

Evaluation of Public Health Impacts from Oil and Gas activities

Raj Goyal, Ph.D

Toxicologist

CDPHE

June 14, 2012

Outline

- What is environmental health?
- How do we evaluate environmental health issues?
- What do we know about health impacts of oil and gas operations?
 - What are major data gaps?
 - What does limited available information suggest?
 - What is being done to address data gaps in our knowledge?

What is environmental health?

- We try to understand how environmental chemicals can result in health impacts (e.g., cancer and other diseases)
- Need to understand:
 - If and how exposures are occurring
 - If health outcomes could be related to exposure

We do not still understand a great deal about environmental health

What is environmental health? –cont.

- Disease is caused by a complex interaction between multiple factors:
 - Environmental and other factors
 - Chemical dose (how much)- “the right dose” (how much) can vary based on:
 - Duration of exposure (how long)
 - life style
 - gender
 - age
 - family traits
 - nutritional status
 - general health and other exposures

“All substances are poisons: the right dose differentiates a poison from a remedy”
Paracelsus 1493-1541

How Do We Evaluate Environmental Health Issues?

Two Approaches:

- Evaluate risk to human health
- Conduct health studies
 - To link health problems to environmental chemicals
 - Association vs. Causation
 - Requires an extensive commitment of time and resources

Many studies are needed to establish a cause-and-effect relationship between exposure and disease – “weight of evidence” approach

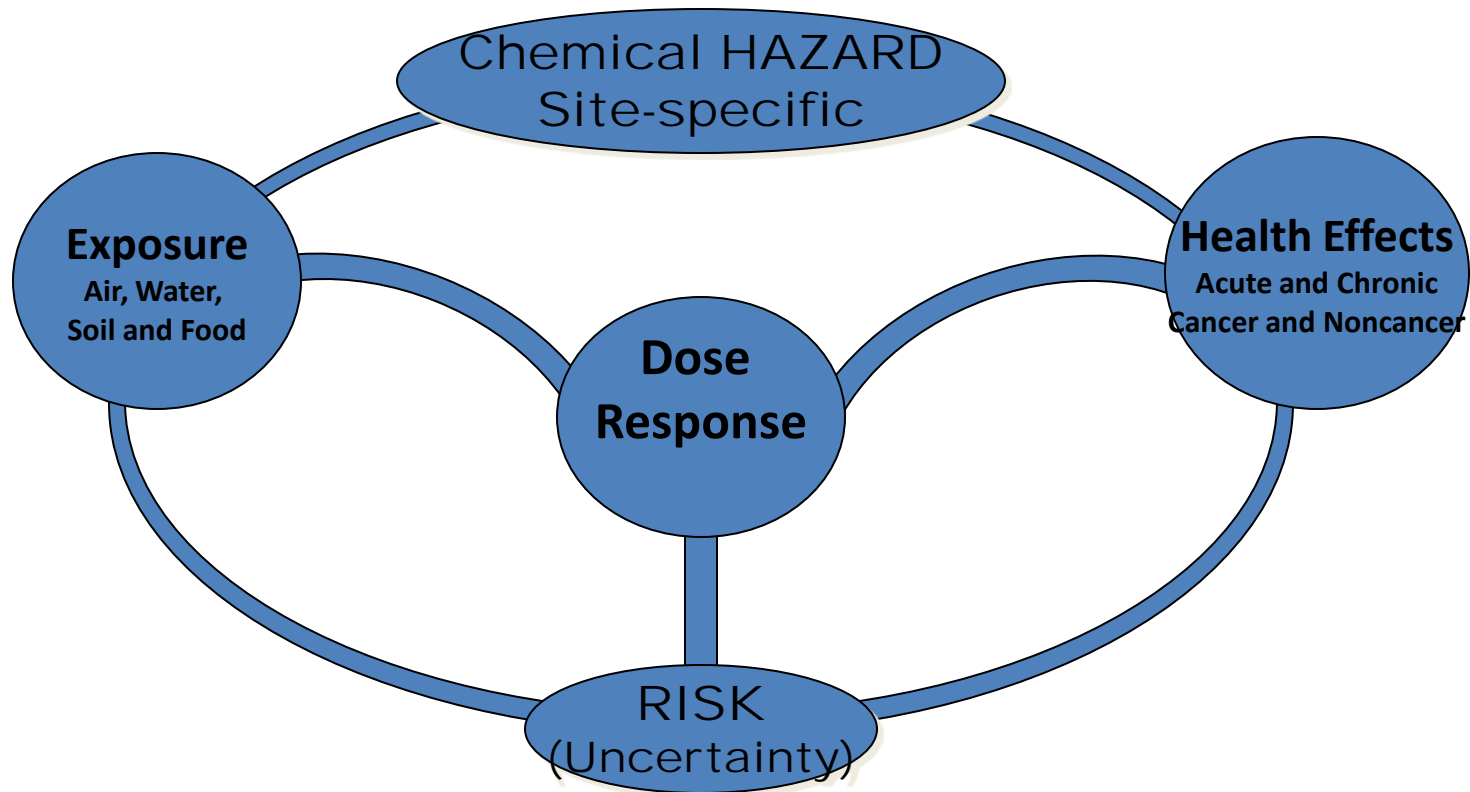
How Do We Evaluate Environmental Health Issues? – cont.

Evaluation of Risk to Human Health:

- Risk Assessment - a scientific screening tool
 - Determines the increased probability or chance that an individual's health may be affected as a result of exposure to environmental chemicals
 - It is not an exact science.
 - It cannot be used to make realistic predictions of biological effects.

A risk assessment may help to determine if a health study would be useful

Elements of Risk Assessment



What do we know about health impacts of oil and gas operations?

- We know there are critical data gaps.
 - For example, ambient air health risk assessment studies conducted in Garfield County by CDPHE in cooperation with the federal public health agency identified major data gaps:
 - No reference values available for the majority of chemicals associated with oil and gas operations
 - No short-term (acute) air samples to evaluate impacts of intermittent peak exposures
 - No data to determine contribution of different local sources
 - No information on all chemicals related to oil and gas operations
 - No data on air contaminants in the breathing zone
 - No information to assess exposures to complex mixtures of air toxics

Could not determine if ambient air inhalation harmful to people's health

What do we know about health impacts of oil and gas operations?-cont.

- Recent health risk assessment study (McKenzie et al., 2012) reviewed by CDPHE also has major uncertainties due to a lack of critical information

For example:

- It is unknown whether data collected adjacent to well pads (130-500 ft from the well pads) can appropriately represent actual exposures for individuals living $\leq \frac{1}{2}$ mile (up to 2640 ft) from the well pad that is undergoing completion activities.
- Air dispersion can rapidly dilute pollutants, so exposures beyond the 130-500 ft measurement distances may not relate to the data collected adjacent to the well pads.

The 2012 study concluded:

“preliminary results indicate that health effects resulting from air emissions during development of unconventional natural gas resources are **most likely to occur in residents living nearest** to the well pads and **warrant further study”**

What does limited available information suggest?

- Garfield County ambient air risk assessment studies indicated a low potential for public health impacts based on:
 - Theoretical lifetime cancer risk estimates
 - Non-cancer hazard estimates for short- and long-term exposures to volatile organic compounds
- Likely underestimation of risk due to critical data gaps

Limited data suggested a low potential for public health impacts

What is being done to address data gaps?

- Federal agencies are conducting studies (e.g., EPA Hydraulic Fracturing/groundwater study)
- Recently, the Institute of Medicine (IOM)/National Academy of Science (NAS) and the Center for Disease Control and Prevention (CDC) had information gathering sessions
- CDPHE is participating on the Technical Advisory Committee at CSU for the research being done into air quality emissions from oil and gas activities in Garfield County
 - The study will provide data on emissions from oil and gas sites at various distances from the well pad. We hope to learn how quickly emissions disperse in the air and discover how different seasons affect

National Challenge – Need for research on chemical toxicity and public health impacts