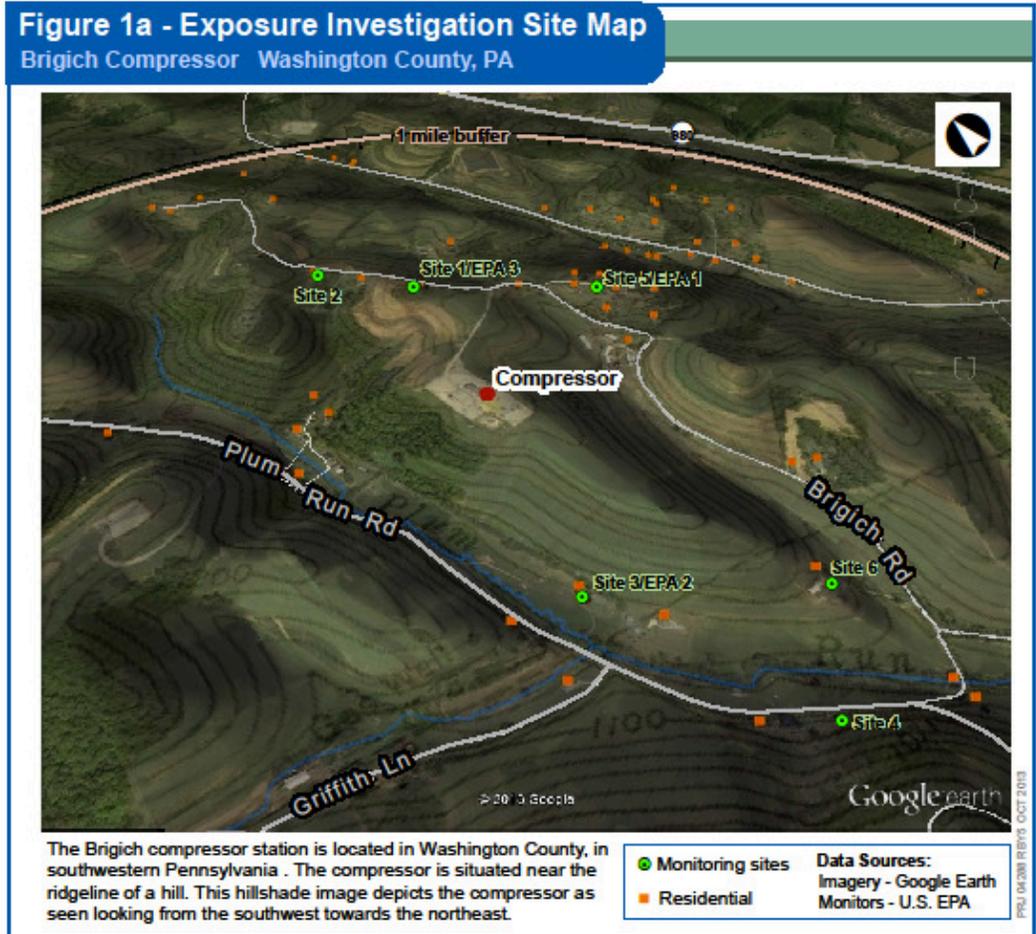


Southwest Pennsylvania Environmental Health Project Technical Reports

“Since 2010, the ATSDR Region 3 office has received a number of requests from Pennsylvania residents, particularly in Washington County, to assess impacts to air quality from newly developed natural gas infrastructure in their communities. After discovering there is limited data available to assess community air quality near these infrastructure, ATSDR initiated an Exposure Investigation” (p.1)

ATSDR Releases Investigation of Pennsylvania Compressor Station

In conducting an investigation of the Brigich compressor station in Chartiers Township, PA, the Agency for Toxic Substances & Disease Registry (ATSDR) advanced the understanding of the community exposures and potential risks introduced by unconventional oil and gas development (UOGD) infrastructure to those living, working, or going to school nearby.



EHP's Assessment

Overall, ATSDR, in conjunction with monitoring work of the EPA, provided a solid set of data. Nevertheless, because of the methodologies available to them, we are concerned that there was, in the end, an underestimate of risk to community members. The Report states, "Exposure to the detected levels of chemicals in the ambient air from residences surrounding Brigich compressor is not expected to harm the health of the general population. However, some sensitive subpopulations, including individuals with underlying medical conditions ... or chemical sensitivities, may experience harmful effects from exposures to hydrogen sulfide, PM_{2.5} and/or carbonyls." Going forward, more thorough consideration should be taken of the elderly, those with existing health conditions, and children. Standard sampling and analytic methodologies are not sufficient.

The Investigation

- The researchers sampled air at multiple sites surrounding a natural gas compressor station, measuring concentrations of carbonyls, hydrogen sulfide, reduced sulfur compounds, PM_{2.5}, and VOCs. The findings are in keeping with substances that EHP and others have also documented near compressor stations and well pads. This was very important.
- ATSDR found that at points during the evaluation, some of the chemicals reached levels associated with health risks.
- The finding of gluteraldehyde was of particular interest because of its extreme toxicity and because it is known to be used at the well site. Its presence near the compressor station raises the question of what, from the shale itself or the well development process, is found in the gas and pipeline down stream?
- Unlike the other sampling protocols, sampling for hydrogen sulfide was carried out with a continuous monitor. This provided an opportunity for ATSDR to examine the variations in exposure over time, but broken down into smaller averages. From this, it is possible to see points at which concentrations of H₂S peak at levels significantly higher than longer averages revealed and, at times, above ATSDR's acute MRL. *MRL is the Minimal Risk Level, an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure. MRL's are levels below which adverse health effects are not likely to happen.*
- ATSDR acknowledges that multiple UOGD sites nearby might contribute to levels measured near homes.

"ATSDR recommends collecting emission source or fence-line samples for a wide range of chemicals (VOCs, carbonyls, PM_{2.5}... by the appropriate environmental agency (PADEP, EPA) for long term and peak exposures. This information could be compared to the residential sampling summarized in this report...." (p. 34)

Pollutant Detection and Interpretation

- In its investigation, ATSDR, in conjunction with the EPA, detected many toxic chemicals, along with PM_{2.5}, which have also been documented by researchers at well pads and compressor stations around the country.
- The confirmation of the chemicals' presence provides an important acknowledgement that neighbors of such facilities are being exposed (often at very close range) to chemicals that bring with them the possibility of short- and long-term health effects.

- The schedule of sampling (whether once every other day or twice every five days or ten times per month) is not sufficient to adequately capture transient exposures. Exposures vary for a variety of reasons including the content and concentrations of emissions from the source and the weather. Other than wind direction, ATSDR and EPA did not consider the time course of emissions due to dilution at specific sites. Strategically targeting times when exposures are likely to be occurring would increase researchers' ability to characterize what is being emitted.
- The findings and their interpretation support the need for additional investigations but, EHP would argue, as importantly, they point to the need for short-term decision-making by officials to protect the public's health.

Exposures and Averaging

- EPA and ATSDR are restricted in their methodologies and instrumentation, therefore, they are not able to measure the intensity, duration, or frequency of exposures (Hydrogen sulfide being an exception).
- Exposure measurements were generally taken in 24-hour samples. EHP has shown that near a similarly sized compressor station (Minisink, NY), PM_{2.5} levels could reach significantly higher levels than the averages reported by EPA; and spikes were seen 3 to 10 times a week both inside and outside of houses.
- The problem with 24-hour averaging and the averaging over the four-month study period is that transient high levels are often more dangerous, and it is these high levels that are lost in averaging. ATSDR acknowledges this problem brought on by a standard monitoring strategy.

Health Implications and Reference Values

- ATSDR has established that there were levels of exposure around the compressor station raising health concerns. In particular, acetaldehyde, benzene, formaldehyde, carbon tetrachloride, chloroform, 1,2-DCA and 1,1,2-trichloroethane, crotonaldehyde, and 1-methoxy-2-propanone exceeded their respective comparison values (CVs). ATSDR's conclusion, that chemicals exceeded reference values, is based on exposures considered as individual, discrete chemical exposures. In fact, at the Brigich compressor station, like other industrial facilities, multiple exposures are

occurring simultaneously or in close time frames. For instance, ATSDR calculated cancer risk on an individual chemical basis. It is known, however, that there are combinations of chemicals that increase the cancer risk several fold. This occurs, for instance, when PM_{2.5} is present in the air with carcinogens. The PM_{2.5} can increase the dose several fold by bringing other compounds into the deep lung with the fine particulates. To the extent that chemicals have additive or synergistic effects, those effects should be accounted for.

- ATSDR's MRLs do not reflect serious health end points, including birth defects, and do not have health guidelines for dermal exposures, while research has shown that individuals living near compressor stations and well pads often experience skin symptoms.

“ATSDR recommends reducing exposures to PM_{2.5}, carbonyls, and hydrogen sulfide in ambient air by taking steps to control releases from the emission sources of these chemicals to protect the health of sensitive populations living near the site.” (p. 34)

EHP Report Authors

Beth Weinberger, MPH, PhD
David Brown, ScD

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Our mission is to respond to individuals' and communities' need for access to accurate, timely and trusted public health information and health services associated with natural gas extraction.

Conclusions

EHP believes the ATSDR Report makes an important contribution in identifying toxic chemicals and fine particulate matter in the vicinity of homes near the Brigich compressor station. We think the exposure levels around this modest-sized facility – sometimes presenting a health risk – are a harbinger for increased risks to come in communities with 20,000 to 80,000 horsepower compressor stations typically found along transport lines. We look forward to additional investigations by ATSDR into the human health effects associated with shale gas and oil development.

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Health Consultation
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For more information contact:

Southwest Pennsylvania Environmental Health Project
2001 Waterdam Plaza Drive, Suite 201
McMurray, PA 15317
724.260.5504
www.environmentalhealthproject.org

