

Studies conducted by the Department of Environmental Quality indicate that most natural gas production activities in northern Arkansas do not significantly impact the state's air quality. However, the ADEQ recommends additional monitoring during well development to determine the impact of air pollution from oil-based drilling mud and cuttings.

Natural gas production in the Fayetteville Shale region of north central Arkansas has grown rapidly over the past several years, but little was known about either the total air pollution emissions or local air quality impacts of gas production. Previous studies performed in other areas of major gas development such as the Barnett Shale region of northeastern Texas have found that gas production can be a major emissions source of ozone-forming compounds, air toxic compounds, and greenhouse gases.

In 2010 the Environmental Protection Agency (EPA) Region 6 office awarded the Arkansas Department of Environmental Quality (ADEQ) a small grant to estimate emissions associated with natural gas production and perform air quality monitoring at gas production sites in the Fayetteville Shale. The resulting emissions inventory estimated county-level emissions from gas production for the year 2008. Ground-based ambient air monitoring was performed from November 2010 – June 2011 at 14 sites, including compressor stations that transport natural gas and new wells that were undergoing drilling or hydraulic fracturing. This preliminary study may assist in future assessments of the effects of natural gas production on air quality and public health.

Emissions Inventory

Fayetteville Shale gas production in 2008 was estimated to be responsible for the emissions of 128 tons sulfur dioxide (SO₂), 674 tons particulate matter ≤ 10µm (PM₁₀), 977 tons volatile organic compounds (VOCs), 3,377 tons carbon monoxide (CO), 5,002 tons nitrogen oxides (NO_x), and 112,877 ton methane (CH₄). Emissions from Fayetteville Shale gas production in 2008 comprised less than one percent of the annual statewide emissions from stationary, mobile, and area sources of each pollutant except nitrogen oxides (NO_x), which comprised approximately 2.6% of statewide emissions. While compressor stations were estimated to be the largest sources of NO_x, VOC, CO, and SO₂ emissions, drilling rigs and hydraulic fracturing pumps were the largest sources of PM₁₀ emissions. Methane was determined to be primarily emitted from fugitive sources such as valves and during flowback venting of wells following hydraulic fracturing. Inclusion of natural gas production emissions in the Arkansas emissions inventory will support future air quality planning.

Air Monitoring

Air monitoring at hydraulic fracturing sites and compressor stations did not detect VOC concentrations above the instruments' detection limit of 100 parts per billion (ppb). However, at drilling sites, VOC concentrations were often elevated along site perimeters with daily average and 15minute rolling average concentrations as high as 678 ppb and 5,321 ppb, respectively. The distribution of elevated VOC concentrations at drilling sites was significantly affected by wind direction and suggests open tanks of oil-based drilling mud and cuttings as possible VOC emission sources. The health effects from elevated VOCs are dependent on the individual

chemicals comprising VOC, which was not determined by this study and therefore cannot be assessed at this time. Air monitoring did not detect NO_x above the instruments' detection limits of 2,000 ppb NO or 300 ppb NO₂; consequently, the study was unable to determine if NO_x concentrations violated the 1-hour NO₂ National Ambient Air Quality Standard of 100 ppb. Future air monitoring studies may use instruments with lower detection limits and the ability to quantify individual VOC compounds to determine if air quality at natural gas sites poses a potential harm to public health.

If you have any questions, please contact Mike Bates, Chief, Air Division at 501-682-0730 or Bates@adeq.state.ar.us