Colorado Department of Public Health and Environment
Colorado Cooperative Program for Environmental Health Assessments

Public Health Implications of Ambient Air Exposures as Measured in Rural and Urban Oil & Gas Development Areas – an Analysis of 2008 Air Sampling Data – Garfield County, Colorado

Colorado Department of Public Health and Environment

September 2010

The Garfield County Public Health Department (GCPHD) requested assistance from the Colorado Cooperative Program for Environmental Health Assessments (CCPEHA) of the Environmental Epidemiology Section of CDPHE to evaluate the potential public health hazards with respect to ambient air pollution in the county. Based on the results and recommendations of the previous health consultation, GCPHD enhanced air quality monitoring in 2008 by analyzing samples for 90 speciated non-methane organic compounds (SNMOCs) and carbonyls, increasing the frequency of sampling to a weekly or bi-weekly basis, and focusing on 4 of the original 14 monitoring sites. Therefore, the GCPHD requested that CCPEHA evaluate the 2008 data, identify any potential public health implications resulting from inhalation of ambient air in Garfield County and recommend actions to reduce the exposure, if necessary.

Site Background

- The Garfield County Public Health Department has been monitoring air quality since 2005 in response to residents' concerns regarding the health impacts of increased oil and gas development activities.
- Exploration for natural gas and oil is rapidly increasing in Garfield County, the state of Colorado, and throughout the West.
- Some of the oil and gas development has occurred within close proximity to residential housing

What did CCPEHA find in the Health Consultation?

- It cannot currently be determined if breathing ambient air in Garfield County could harm people's health. This conclusion was reached because the cancer risks and noncancer hazards for 65 out of 86 contaminants cannot be quantitatively estimated due to the unavailability of inhalation toxicity values. Thus, overall, there is an inability to determine if breathing ambient air in Garfield County could harm people's health.

What's next?

- We recommend that Garfield County should continue to do the following:
    - Continue long-term air monitoring; increased frequency of sampling; and development of a complete list of contaminants associated with oil and gas development.
    - Conduct short-term (acute) air monitoring by collecting 1-hour air samples in order to evaluate health risks posed by intermittent peak exposures.
    - Conduct source apportionment including sources other than the oil and gas operations, such as stationary industrial sources and mobile traffic sources.
    - Continue management of the risk posed by potential exposures to air toxics as a result of increase in oil and gas development activities (e.g., additional monitoring, sample analysis, and action as appropriate).
- By request, CCPEHA will evaluate any additional air data that may be collected in the future.
- Upon request, CCPEHA will collaborate with Garfield County to provide appropriate health education activities on the findings of this health consultation to stakeholders and the community.

FREQUENTLY ASKED QUESTIONS:

What is a health consultation? A health consultation provides advice on a specific public health issue related to real or possible human exposure to toxic material. A Health Consultation is a way for the Colorado Department of Public Health and Environment to respond quickly to a need for health information on toxic substances and to make recommendations for actions to protect the public's health. Health Consultations may consider:

1. The levels (or "concentrations") of hazardous substances;
2. If and how people might be exposed to contamination (through "exposure pathways" such as breathing air, drinking or contacting water, contacting or eating soil, or eating food);
3. The harm the substances might cause to people (or the contaminants' "toxicity");
4. If and how working or living nearby might affect people's health; and
5. Other dangers to people, such as unsafe buildings, explosive hazards, or other physical hazards.

Where can I find this health consultation?
An electronic copy of this health consultation can be found at: http://www.cdphe.state.co.us/dc/ehs/healthconsult.html. To request a free copy of this health consultation, or for more information, call Shannon Rossiter, or Raj Goyal at 303-692-2700. For other site-related concerns, please call Jim Rada, Environmental Health Manager for Garfield County at 970-625-5200.

How is drilling for oil or gas accomplished? This process starts with crews of specialized workers who search for geologic formations that are likely to contain oil and gas. In rotary drilling, a rotating bit attached to a length of hollow drill pipe bores a hole in the ground by chipping at and cutting the rock. A stream of drilling “mud”—a mixture of clay, chemicals, and water—is continuously pumped through the drill pipe and through holes in the drill bit. When oil or gas is reached, the drill pipe and bit are pulled from the well, and metal pipe (casing) is lowered into the hole and cemented in place. The casing’s upper end is fastened to a system of pipes and valves called a wellhead, or “Christmas Tree,” through which natural pressure forces the oil or gas into separation and storage tanks.

What are the possible environmental problems that could occur during the production of oil and gas? In general, air, soil, and water qualities can be affected by extraction of natural gas that is rich in methane. VOCs are released to the air at all stages of oil and gas operations, from exploration and drilling to processing, including venting, dehydration, gas processing, compression, leaks from equipment, evaporation of produced water from pond, and evaporation of wastes from open pits. For example, benzene is released during venting and dehydration.

Additionally, “produced water” is groundwater drawn from wells that can contain various salts as well as drilling and fracking chemicals. This substance can be placed in evaporation ponds, allowing the evaporation of chemicals including VOCs into atmosphere. Methane and fracking chemicals can also migrate into shallow aquifers used for drinking water wells.