Outdoor Air, Indoor Air, and School Exposure

ENVIRONMENTAL HEALTH PROJECT
DEFENDING PUBLIC HEALTH SINCE 2012

Whether a school is newly constructed or is an old structure, air from the outside comes inside.

A building's structure does not necessarily provide protection from pollutants entering from outside. In fact, for the most part, school buildings (as well as other types of buildings) are designed to bring in fresh outdoor air. The circulation of outdoor and indoor air is beneficial when the air coming in is clean. It dilutes pollution generated from inside activity and releases the indoor air over time. However, *if the outside air is polluted it adds to any air contaminants already in the school's air.*

air as possible. There can, however, be pockets of air within the building that are left relatively undisturbed, and are not mixed with incoming air.

Wind direction and speed will have some effect on air contaminants entering a school. If a pollution source is upwind or very close, the wind will push the contaminents through windows, doors and leaks.

In warmer weather – which characterizes both the beginning and end of the school year – most schools cool their classrooms by opening windows. This tremendously increases the flow of outdoor air into the building.

While ventilation is designed to maximize the possibility of clean air inside the school building, in close proximity to industrial activity such as natural gas development, outdoor air may contain high concentrations of contaminants.

Ventilation in schools is largely driven by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) requirements. These ventilation standards are not designed to control specific pollutants, but rather to provide a basic level of fresh outdoor air ventilation. Ventilation systems are generally designed to promote as much mixing of the indoor

If a school's ventilation system is balanced, the amount of incoming air will slightly exceed the amount of exhaust air. In most cases, however, the amount of air exhausted exceeds the amount coming in through the ventilation system, creating a situation of negative pressure in which outdoor air will enter through leaks and openings in the building.

What is inside?

Some air contaminants are produced by materials inside the school. These indoor pollutants include substances such as molds and pollen; and chemical pollutants such as formaldehyde and other volatile organic compounds (VOCs). Air toxics are produced by furnaces, cleaning supplies, paints, and other common products.

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What are the risks?

A school's indoor environment can have a significant impact on its students' health and learning. Children, more than adults, are vulnerable to the negative health and performance effects of poor environmental conditions.[1] A child's respiratory, immune, nervous, reproductive, and skeletal systems continue to develop throughout childhood, so exposures to environmental contaminants that occur early in life can cause immediate adverse health impacts as well as produce health implications well into adulthood.[2] Some children with pre-existing health conditions will be especially vulnerable to the effects of an unhealthy school environment.[3]

Examples of symptoms caused by poor indoor air quality generally include respiratory irritation, sore throat, asthma attacks, drowsiness, headaches and inability to concen-trate. Examples of symptoms commonly documented in residents near unconventional natural gas developemnt (UNGD) include all of those, plus cough, shortness of breath, throat and sinus pain or irritation, rash, nausea and abdominal pain.

What to do?

Exposures to emissions from SGD would be best addressed by minimizing the pollution generated at the sources. Absent the ability to control outdoor pollutant sources, measures need to be taken to prevent or minimize exposures to children on their school grounds. First, it is always a good idea to reduce the use of toxic chemicals in and around the school, and use non- or less-toxic alternatives when possible. Second, to minimize exposures from SGD, schools can: cancel or reduce outdoor activities when pollution episodes are occurring; cancel school altogether if dangerous levels of pollutants are expected; and prevent or minimize pollutant intrusion indoors. Your school can take steps to minimize air flow through effective air sealing and ensuring that the HVAC is properly operated and maintained. HVAC systems can be upgraded to ensure more effective pollution control, at least for fine particles.

There is no consensus on what constitutes an adequate setback distance from a school, however, many studies document that close proximity to well sites pose risks to individuals.[4] At this time we believe that children and school staff members are at risk for health effects from a well site that is within a mile of their school. We strongly recommend a minimum of one mile should be between shale gas development and schools.

[1] EPA, Indoor Air Quality & Student Performance, document 402-K-03-006, revised August 2003.
[2] EPA State School Environmental Health Guidelines, http://www.epa.gov/schools/guidelinestools/ehguide/read/about.html.
[3] EPA State School Environmental Health Guidelines, 2012, http://www.epa.gov/schools/guidelinestools/ehguide/.
[4] For a review of the research, see Shonkoff, S.B., Hayes, J., Finkel, M.L. "Environmental Public Health Dimensions of Shale and Tight Gas Development". Environmental Health Perspectives, Volume 122 (8): 787-795 2014. http://ehp.niehs.nih.gov/1307866/.

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