

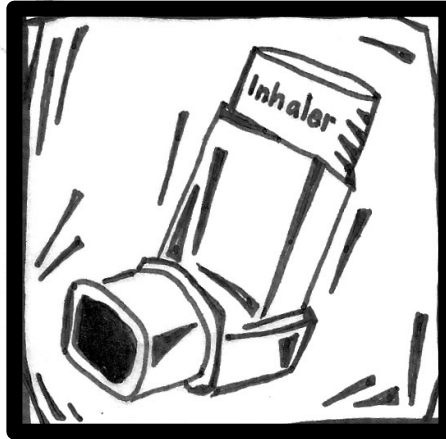
Things to consider if your school district has shale gas activity.

Common air emissions

All shale gas activities and facilities generate emissions – this includes construction of sites, drilling, flaring, and trucking to and from the well pad, the operations of compressor stations, metering stations, and processing plants. If children live or go to school near any of these facilities they will be exposed to emissions.

Particulate Matter (PM) is generated at all phases of the shale gas development process. Particulate matter is a complex mixture of extremely small particles and liquid droplets. The size of the particles is linked to their potential for causing health problems. Fine particulate matter is capable of passing through the nose and throat and can penetrate deep inside the lung. It can cause conditions such as decreased lung function, nonfatal heart attacks, and high blood pressure. PM inhalation can aggravate asthma symptoms.

Volatile Organic Compounds (VOCs) are a varied group of compounds, such as benzene and formaldehyde, that are released from unconventional natural gas development (UNGD). Short-term, high



exposures can cause acute eye and respiratory tract irritation, allergic skin reactions, headaches, dizziness, visual disorders, fatigue, loss of coordination, and memory impairment. Possible long-term effects include damage to the liver, kidney, and central nervous system. Some VOCs are known or suspected carcinogens.

Emissions - and children's exposure to those emissions - can be intermittent and varied. Stages at the drill pad vary and, as a result, their emissions vary (content as well as amount). Also, facilities such as compressor stations and metering stations do not vent consistently. *Periodically, there may be dangerous spikes of emissions. So sometimes children may be exposed to high concentrations of air contaminants while other times*

Children are at Higher Risk

- 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 accumulate more toxins in their bodies than adults. Their bodies are still maturing and they cannot metabolize some toxicants as well as adults. They don't detoxify as efficiently.
- Children spend more time engaged in vigorous activity outside.
- Children's brains are still developing. Many toxic agents are known to interfere with developmental processes within the brain.

their exposure may be more limited. Students may be exposed to emissions both at home and at school and from multiple shale gas related sources.

Symptoms in children that may result from exposure. Be aware that the symptoms a student presents may be the result of air or water contaminants. **Documented transient effects of SGD, such as rash, headache, nausea, asthma incidents, nosebleeds, and eye, nose, throat and lung irritation, are not unique to exposure to shale development emissions.** **As a nurse, you are likely to see some of these symptoms in your students anyway.** Bear in mind, however, that they may be the result of sporadic or chronic exposure and may point to a larger risk for the student. Persistent or recurrent symptoms are signals that there might be chemical or PM exposure.

Fatigue, anxiety, and stress have been documented in adults living in close proximity to shale gas development. There are many reasons for this: noise and light intrusion make it difficult to sleep or even relax when at home; concern about the potential health effects can raise adults' anxiety and stress levels. Some chemicals are known to produce psychiatric/psychological effects such as a vulnerability to anxiety.

Children may react similarly to the same exposures as adults do. They may also react to parents who are feeling especially anxious or stressed.

What you can do

- Keep an eye out for an increase in symptoms or for unusual symptoms in your student body. Note whether students' symptoms (even for common complaints like congestion and sinus pain) go on for longer than you would expect or occur in patterns that you wouldn't expect.
- Keep a log that includes not only symptoms but whether those symptoms developed *since the siting of a nearby facility*.
- Note whether students are missing more school than usual.
- If you are seeing anything of particular concern in your students, either individually or as a group, report these concerns to the relevant health department and educational department. Be sure to include concrete information you have collected that led to your concern.
- Keep in contact with parents and with their pediatricians, if it is appropriate.

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US Environmental Protection Agency discussion of health effects from oil and natural gas production, specifically hazardous air pollutants (HAPs) and volatile organic compounds (VOCs), can be found at http://www.epa.gov/oaqps001/community/details/oil-gas_add_info.html.

US Environmental Protection Agency discussion of health effects of particulate matter (PM) can be found at <http://www.epa.gov/pm/health.html>.