ENVIRONMENTAL HEALTH PROJECT
DEFENDING PUBLIC HEALTH SINCE 2012

Biomonitoring and Volatile Organic Compounds (VOCs)

Individuals who want to know if they have been exposed to emissions from oil and gas development often request that their health care provider perform medical tests to determine if an exposure has occurred. Performing medical tests to evaluate environmental exposure is referred to as "biomonitoring".

One common class of potentially harmful emissions from oil and gas development is "volatile organic compounds" (VOCs). While there are blood and urine tests available to assess exposures to VOCs, the results can be misleading, resulting in either false reassurance or unnecessary alarm. Before undergoing testing, it is important to understand the nature and limitations of these tests.

TERMS TO REMEMBER:

Environmental Exposure: influence on human health by exposure to physical, chemical, biological, and/or radiological contaminants in one's surroundings or environment.

Biomonitoring: the laboratory analysis of blood, urine, saliva, and other body fluids to identify the presence of certain chemicals in the human body.

Volatile Organic Compounds (VOCs): organic compounds that easily become vapors or gases. Many VOCs are also hazardous air pollutants (HAPs) such as benzene, formaldehyde, toluene and xylene.

Biomonitoring

What is Biomonitoring? It is the laboratory analysis of blood, urine, saliva, and other body fluids to identify the presence of certain chemicals in the human body. It is a procedure that measures the extent to which chemical pollution is absorbed by our bodies through air we breathe, food we eat, and water we drink. Biomonitoring allows us to recognize the populations that are exposed to, and potentially affected by chemicals in the environment. It does not give information on how long the substance has been in the body or how it got there.

If you and your health care provider believe biomonitoring is important for you, consider these guidelines:

- The presence of VOCs does not generally indicate any adverse health effect, even at levels multiple times higher than reference ranges.
- Individuals are commonly exposed to low-levels of VOCs from multiple sources, and laboratory testing cannot distinguish among possible sources of exposure.

- VOCs tend to rapidly leave your body; thus, no treatment is necessary to remove VOCs from your blood.
- The half-life of most VOCs is typically a few hours and laboratory results reflect very recent exposures such as within hours or days. If you were exposed a month ago, even every day, you will not see it.
- Laboratories used for testing occupational exposures may not be suitable to detect low-level environmental exposures.
- Laboratory tests for VOCs are technically difficult to perform due to preparation and storage of test tubes.
- When some chemicals enter the body, they are partially broken down – or metabolized – before they are excreted. Thus, when testing occurs, it is the 'metabolite' and not the chemical itself that can be detected. Various chemicals and even dietary sources may have the same metabolite. Consequently, results of testing may be misleading.

Volatile Organic Compounds (VOCs)

Earthworks - Compressor station emissions containing VOCs made visible with a FLIR Camera

What are VOCs? Organic compounds are chemicals that contain carbon and are found in all living things. Volatile organic compounds, referred to as VOCs, are organic compounds that easily change from liquid to vapors (fumes) or gases at room temperature. They are emitted from oil and gas sites including but not limited to well pads, compressor stations and pigging stations. Diesel trucks which go back and forth from sites are big emitters of VOCs. VOCs are also released from liquid fuels such as gasoline or kerosene, as well as from burning fuel such as gasoline, wood, coal, or natural gas. Additionally, they are released from solvents, paints, glues, and other products that are used and stored at home and work.

Many VOCs are also hazardous air pollutants. VOCs, when combined with nitrogen oxides, react to form ground-level ozone, or smog. Examples of VOCs are benzene (a known cancer causing substance), formaldehyde (suspected of causing cancer), solvents such as toluene and xylene, and styrene.

How might I be exposed to VOCs? You can be exposed outdoors and indoors (indoors from cleaning, painting, or hobby supplies that contain them, or from contaminated outside air coming indoors). All people have occasional exposure to VOCs from contact with common sources such as gasoline refueling, breathing vehicular exhaust, cigarette smoke, and working with paints, glues, or solvents.

How can VOCs affect my health? The health effects of VOCs can vary greatly according to the compound, which can range from being highly toxic to having no known effects. The health effects of VOCs will depend on the nature of the compound, the level of exposure, and the length of exposure.

Long-term exposure to some VOCs can cause damage to the liver, kidneys, and central nervous system. Short-term exposure can cause eye and respiratory tract irritation, headaches, dizziness, fatigue, allergic skin reactions, nausea, and memory impairment.

For information about how to limit environmental exposure, refer to EHP's ***Citizen Science Toolkit***.

Resource: http://toxtown.nlm.nih.gov/text_version/chemicals.php?id=31

October 2017

Funded by 11TH HOUR PROJECT