Air

CDPHE's Air Pollution Control Division (APCD) conducted Erie, CO Air Emissions Case Study
12/5/12
"Average, speciated non-methane organic compounds (SNMOCs) concentrations in Erie were captured at 10 times those found in agricultural areas of higher oil and gas well pad density than in downtown Denver."
http://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=Erie_Air_Emissions_Case_Study_2012.pdf

The Endocrine Disruption Exchange: An Exploratory Study of Air Quality near Natural Gas Operations
11/9/12
"This exploratory study was designed to assess air quality in a rural western Colorado area where residences and gas wells co-exist. Sampling was conducted before, during, and after drilling and hydraulic fracturing of a new natural gas well pad. Weekly air sampling for 1 year revealed that the number of non-methane hydrocarbons (NMHCs) and their concentrations were highest during the initial drilling phase and did not increase during hydraulic fracturing in this closed-loop system. Methylene chloride, a toxic solvent not reported in products used in drilling or hydraulic fracturing, was detected 73% of the time; several times in high concentrations. A literature search of the health effects of the NMHCs revealed that many had multiple health effects, including 30 that affect the endocrine system, which is susceptible to chemical impacts at very low concentrations, far less than government safety standards. Selected polycyclic aromatic hydrocarbons (PAHs) were at concentrations greater than those at which prenatally exposed children in urban studies had lower developmental and IQ scores. The human and environmental health impacts of the NMHCs, which are ozone precursors, should be examined further given that the natural gas industry is now operating in close proximity to human residences and public lands."
http://www.endocrinedisruption.com/chemicals.air.php

Natural Gas Operations from a Public Health Perspective: TEDX, The Endocrine Disruption Exchange, Paonia, CO, USA
October 2011
"The technology to recover natural gas depends on undisclosed types and amounts of toxic chemicals. A list of 944 products containing 632 chemicals used during natural gas operations was compiled. Literature searches were conducted to determine potential health effects of the 353 chemicals identified by Chemical Abstract Service (CAS) numbers. More than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems. Approximately 40-50% could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations. These results indicate that many chemicals used during the fracturing and drilling stages of gas operations may have long-term health effects that are not immediately expressed."
http://www.endocrinedisruption.com/files/Oct2011HERA10-48forweb3-3-11.pdf

CU Study shows air emissions near fracking sites may pose health risk
3/19/12
"The report, based on three years of monitoring, found a number of potentially toxic petroleum hydrocarbons in the air near the wells including benzene, ethylbenzene, toluene and xylene."

"Our results show that the non-cancer health impacts from air emissions due to natural gas development is greater for residents living closer to wells," the report said. "The greatest health impact corresponds to the relatively short-term, but high emission, well completion period."
"We also calculated higher cancer risks for residents living nearer to the wells as compared to those residing further [away]," the report said. "Benzene is the major contributor to lifetime excess cancer risk from both scenarios."
http://www.ucdenver.edu/about/newsroom/newsreleases/Pages/health-impacts-of-fracking-emissions.aspx

Cooperative Institute for Research in Environment Sciences (CIRES) study: Oil and Gas Wells Contribute Fuel for Ozone Pollution
1/14/13
"At our test site in Weld County, we found that oil and natural gas operations are the dominant wintertime source of certain gasses, called volatile organic compounds (VOCs), that act as precursors—'starting ingredients'—for ozone pollution," said lead author Jessica Gilman, a CIRES research chemist working at NOAA's Earth System Research Laboratory."
"Average levels of propane were higher than the range of values reported for 28 U.S. cities. For example, they were four to nine times higher than in Houston, Texas, and Pasadena, California."
"The oil and gas footprint extends beyond Weld County, though. When the researchers took measurements near Fort Collins and in Boulder, north and west of the BAO tower respectively, they also detected emissions attributed to oil and natural gas there."
"Propane and ethane are fairly long-lived in the atmosphere, so they travel far. No matter where you are in the Front Range, you can still see the signature of VOC emissions from oil and natural gas operations."
http://cires.colorado.edu/news/press/2013/natgas.html

Lisa McKenzie Study: Human health risk assessment of air emissions from development of unconventional natural gas resources.
February 2012
"Residents living ≤ ½ mile from wells are at greater risk for health effects from NGD than are residents living >½ mile from wells. Subchronic exposures to air pollutants during well completion activities present the greatest potential for health effects. The subchronic non-cancer hazard index (HI) of 5 for residents ≤ ½ mile from wells was driven primarily by exposure to trimethylbenzenes, xylenes, and aliphatic hydrocarbons. Chronic HIs were 1 and 0.4. for residents ≤ ½ mile from wells and >½ mile from wells, respectively. Cumulative cancer risks were 10 in a million and 6 in a million for residents living ≤ ½ mile and >½ mile from wells, respectively, with benzene as the major contributor to the risk."
http://cogcc.state.co.us/library/setbackstakeholdergroup/Presentations/Health%20Risk%20Assessment%20of%20Air%20Emissions%20From%20Unconventional%20Natural%20Gas%20-%20HMcKenzie2012.pdf

National Institute for Occupational Safety and Health (NIOSH): Worker Exposure to Silica during Hydraulic Fracturing
6/21/12
"The National Institute for Occupational Safety and Health (NIOSH) identified exposure to airborne silica as a health hazard to workers conducting some hydraulic fracturing operations during recent field studies."
http://www.osha.gov/SLTC/oilgaswelldrilling/index.html