

February 10, 2017

Penn Trafford School Board
1006 Harrison City/Export Road
PO Box 530
Harrison City, PA 15636

Dear Dr. Harris and Penn Trafford School Board:

Protect PT and parents in the Penn-Trafford School District have requested I write to you regarding the need for air monitoring at schools within the district that will be in close proximity to proposed unconventional natural gas development (UNGD).

As a health professional with experience in direct service maternal-child health, focusing primarily on research and consulting, I have written the attached document as a preliminary resource for the district. It contains information about toxins emitted during UNGD, protective measures and questions the district should be asking of the operator.

Research referenced for this document indicates that children, because of their developing lungs, brains, and high activity levels, are our most vulnerable population. The school board has a responsibility to protect students against harm at school. The research associated with the document identifies this industrial development in close proximity to the schools at a potential risk.

If you have any questions on this document, please contact me for more information. Thank you.

Sincerely,

Dr. Beth Weinberger, MPH, PhD
Research and Communications Specialist, SWPA Environmental Health Project

Phone: 203.530.3436
bweinberger@environmentalhealthproject.org

School Board and Administrator Safety Considerations on Shale Gas Well Siting

There is now a large body of research on exposures to unconventional natural gas development (UNGD) emissions. Researchers have documented the presence of specific air contaminants with known toxic effects; and have also identified associations between those UNGD exposures and health conditions.

Air contaminants and potential health effects

UNGD contaminants are produced and released into the air. They include fine particulate matter (PM_{2.5}) and elevated concentrations of polycyclic aromatic hydrocarbons (PAHs), methane, ozone, NO_x and VOCs like benzene, formaldehyde, alkenes, alkanes, aromatic compounds, and aldehydes. For additional information see the Pennsylvania DEP 2014 National Gas Emissions Inventory by County (<http://www.dep.pa.gov/business/air/baq/business/topics/emission/pages/marcellus-inventory.aspx>), and articles by Roy (2014), Helmig (2014), Macey (2014), and Thompson (2014). These contaminants cause a range of health effects. Some are carcinogens; many are hazardous respiratory pollutants. Acute respiratory symptoms produced by PM_{2.5} and formaldehyde, for instance, are: shortness of breath, wheezing, cough, airway inflammation and pulmonary inflammation.

Table 1 contains a list of published, peer reviewed scientific studies on the potential effects of exposure on UNGD

Table 1 Published Studies on Potential UNGD Health Effects

Category	Researcher/author	Category	Researcher/author
Behavioral/mood/stress	Earthworks (2012) Ferrar et al. (2013) ¹ Perry (2013) ² Resick (2013) ³ Subra (2009) ⁴	Gastrointestinal	Bamberger & Oswald (2012) Earthworks (2012) Ferrar et al. (2013)
Birth Outcomes	Hill (2012) ⁵ McKenzie (2014) ⁶ Casey (2016) Stacy (2015)	Muscle/joint pain	Earthworks (2012) Subra (2010) Subra (2009)
Cancer risk	Jemielita (2015) Yao (2015) McKenzie (2012)	Neurological	Tustin (2016) Jemielita (2015) Bamberger & Oswald (2012) McKenzie (2012)

			Subra (2010) Subra (2009)
Dermal	Jemielita (2015) Earthworks (2012) Rabinowitz (2014) ⁷ Subra (2009)	Respiratory	Rasmussen (2016) Tustin (2016) Webb (2016) Bamberger & Oswald (2012) Earthworks (2012) McKenzie (2012) Rabinowitz (2014) Subra (2009)
Ear, nose, mouth, throat	Earthworks (2012) Subra (2010) ⁸ Subra (2009)	Cardiology	Jemielita (2015)
Eye	Bamberger & Oswald (2012) ⁹ Earthworks (2012) Subra (2010) Subra (2009)		

Children are at particular risk

Much of the direct UNGD health research focuses on adults, likely due to the sensitive nature of doing research related to minors. Webb and colleagues, however, look at respiratory health risk in children. Additionally, several researchers find associations between exposure and adverse birth outcomes (McKenzie, Stacy, Hill, Casey). Furthermore, many studies confirm that chemicals emitted by UNGD sources have health consequences for children

Reasons children are more vulnerable than healthy adults

- Children have higher respiratory rates and, as a result, children exposed to air contaminants breathe in more toxics per pound of body weight than adults.
- Children cannot metabolize some toxicants as well as adults. They accumulate more toxics in their bodies and do not detoxify as efficiently.
- Children have developing lungs and narrower airways.
- Many toxic agents are known to interfere with developmental processes within the brain.

Children's circumstances at school

- Children can be exposed to emissions outside for recess or gym class.
- Children spend more time engaged in vigorous outside activity.
- Even inside there may be exposures from nearby UNGD facilities. Outdoor air pollutants enter school building through open doors, open windows, ventilation systems, and cracks in structures.
- Once inside the school, chemicals and particles can be trapped, extending the period of exposure.

Actions schools can take

Contaminated air gets inside of schools and other buildings. School administrators can

- Have their ventilation system inspected
- Filter air, if possible
- Monitor the air – indoors and outdoors – using a continuous air monitor
- Consider establishing “bad air days” akin to “snow days” when air is particularly polluted due, for instance, to flaring
- Have an emergency plan in place if children need to be removed from the area.
- Note unusual patterns of health complaints in school. For example, increased complaints of headaches or need for inhalers. Report unusual patterns to the PA Department of Health.

School boards and administrators can ask questions of the owner or operator of a proposed or nearby site. Important questions include:

- What – exactly – are the expected emissions? If the site is not yet completed, what are the expected emissions at each stage of development? High concentrations of diesel exhaust, for instance, can be produced when a site is under construction.
- If not yet constructed, what kinds of controls can be put into place to capture or limit emissions? Is every reasonable safety mechanism being used? If not, why not?
- Can the peak emissions be scheduled just after the school day ends? That way there is time for dispersion before children arrive in the morning. Overnight emissions are not safe because at night air contaminants often hover closer to than ground and can still be high in the early morning.
- Can the school be alerted in advance about planned large releases?
- Can the school be alerted immediately if there is an unplanned release, spill or other accident? What kind of warning system can be put into place?
- Can the gas company take responsibility for the additional costs to the school for taking steps to keep students safe?

For more information, contact Beth Weinberger at the Southwest Pennsylvania Environmental Health Project at bweinberger@environmentalhealthproject.org or 724.249.7501.

¹ Ferrar KJ, Kriesky J, Christen CJ, Marshall LP, Malone SL, RK Sharma, et al. Assessment and longitudinal analysis of health impacts and stressors perceived to result from unconventional

shale gas development in the Marcellus Shale region. *International Journal of Occupational and Environmental Health* 2013; 19(2):104-12.

² Perry S. Using ethnography to monitor the community health implications of onshore unconventional oil and gas developments: examples from Pennsylvania's Marcellus Shale. *New Solutions* 2013; 23(1):33-54.

³ Resick L, Knestrick JM, Counts MM, Pizzuto LK. The meaning of health among mid-Appalachian women within the context of the environment. *Journal of Environmental Studies and Science* 2013; 3:290-296.

⁴ Subra W. Results of health survey of current and former DISH/Clark, Texas residents. December 2009. Earthworks' Oil and Gas Accountability Project, http://www.earthworksaction.org/files/publications/DishTXHealthSurvey_FINAL_hi.pdf

⁵ Hill E. Working paper. Unconventional gas development and infant health: evidence from Pennsylvania. The Charles H. Dyson School of Applied Economics and Management, Cornell University. July 2012.

⁶ McKenzie LM, Guo R, Witter R, Savitz DA, Newman LS, Adegate JL. Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado. *Environmental Health Perspectives* 2014; 122(4):412-417.

⁷ Rabinowitz PM, Skizovskiy IB, Lamers V, Trufan SJ, Holford TR et al. Proximity to natural gas wells and reported health status: Results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives* 2014; DOI:10.1289/ehp.1307732.

⁸ Subra W. Community health survey results: Pavilion, WY residents. 2010. <http://www.earthworksaction.org/files/publications/PavillionFINALhealthSurvey-201008.pdf>

⁹ Bamberger M, Oswald RE. Impacts of gas drilling on human and animal health. *New Solutions* 2012;22:51-77.