



## **PEHSU Information on Natural Gas Extraction and Hydraulic Fracturing Information for Parents and Community Members**

The Pediatric Environmental Health Specialty Units (PEHSU) Network encourage families, pediatricians, and communities to work together to ensure that children are protected from exposure to environmental hazards.

### Special Susceptibility of Children

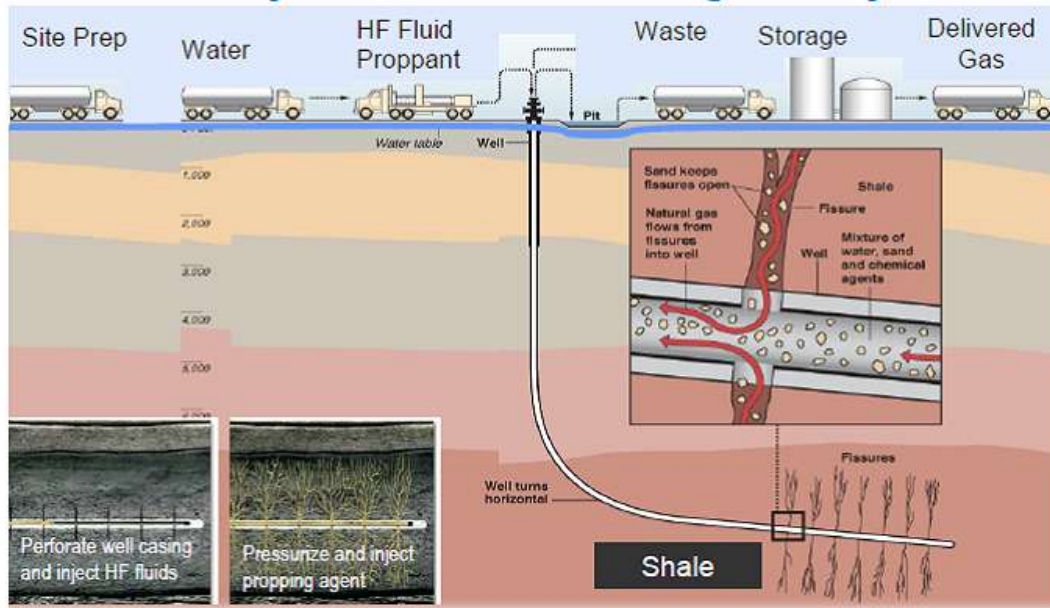
Children are more vulnerable to environmental hazards. They eat, drink, and breathe more than adults on a pound for pound basis. Research has also shown that children are not able to metabolize some toxicants as well as adults due to immature detoxification processes. Also, the fetus and young child are in a critical period of development when toxic exposures can have profound negative effects.

### Background

Natural gas extraction from shale is a complex process which includes: 1) building access roads, holding ponds, and the drill site; 2) construction of pipe lines and compressor stations; 3) drilling and hydraulic fracturing to capture the natural gas; and 4) disposal of flowback water and drilling waste.

Hydraulic fracturing, also known as hydrofracking or fracking, uses a combination of water, sand, and chemicals injected into the ground under high pressure to release natural gas or oil. This process has become much more common in the US over the last decade. It was first used for natural gas in Colorado, Wyoming, and Texas but has recently spread into other states including West Virginia, Pennsylvania, and New York. The figure below is a diagram of the process:

## Definition of Hydraulic Fracturing Lifecycle



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Adapted from Graphic by Al Granberg

### Health Issues

Questions have been raised about the possible health effects of air and water pollution caused by Natural gas extraction/Hydraulic fracturing (NGE/HF). The Pediatric Environmental Health Specialty Unit (PEHSU) network, which consists of experts throughout the country dedicated to preventing poor health outcomes in children from environmental causes, developed this fact sheet. There is little research on the health effects to children from NGE/HF. Because many questions remain unanswered, the PEHSU network recommends a cautious approach to toxicants in general and to the NGE/HF process specifically.

### Water Contamination

One of the potential routes of exposure to toxins from the NGE/HF process is the contamination of drinking water, including public water supplies and private wells. This can occur when geologic fractures extend into groundwater or from leaks from the natural gas well if it passes through the water table. In addition, drilling fluid, chemical spills, and disposal pit leaks may contaminate surface water supplies. A study conducted in New York and Pennsylvania found that methane contamination of private drinking water wells was seen in areas close to active natural gas drilling. (Osborne SG, et al., 2011). While many of the chemicals used in the drilling and fracking process are not disclosed, the list includes benzene, toluene, ethyl benzene, xylene, ethylene glycol, glutaraldehyde, hydrochloric acid, and hydrogen treated light petroleum distillates. These substances have a wide spectrum of potential toxic effects on humans ranging from cancer to

adverse effects on the reproductive, neurological, and endocrine systems (ATSDR, Colborn T, et al, U.S. EPA 2009).

### Air Pollution

Sources of air pollution around a drilling facility include diesel exhaust from the use of machinery and heavy trucks, and emissions from the drilling and NGE/HF processes. These air pollutants are associated with a spectrum of health effects in humans. Particulate matter air pollution (dust), for example, has been linked to lung illnesses, wheezing in infants, cardiovascular events, and premature death (Laden F, et al, Lewtas J, Ryan PH, et al, Sacks JD, et al). Since each fracturing event at each well requires up to 2,400 industrial truck trips, residents near the site and along the truck routes may be exposed to increased levels of these air pollutants (New York State DEC/DMR, 2009).

Volatile organic compounds can escape from the wells and combine with nitrogen oxides to produce ozone (CDPHE 2008, CDPHE 2010). Due to its inflammatory effects on the lung system, ozone has been linked to asthma attacks. Elevated ozone levels have been found in rural areas of Wyoming, partially due to natural gas drilling in these locations. (Wyoming Department of Environmental Quality, 2010). In an air sampling study from 2005 to 2007 conducted in Colorado, researchers found that air benzene concentrations approached or exceeded standards at sites with oil or gas drilling (Garfield County PHD, 2007). Benzene exposure during pregnancy has been associated with neural tube defects (Lupo PJ, et al) and childhood leukemia (Whitworth KW, et al., 2008).

### Noise Pollution

Noise pollution from the drilling process and resulting truck traffic has not been adequately evaluated, but since drilling sites have been located close to housing in many locations, noise from these industrial sources might impact sleep, and that has been associated with negative effects on learning and other aspects of daily living (Stansfeld SA, et al., 2003, WHO 2011).

### Recommendations

In light of the lack of research on the possible health effects from gas and oil well operations located near human habitation, as well as considering the unique vulnerability of children, the PEHSU network recommends the following:

- Continuing to monitor water quality, noise levels, and air pollution in areas where NGE/HF sites are located near communities.
- Monitoring the health impacts of persons living in the area with research studies.
- Increasing the awareness of community healthcare providers about the possible health consequences of exposures from the NGE/HF processes, including occupational exposures to workers and the issue of take-home toxics (e.g., clothing and boots contaminated with drilling muds).
- Disclosure of all chemicals used in the drilling and NGE/HF to ensure that exposures are handled appropriately and to ensure that monitoring programs are adequate.
- Given the short half-lives of volatile organic compounds and the fact that many of the NGE/HF chemicals have not been disclosed, blood testing should not be performed unless there has been a known, direct exposure.

- In addition to the annual testing of private drinking water wells recommended by the U.S. EPA and the American Academy of Pediatrics (AAP), the AAP guidance recommends that families with private drinking water wells in NGE/HF areas should consider testing the wells before drilling begins and on a regular basis thereafter for chloride, sodium, barium, strontium, and VOCs in consultation with their local or state health department.
- As invaluable resources for their local, state, and regional communities, health professionals should advocate for human health effects to be a part of the discussion regarding NGE/HF.

**For further information, please contact your regional Pediatric Environmental Health Specialty Unit, available at [www.pehsu.net](http://www.pehsu.net).**

Resources:

U.S. Environmental Protection Agency. Outdoor Air - Industry, Business, and Home: Oil and Natural Gas Production - Additional Information. [http://www.epa.gov/oaqps001/community/details/oil-gas\\_addl\\_info.html](http://www.epa.gov/oaqps001/community/details/oil-gas_addl_info.html). Last updated 06/05/09. Accessed 04/21/11

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