the house to the southeast of the PIG launcher, but only with light winds and certain wind directions ... and either a shallow inversion or overcast skies.”*  
(p. 5)

ATSDR’s report compares the emission exposures likely at 1,000 psi with the new lower exposures after the jumper line was created. Specifically, ATSDR estimated the potential release of benzene as their gauge of the safety of the operation for its neighbors. According to the Centers for Disease Control & Prevention, *high* air exposures to benzene may cause drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, and unconsciousness. Long-term health effects include anemia, immune compromise, endocrine disruption, and/or reproductive/developmental effects.<sup>1</sup>

### Findings About Pigging Station Emissions

ATSDR modeled exposures (based on emissions estimates and weather conditions) of benzene at two houses within 300 yards of the pigging operation – one to the northeast; one to the southeast. The house to the southeast was consistently more impacted than the northeast house. ATSDR used *Protective Action Criteria* (PAC)<sup>2</sup> Levels 1, 2, and 3; and its own *Minimal Risk Level* (MRL) for benzene to assess the risk posed to residents.<sup>3</sup> Based on the MRL, a measurement above 9 parts per million (ppm) is of concern.

PAC threshold levels are:

PAC-1 52 ppm (risk of discomfort, irritation or reversible health effects);

PAC-2 800 ppm (risk of irreversible health effects or impaired ability to escape);

PAC-3 4,000 ppm (risk of life threatening health effects or death).

ATSDR does not provide the data on which they determine the PAC levels at the two homes. Nevertheless, a couple of comparisons are useful. The National Institute for Occupational Safety and Health (NIOSH) set its Recommended Exposure Limit for benzene at 0.1 ppm for a time-weighted average concentration for up to a 10-hour work day during a 40-hour work week. It set 1.0 as the Short Term Exposure Limit, which should not be exceeded at any time during a work day. These levels are designed to prevent health injury from chronic or repeated exposures.

Secondly, according to the EPA Acute Exposure Guidelines for Airborne Chemicals (AEGL) threshold levels are:

AEGL-1 (concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects). Levels are:

10 minutes exposure: 130 ppm, 30 minutes: 73 ppm, 60 minutes: 52 ppm, 8 hours: 9.0 ppm.

AEGL-2 (concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other

<sup>1</sup> <https://emergency.cdc.gov/agent/benzene/basics/facts.asp>

<sup>2</sup> [https://www.atsdr.cdc.gov/toxprofiles/Benzene\\_Addendum.pdf](https://www.atsdr.cdc.gov/toxprofiles/Benzene_Addendum.pdf)

<sup>3</sup> MRL is the highest level of exposure that can be expected *not* to produce harm

serious, long-lasting adverse health effects or an impaired ability to escape). Relevant levels are: 60 minutes exposure: 800 ppm, 4 hours 400 ppm, 8 hours: 200 ppm.

\*\*\* According to the EPA's website: Acute Exposure Guideline Levels (AEGLs) describe the human health effects from once-in-a-lifetime, or rare, exposure to airborne chemicals. Used by emergency responders when dealing with chemical spills or other catastrophic exposures, AEGLs are set through a collaborative effort of the public and private sectors.

*“Based on our understanding of the variety of natural gas related operations in the vicinity, there are likely other air contaminants [than benzene and methane] of concern at this site, as well as other less concentrated sources (e.g., venting at tanks, well head emissions, flaring at pigging locations) of these two chemicals nearby.” (p.6)*

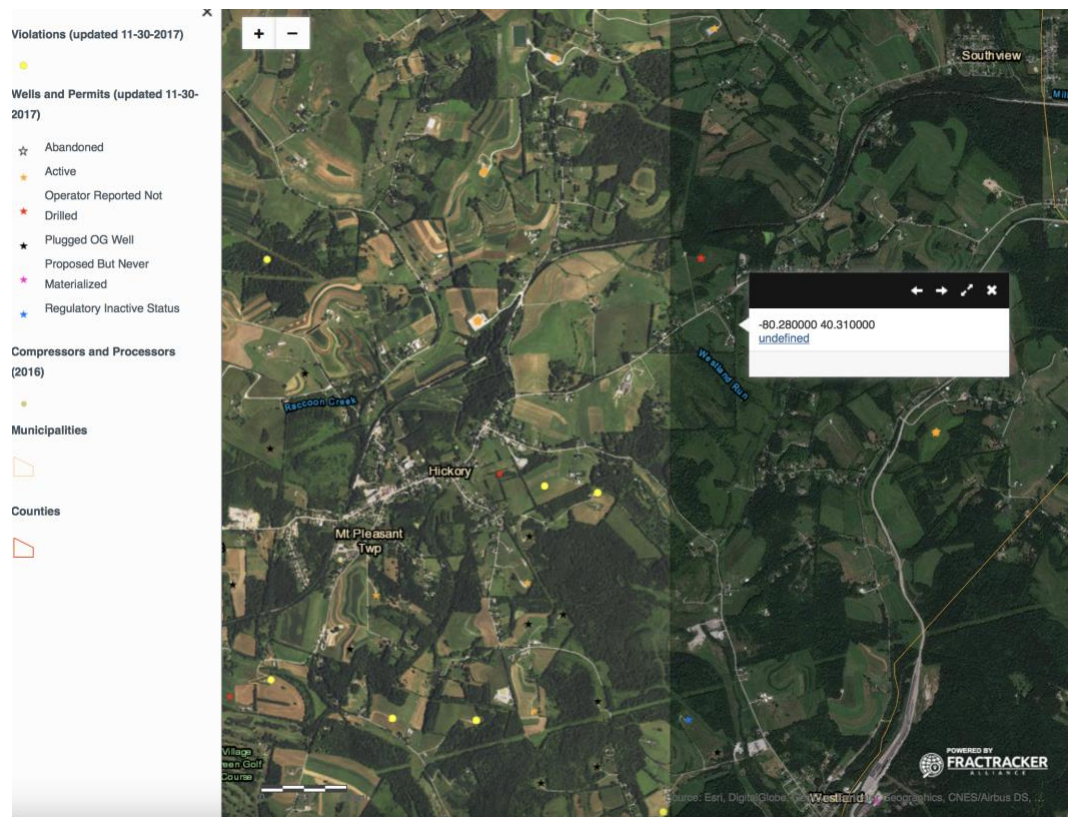
**When pressure was 1,000 psi**, ATSDR shows that the southeast home is more impacted than the northeast home. Many conditions (e.g., nighttime, overcast) at the southeast home would push emissions of benzene over the PAC-1 threshold; and extremely stable conditions, particularly at night, would lead to surpassing the PAC-2 threshold. No conditions put the southeast house over the PAC-3 level. The southeast house exceeded ATSDR's MRL under all meteorological conditions. At the northeast house, no meteorological conditions would result in exceeding the PAC-2 or PAC-3 limit. Certain conditions could put the risk at PAC-1. Some conditions put it above ATSDR's MRL.

**After the pressure was brought down to 100 psi**, the southeast home continues to be more intensely exposed, but the level of exposure for both houses was reduced by the mitigation. Four conditions raised benzene levels above PAC-1 at southeast but no conditions would be expected to produce levels that exceed PAC-2 or 3. At the reduced pressure, the southeast home could exceed ATSDR's MRL under a number of night conditions. The house to the northeast would rarely exceed PAC-1 and would not be expected to reach PAC-2 or 3 levels. Exposures at the northeast house would also rarely hit ATSDR's MRL.

### **Why ATSDR's findings matter**

This is an important report for several reasons. First, it provides some insight into the dispersion of emissions from a pig launcher to nearby homes. It shows that emissions are released from the entrance point of a PIG launcher and those emissions can reach levels of concern, no matter what the pressure. It demonstrates that higher pressure, thus more volume of emissions, puts nearby residents at increased risk. **Reduced pressure reduces risk.** It also demonstrates how weather and time of day can affect the intensity of exposures at nearby homes. Risks of exposure are greatest at night, under stable weather conditions (conditions where air stays closer to the ground rather than rising and dispersing).





## Information gaps

ATSDR did not measure actual emissions but based levels on estimates of the proportion of benzene to methane in the pipeline. They acknowledge, however, that the levels of benzene used in the analysis could be an underestimate, so the health risks would be greater at both 1,000 and 100 psi. Furthermore, benzene is just one of many substances released into the atmosphere when the pigging hatch is opened. This is important because other components of the emissions can carry their own risks and the mixture of the chemicals can produce still more risks.

The analysis discussed here only accounts for potential exposures from the launch site of the pigging operation. There is very little known about the emissions at the endpoint of the pigging process. At this endpoint, higher concentration of contaminants released would be expected over a short period of time because the PIG pushes out accumulated matter within the pipeline as well as what would normally have come through before the PIG launch.

Lastly, the pigging emissions do not occur in isolation. It is important to understand the content and intensity of emissions of a single source, particularly for those living nearby. But it is just as important to recognize that homes are likely to be exposed to emissions from multiple sites in different directions. This launch site is within 2 miles of a number of producing wells and a compressor

station. The nearby compressor station is recorded as emitting over 16 tons of VOCs, including 3 tons of formaldehyde and 64 tons of nitrogen oxide (NOx) in 2015.

### Lessons learned

Mitigation steps are worthwhile, and large releases of air toxics should occur only when they are likely to disperse quickly into the ambient air rather than hover nearby as can often happen at night when the air is stable. ATSDR reminds readers that this mitigation was brought about under particular circumstances at this particular site. Higher pressure conditions are still in use at pipeline pigging operations in different communities across the country. **EHP maintains that, to protect the public's health, the least dangerous methods of extracting, processing and transporting shale gas and oil should always be used.**

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*EHP responds to communities' need for accurate, timely and trusted public health information and health services associated with shale gas and oil development.*