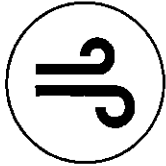




Safety is the top priority for Colorado's oil and natural gas industry. We want nothing more than to ensure our community is a safe place to live, which is why companies often go above and beyond regulatory requirements to operate safely and responsibly.



Air Quality

The Colorado Department of Public Health & Environment (CDPHE) reviewed 10,000 air samples from areas of the state with "substantial" oil and natural gas operations and found air quality to be below short - and long-term "safe" levels, even for sensitive populations.¹



Water Quality

Colorado requires initial baseline groundwater sampling within a one-half mile radius of a proposed oil and natural gas well before drilling occurs.² After site development is completed and production has started, operators are required to sample groundwater within six to twelve months and again five years later. All laboratory results must be provided to the state.



Health Risks

Data collected by public health regulators at both the national Center for Disease Control (CDC) and CDPHE and analyzed found no link between oil and gas operations and adverse health effects in Weld County between 2002 to 2015.³ This was true even as oil production in the county increased 12 times, natural gas production increased three times, and well counts more than doubled. In fact, during that same timeframe, Weld County cancer rates decreased by 1.9 percent, respiratory illness decreased by 9.1 percent, and heart disease decreased by 21.4 percent.

Industry Efforts

- Proactive measures in 2017 and 2018 to plug and reclaim an estimated 4,000 wells, resulting in emissions savings.⁴
- Consistently perform Leak Detection and Repair (LDAR) audits using infrared cameras that detect emissions invisible to the human eye.
- Voluntary programs to reduce emissions on high ozone days, including:
 - Delayed operational activity
 - Reduced vehicle traffic and miles traveled
 - Alternate vehicle fueling times
 - Additional aerial surveys to detect and fix leaks
- Protecting and safeguarding water sources by lining each well with multiple, concentric layers of steel and cement casing to ensure proper construction and integrity.
- Transporting oil, natural gas and water from well sites via pipelines, not trucks, as often as possible to eliminate millions of truck miles in our communities and eliminate emissions from storage tanks.

Updated: 3.4.2019



Colorado Leads the Country in Regulatory Oversight

Over the past eight years, Colorado has held 14 precedent-setting regulatory oil and natural gas focused rulemakings, each with a host of new regulations, from baseline groundwater testing and monitoring to air regulations targeting methane leak detection and repair.

These regulations ensure a safe environment for the public, the safety of our workforce, and the administrative oversight to ensure the oil and natural gas industry remains a responsible and integral part of Colorado's bright economic future.



COLORADO
Department of Public
Health & Environment



COLORADO
Oil & Gas Conservation
Commission
Department of Natural Resources



Additional Resources & Information

¹ CDPHE: <https://www.colorado.gov/pacific/cdphe/oil-and-gas-health-assessment>

² COGCC: <https://cogcc.state.co.us/documents/reg/Rules/2012/groundwater/FinalRule609-01092013.pdf>

³ Energy in Depth: <https://eidhealth.org/wp-content/uploads/2018/03/Weld-County-Health-Report.pdf>

⁴ COGA: <http://www.coga.org/wp-content/uploads/2018/10/Fact-Sheet-Ozone-FINAL-10-2-18.pdf>

For More Oil & Natural Gas Industry Informational Fact Sheets:
www.coga.org/energy-education/factsheet

Updated: 3.4.2019



Protecting the air we breathe is one of Colorado's oil and natural gas industry's highest priorities. This commitment to preserving the state's air quality has resulted in methane emissions declining by 45% between 2011 and 2017, even as production has quadrupled.¹ In fact, the Regional Air Quality Council (RAQC) and the Colorado Department of Health and Environment (CDPHE) found that "new regulations and advancements in technology" have resulted in significantly reducing emissions.²

Colorado has led the nation in creating some of the most stringent air regulations in the U.S. In 2014, the state was the first to:

- Regulate methane emissions from oil and natural gas production, estimated to reduce more than 60,000 tons of methane emissions per year.
- Implement the most comprehensive leak detection and repair program for oil and natural gas facilities in the country.
- Expand control and inspection requirements for storage tanks to ensure tank emissions are captured and routed to the required control devices.³

Examples of Reducing Emissions Sources

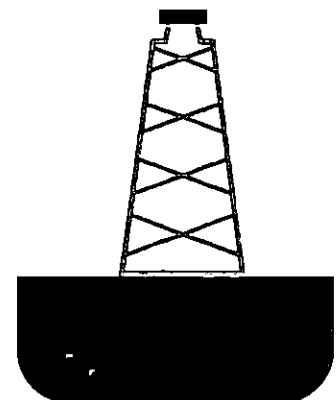
- Use of electric-powered drilling rigs instead of diesel-powered rigs to eliminate source emissions.
- Electric power used to run production facilities throughout the life of the well where feasible.
- Pipelines instead of trucks to transport oil and water, reducing site emissions and eliminating on average 40,000 truck trips and millions of truck miles per pad over 30 years.
- Use of closed-loop systems that are airtight and designed to reduce emissions.
- Removal and reclamation of thousands of legacy wells and facilities, removing older technology and emission sources.

Inspection & Monitoring Programs

- Regular inspections and recordkeeping throughout the life of the well.
- Consistently performing Leak Detection and Repair (LDAR) inspections using infrared cameras that detect emissions invisible to the human eye. Since 2014, when Colorado began LDAR monitoring, the industry has carried out nearly 1.5 million of these inspections across the state.⁴

Engineering Improvement Examples

- Use of low bleed pneumatic controllers (this releases significantly less methane into the air).
- Internal Floating Roof (IFR) tanks for control and storage of pressurized oil at gathering facilities (this provides minimum vapor loss into the environment).
- Vapor capture technology applied at some pad facilities.
- Closed-loop designs that minimize potential emission sources.

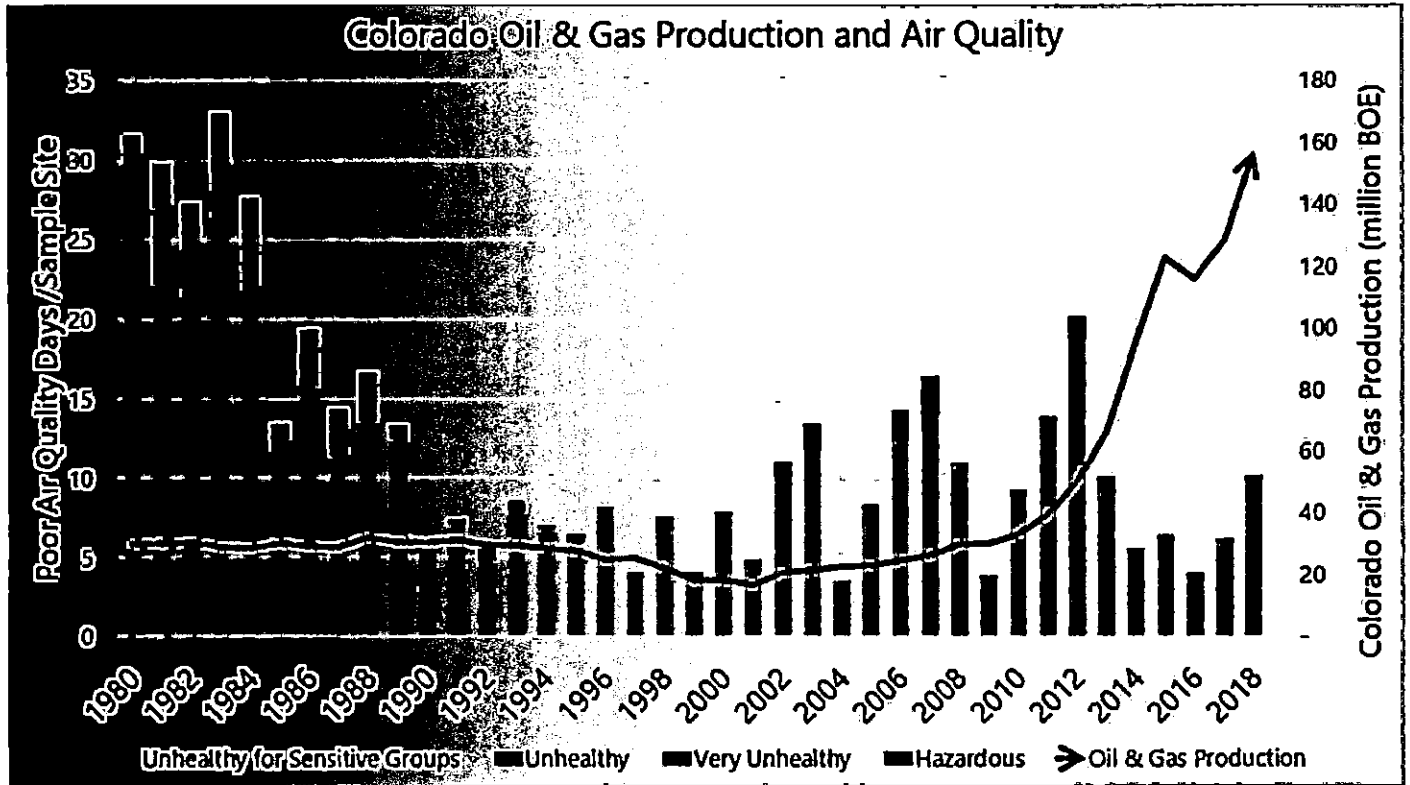


Updated: 3.4.2019



Improving Air Quality While Production Soars

Technical innovation and strict regulations resulted in Colorado experiencing fewer poor air quality days in 2018 than at any other time in the past 40 years – all while oil and natural gas production in the state increased by a magnitude of 10.⁵



Additional Resources & Information

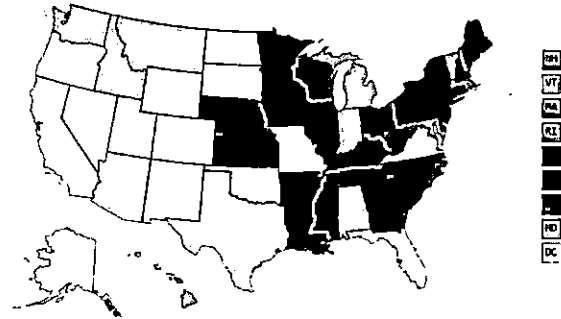
- ¹ CDPHE: https://www.colorado.gov/airquality/inv_maps.aspx
- ² CDPHE/RAQC: https://raqc.egnyte.com/dl/Kk5jSAclAm/TSD_2011-2017_Oil%26GasEl.pdf
- ³ CDPHE: Air Quality Control Commission, Reg. 7
- ⁴ CDPHE: <https://www.colorado.gov/pacific/cdphe/air/oil-and-gas-compliance>, accessed January 29, 2019
- ⁵ US Environmental Protection Agency. Air Quality System Data Mart: <http://www.epa.gov/ttn/airs/aqsdatamart>
- ⁶ Colorado Oil and Gas Conservation Commission: <http://cogcc.state.co.us/data.html#/cogis>

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Updated: 3.4.2019



The health and safety of Colorado residents and oil and natural gas employees is industry's top value. Colorado's oil and natural gas industry is one of the most regulated in the country, and scientific data supports the conclusion that these regulations are effectively protecting health and safety. A review of federal and state studies, as well as some questionable studies used by opponents to oil and gas development, can be found below.

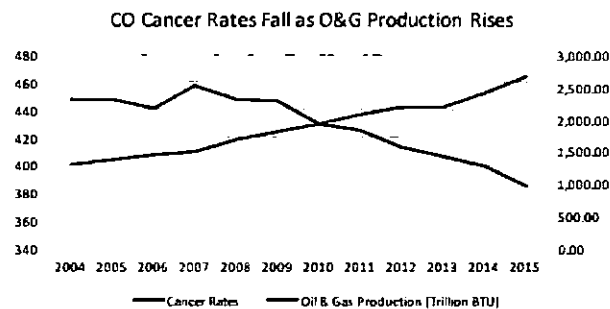


CDC: *Rates of New Cancers in the United States*

Federal and State Agency Studies

Multiple data-driven, scientific studies from federal and state health agencies show that Colorado's strict regulations are protecting the health and safety of all Coloradans.

- **Colorado Department of Public Health and Environment** – The state health department (CDPHE) studied over 10,000 air samples collected over a decade in oil and natural gas producing areas in Colorado. That analysis concluded: "All measured air concentrations were below short-and long-term safe levels" and "the risk of harmful health effects is low for residents living near oil and gas operations." In fact, drawing from thousands of air measurements, CDPHE did not find one single exceedance of federal and state health protective guideline values.
- **Weld County** – Data collected by public health regulators at both the national Center for Disease Control (CDC) and CDPHE were recently analyzed by Energy in Depth. Reviewing Weld County data between 2002 and 2015, they found no link between oil and natural gas operations and adverse health effects. This was true even as oil production in the county increased 12 times, natural gas production increased three times, and well counts more than doubled. In fact, during that same timeframe, Weld County cancer rates decreased by 1.9 percent, respiratory illness decreased by 9.1 percent, and heart disease decreased by 21.4 percent.
- **CDPHE & RAQC** – Emission inventory data compiled by the Regional Air Quality Council (RAQC) and CDPHE found that "new regulations and advancements in technology" have resulted in a "significant change" in reducing ozone-causing emissions. Between 2011 to 2017, the industry cut its emissions of Volatile Organic Compounds (VOCs) in the Denver Metro/North Front Range ozone nonattainment area by nearly 50 percent even as oil production quadrupled statewide.
- **Oil Production & Cancer Rates** – There is no correlation between high oil production and cancer rates, according to a comparison of U.S. Energy Information Administration oil production data and CDC cancer rate data. Looking at 2015, which is the most recent year for CDC cancer rate data, Colorado ranked 7th in oil production and had the 4th lowest cancer rate nationally. Similarly, Texas ranked 1st in oil production and had the 6th lowest cancer rate nationally, New Mexico ranked 6th in production and had the 2nd lowest cancer rate nationally, and Wyoming ranked 8th in production and had the 5th lowest cancer rate nationally. A full list comparing production and cancer rates may be found here.





Questionable Studies

There are a handful of reports commonly referred to as “The McKenzie Studies,” in reference to Lisa McKenzie, PhD, an assistant research professor at the Colorado School of Public Health. They are frequently cited by activists who want to shut down Colorado’s oil and natural gas industry. However, they have frequently been discredited and debunked by health officials. Even McKenzie has stated publicly that her research does not definitively link oil and natural gas development to health issues, conceding multiple flaws in her analysis.

- **March 2012** – This study incorrectly exaggerated emissions for well sites by at least 10 times. Researchers failed to include exhaust fumes from a major interstate nearby. In fact, no background emissions data was included at all.
- **January 2014** – This study reviewed birth records from CDPHE to determine if there was an association with oil and natural gas development and birth outcomes. At the time, CDPHE’s Chief Medical Officer and Executive Director Dr. Larry Wolk said health officials “disagree with many of the specific associations” in the study. “As Chief Medical Officer, I would tell pregnant women and mothers who live, or who at-the-time-of-their-pregnancy lived, in proximity to a gas well not to rely on this study as an explanation of why one of their children might have had a birth defect. Many factors known to contribute to birth defects were ignored in this study.” Additionally, the results found that the nearer a mother lived to a well the less likely she was to give birth prematurely or have a low-birth-weight baby.
- **February 2017** – This study claimed increased childhood cancer risks within 10 miles of an oil and natural gas well. The Colorado Department of Public Health and Environment (CDPHE) debunked the study calling it “misleading” and said “it does not prove or establish such a connection.” The study focused on only 16 cases. CDPHE further concluded that “the lack of a conclusive association is a result of many limitations.”
- **April 2018** – This study looked at acute and chronic health risks from non-methane hydrocarbons. Analysis showed that the study relied on just 29 samples to claim oil and natural gas “could” increase cancer risk by one-tenth of 1 percent. Notably, the 29 samples were taken inside the state’s 500-foot setback requirement. The state health department wrote: “This study confirms our 2017 findings of low risk for cancer and non-cancer health effects at distances 500 feet and greater.” The average American has a 30 to 40 percent chance of cancer over their lifetime. After pointing to a theoretical risk increase of 1/10th of one percent, the study ultimately concludes that there are “substantial uncertainties and the need for more research.”
- **December 2018** – This study announced a “possible connection” among volunteer participants to increased early indicators of cardiovascular disease as a result of living near oil and gas activity areas. A closer look revealed the study did not account for multiple other non-oil and gas factors that could cause the connection, and did not measure exposures to possible environmental stressors, like air or noise pollution. And, the extremely small sample size of 97 volunteers included a lopsided demographic: “Participants in the high exposurer tertile were older and less educated than participants in the other tertiles,” according to the study. The study further concludes that “our results may not be applicable to the general population.”

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Industry's Commitment to Safety



Goal of zero injuries and incidents



Continuously monitored operations



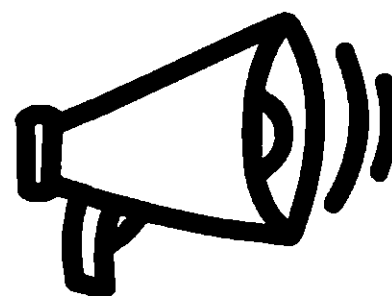
Automatic, remote shut-in capabilities



Stop-work authority at all active sites



Regular, mandatory safety training for employees



Active safety drills in collaboration with local first responders

Additional Resources & Information

¹API Workplace Safety Report 2008-2017: <https://www.api.org/news-policy-and-issues/safety-and-system-integrity/workplace-safety-report>

²API Workplace Safety Report 2008-2017: <https://www.api.org/news-policy-and-issues/safety-and-system-integrity/workplace-safety-report>

³U.S. Bureau of Labor Statistics: The incidence rates represent the number of injuries per 100 full-time equivalent workers. ⁴U.S. Bureau of Labor Statistics: <https://www.bls.gov/iif/oshsum.htm#17Summary> Tables

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www.coga.org/energy-education/factsheet

Updated 3.4.2019



Colorado oil and natural gas operators are an integral part of one of the safest industries in the country. In 2017, the rate of job-related injuries and illnesses for the oil and natural gas industry was 1.7 per 100 full-time workers compared to a rate of 2.8 for the entire U.S. private sector.¹

Over the past decade, the oil and natural gas industry's incident rate has decreased by 41 percent, while doubling the size of its workforce and increasing overall production and the number of drilling rigs.² The U.S. Bureau of Labor Statistics found that the oil and natural gas industry is safer than construction, agriculture, manufacturing, leisure and hospitality and educational and health services.

Incidence Rates³ of Occupational Injuries by Industry⁴



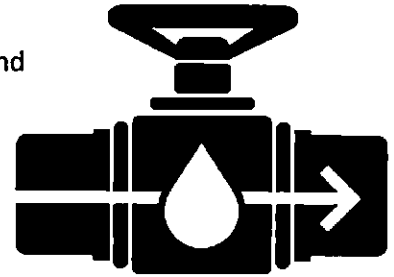
Colorado operators are continually working to improve their safety record through:

- **Prevention**
 - ✓ Operations are intentionally designed to reduce the risk of injury and incident.
 - ✓ Many operations are monitored 24/7 and are designed to automatically shut in remotely, further preventing risk of injuries and incidents.
 - ✓ Anyone who comes on an active site has stop-work authority if they see anything unsafe occurring.
- **Training**
 - ✓ Colorado employees attend regular, mandatory safety training sessions.
 - ✓ Operators conduct spontaneous safety drills in coordination with local responders to ensure everyone has the skills and confidence to effectively respond to a situation.
- **Industry Collaboration**
 - ✓ Through innovation, applied learnings and tailoring operations in ways that benefit communities and improve the safety of employees.
 - ✓ Applying best safety practices and train employees on incident prevention.
 - ✓ Serving as a resource to community first responders on incident responses.
 - ✓ Engaging in active campaigns like Colorado811 to educate excavators and the general public on the industry's underground infrastructure of pipelines to avoid incident and injury.

Updated 3.4.2019



On the regulatory front, in 2018, the Colorado Oil & Gas Conservation Commission (COGCC) unanimously approved dozens of new regulations pertaining to flowlines and other types of production piping systems. Those regulations increase transparency while also strengthening safety and reporting requirements. They also further require operators to lock and mark any flowlines not in use or abandoned. All lines must continue to undergo integrity testing under the same standards as active lines until abandonment. Finally, operators are also now required to become Tier 1 participants in the 811 call-before-you-dig system. Overall, from new domestic gas tap rules to specifying where isolation valves must be installed on a flowline, these latest regulations, combined with existing state oversight requirements, provide Colorado with the nation's most stringent and comprehensive rules for oil and natural gas flowline and production piping systems.



Oversight and 811

In addition to these new regulations, bipartisan legislation (SB18-167) was signed into law in 2018 which greatly strengthened enforcement powers related to notification protocols and the excavation of underground facilities. That legislation established an independent Safety Commission to oversee the implementation of this new authority, as well as the more rigorous obligations for legal excavation. These additional requirements give local communities, builders, and property owners the information they need to feel confident in safely identifying the location and preserving the integrity of underground facilities, including oil and natural gas flowlines. That transparency provides greater awareness of COGCC's strict guidelines for flowline installation, design, registration, and management.



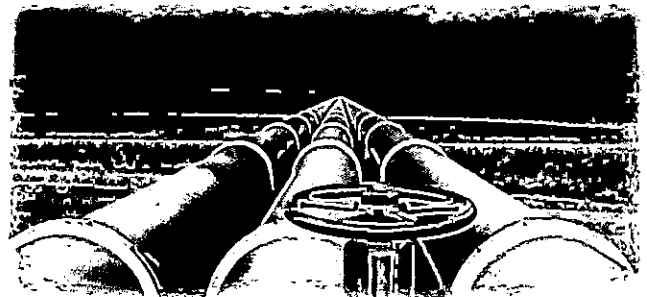
Pipelines: The Safest Way to Transport Oil and Gas

According to data released by the National Transportation Safety Board, pipelines remain the safest way to transport oil and gas and its byproducts. Communities located near oil and gas developments routinely demand operators to do everything in their power to utilize pipelines because they also reduce truck traffic, visual impacts, and spills.

Additional Resources & Information

Colorado Oil & Gas Conservation Commission (COGCC)
www.cogcc.state.co.us

Colorado Oil and Gas Regulatory Overview
www.coga.org/RegulatoryOverview/



For More Oil & Natural Gas Industry Informational Fact Sheets:
www.coga.org/energy-education/factsheet

Updated: 2.5.201