



COGA | Oil and Gas Development and Public Health Whitepaper

We are all concerned about the health of our families. Oil and gas development, including new technologies such as horizontal drilling and multi-stage hydraulic fracturing (commonly referred to as “fracking”), has been repeatedly studied and continues to be researched. There are many scary and often unfounded health risk claims about communities near oil and gas development.

We are all surrounded by numerous chemicals every day. The presence of a chemical in your environment does not automatically translate into adverse effects. The way we are exposed (exposure route), time of exposure (duration), and concentration of exposure (dose), are only three pieces of the very complex puzzle that must be evaluated to determine if there is a significant risk.

Because the oil and gas industry is raising our families in the Colorado communities in which we work, live, and play, we understand the importance of sharing good information. We have assembled below summaries of peer-reviewed studies and reports, an overview of recent oil and gas rulemakings in Colorado, and a discussion of ozone so you can have access to more information and draw your own conclusions.

EXISTING STUDIES FOCUSED ON PUBLIC HEALTH

STUDIES IN COLORADO

- **Fort Collins Memorandum 2a Technical Support Document City of Fort Collins- Prepared for the City of Fort Collins by Terra Mentis Environmental Consulting, February 2015¹**
 - **Study Scope:** This report was commissioned by the City of Fort Collins following their voter approved moratorium on hydraulic fracturing in February 2013. The intended outcome was to, “provide an aid to the City of Fort Collins for future decision- making regarding hydraulic fracturing (also called “fracking”) and the implications for the future of hydraulic fracturing in the City of Fort Collins...”
 - The study looked at four specific issues to evaluate the potential implications of hydraulic fracturing in Fort Collins.
 - A Human Health Risk Assessment process which is used by the United State Environmental Protection Agency (EPA) to evaluate potential impacts to human health from chemicals;
 - The local geology of Fort Collins;
 - A holistic summary of the oil and gas extraction process, including hydraulic fracturing; and
 - “The nature of the chemicals used or extracted and a summary of the potential health effects of these chemicals.”
 - The report concluded, “The primary conclusions from the body of data presented in the previous section of this report are that there are little environmental data characterizing background and/or potential impacts from the chemical released during hydraulic fracturing and oil extraction in Fort Collins.”

¹ http://www.fcgov.com/oilandgas/pdf/FtCollinsSupportDocument_TerraMentisFinal_Feb2015.pdf

OTHER STUDIES

- **“Noise, Light, Dust, Volatile Organic Compounds Generated by the Drilling of Horizontal Wells Related to the Well Location Restriction Regarding Occupied Dwelling Structures” - West Virginia Department of Environmental Protection Office of Oil and Gas, 2012²**
 - **Study Scope:** The study covered five stages of well pad development: Site clearing and preparation; vertical drilling; horizontal drilling; hydraulic fracturing; and flowback and completion. Ambient air measurements of at least six days duration were obtained at seven well pads in West Virginia and collected during the development stages. The seven well pads were located in Brooke, Marion, and Wetzel Counties and included three different companies. Field monitoring took place from July 2012 to October 2012, and approximately 46 days of measurements of noise, light, dust, and volatile organic compounds, as well as other air pollutants, were obtained. In addition, the Department of Energy’s (DOE) National Energy Technology Laboratory operated a mobile air monitoring trailer, equipped with a suite of continuous monitors, at six of the seven sites.
 - “Even in remote locations across the country, as well as in West Virginia, background ambient air is not free of pollutants, including dust and volatile organic compounds. That is, the mere presence and detection of air pollutants in ambient air is not precluded by federal and state rules. Based on WVU’s study data, vehicle traffic and engine exhaust are the likely sources of the intermittently high dust and benzene observations. While there are no indications of immediate danger to public health based on data obtained from this study, vehicle traffic associated with well pad development activities may pose a nuisance.” {emphasis added}

In regards to associated methane emissions from oil and gas production, the following studies have all cited that natural gas is a cleaner option than coal.

- **“Community Health Risk Analysis of Oil and Gas Industry Impacts in Garfield County” – Saccomanno Research Institute & Mesa State College, 2008³**
 - **Study Scope:** This project involved a "three-pronged" approach to the assessment of human health risks: community focus groups, human health risk assessment, and data analysis and communication.
 - “At the present time – based on our data sources – there is not a health crisis in Garfield County”

EXISTING STUDIES FOCUSED ON AIR

STUDIES IN COLORADO

- **“Town of Erie Air Quality Toxicology Assessment” – Pinyon Environmental, 2012 ⁴**
 - **Study Scope:** In response to health concerns stemming from a report issued by the National Oceanic and Atmospheric Administration (NOAA) that listed elevated contaminants in the air, Erie’s Board of Trustees hired an independent environmental consulting firm to examine the results of NOAA’s report to determine if there was a health risk.
 - “Regarding cancer risk, if Erie residents were to continuously breathe air containing the NOAA/Nitrogen, Aerosol Composition, and Halogens on a Tall Tower (NACHTT) benzene concentration over an entire lifetime (70 years), the risk of cancer would be on the order of 1 in 100,000. In order to put these risk estimates into perspective, it is helpful to compare the cancer risk identified in this assessment to lifetime cancer risk from all causes.

² <http://www.dep.wv.gov/oil-and-gas/HorizontalPermits/legislativestudies/Documents/FINAL%20OOG%20Noise%20Light%20Dust%20and%20VOCs%20Report%205-28-2013.pdf>

³ [http://www.garfield-county.com/public-health/documents/1_COMMUNITY_HEALTH_RISK_ANALYSIS-\(Complete_Report_16MB\).pdf](http://www.garfield-county.com/public-health/documents/1_COMMUNITY_HEALTH_RISK_ANALYSIS-(Complete_Report_16MB).pdf)

⁴ <https://www.erieco.gov/DocumentCenter/Home/View/2531>

- Information extracted from the EPA [Environmental Protection Agency] estimates that approximately 1 out of every 3 Americans (or 33,600 in 100,000) will contract cancer in their lifetimes”
- “[The] Risk of Erie residents experiencing an adverse health effect over an entire lifetime exposure to the NOAA reported benzene concentration is low.”
- **“Air Emissions Case Study Related to Oil and Gas Development in Erie, Colorado” – Colorado Department of Public Health and Environment, December 2012⁵**
 - **Study Scope:** From late July to late August 2012, the Colorado Department of Public Health and Environment, Air Pollution Control Division, conducted air sampling adjacent to natural gas well completion activities in Erie, Colorado. The purpose of the sampling was to measure air emissions that may be associated with the well completion activities. The study examined the release of benzene, and other VOC emissions from drilling operations around Erie.
 - “The monitored concentrations of benzene, one of the major risk driving chemicals, are well within acceptable limits to protect public health, as determined by the U.S. Environmental Protection Agency. The concentrations of various compounds are comparatively low and are not likely to raise significant health issues of concern.” {emphasis added}
- **“Pathway Analysis and Risk Assessment for Solids and Fluids Used in Oil and Gas Exploration and Production in Colorado” – Quality Environmental Professional Associates, June 2008⁶**
 - **Study Scope:** Address data gaps regarding chemicals used in oil and gas development, and their risk to human health.
 - Over 150 environmental media samples were collected from:
 - pit solids;
 - pit fluids
 - fracing flowback fluids;
 - produced water; and
 - air samples.
 - “The results of the air sampling indicate no significant contribution of volatile organic compounds (VOCs) (including benzene) or carbonyls (aldehydes and ketones) from the drilling operations. They also indicate no significant chronic health risk associated with the chemicals present in the air downwind from the pads. And finally they confirm that the standard methods to estimate risk in the risk assessment process over-estimate the airborne risk to these chemicals and are conservative in this manner.” {emphasis added}

OTHER STUDIES

- **“Northeastern Pennsylvania Marcellus Shale Short-term Ambient Air Sampling Report” – Commonwealth of Pennsylvania & Department of Environmental Protection (DEP), 2011⁷**
 - **Study Scope:** The scope of DEP’s investigation of well-sites measured many different emissions, including those of VOC’s
 - “Results of the limited ambient air sampling initiative in the northeast region did not identify concentrations of any compound that would likely trigger air-related health issues associated with Marcellus Shale drilling activities.” {emphasis added}

⁵http://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=Erie+Air+Emissions+Case+Study+2012+-+revised+11252014.pdf

⁶ <http://energyindepth.org/docs/pdf/COGA%20Flowback.pdf>

⁷ http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/docs/Marcellus_NC_05-06-11.pdf

- **“DISH, Texas Exposure Investigation” – Texas Department of State Health Services (TxDSHS) – May 12, 2010⁸**
 - **Study Scope:** TxDSHS performed a toxicological-based study on residents of Dish, Texas based on the concerns of public health risks from increased drilling activity near the town. Blood samples were collected and analyzed.
 - “The blood samples were analyzed for volatile organic compounds (VOCs) to determine whether people living in and around DISH had higher levels of these contaminants in their blood than 95% of the general United States (U.S.) population. Although a number of VOCs were detected in some of the blood samples, the pattern of VOC values was not consistent with a community-wide exposure to airborne contaminants, such as those that might be associated with natural gas drilling operations.” {emphasis added}
 - “Other sources of exposure would explain many of the findings. For instance, all four people who had higher levels of benzene in their blood were cigarette smokers. Cigarette smoking was verified both by a chemical marker in the blood (2,5-dimethylfuran) and by answers provided on an exposure survey. Cigarette smokers also had higher levels of ethylbenzene, styrene, toluene, and xylene in their blood.” {emphasis added}

In regards to associated methane emissions from oil and gas production, the following studies have all cited that natural gas is a cleaner option than coal.

- **“Shale gas production: potential versus actual greenhouse gas emissions” - Massachusetts Institute of Technology, Francis O’Sullivan and Sergey Paltsev, November 2012⁹**
 - **Study Scope:** Using data from approximately 4,000 horizontal wells, study assesses the level of greenhouse gas (GHG) emissions from shale gas well hydraulic fracturing operations in the United States during 2010.
 - “...it is incorrect to suggest that shale gas-related hydraulic fracturing has substantially altered the overall GHG intensity of natural gas production.”
- **“Natural Gas and the Transformation of the U.S. Energy Sector: Electricity” – Joint Institute of Strategic Energy Alliance and National Renewable Energy Labs, 2011¹⁰**
 - **Study Scope:** JISEA designed this study to address four key questions:
 - What are the life cycle GHG emissions associated with shale gas compared to conventional natural gas and other fuels used to generate electricity?
 - What are the existing legal and regulatory frameworks governing unconventional gas development at federal, state, and local levels, and how are they changing in response to the rapid industry growth and public concerns?
 - How are natural gas production companies changing their water-related practices?
 - How might demand for natural gas in the electric sector respond to a variety of policy and technology developments over the next 20 to 40 years?
 - “Based on analysis of more than 16,000 sources of air pollutant emissions reported in a state inventory of upstream and midstream natural gas industry, life cycle greenhouse gas emissions associated with electricity generated from Barnett Shale gas extracted in 2009 were found to be very similar to conventional natural gas and less than half those of coal-fired electricity generation.” {emphasis added}

⁸https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjTzYfMs_KAhVlmoMKHdPBDpwQFggdMAA&url=http%3A%2F%2Fwww.dshs.state.tx.us%2Fepitox%2Fconsults%2Fdish_ci_2010.pdf&usq=AFQjCNF11wvq7k_klWMh2avKMZGdF4Rc6Q&sig2=bOj5ETP9X5kL0r172y

⁹ <http://iopscience.iop.org/article/10.1088/1748-9326/7/4/044030/meta;jsessionid=6C76324844171467501143DD95BCF2CA.c3.iopscience.cld.iop.org>

¹⁰ <http://www.nrel.gov/docs/fy13osti/55538.pdf>

- **“The greenhouse impact of unconventional gas for electricity generation” - University of Maryland, Nathan Hultman, Dylan Rebois, Michael Scholten and Christopher Ramig, 2011¹¹**
 - **Study Scope:** Comparison of the greenhouse gas footprints of conventional natural gas, unconventional natural gas (i.e. shale gas that has been produced using the process of hydraulic fracturing, or 'fracking'), and coal in a transparent and consistent way, focusing primarily on the electricity generation sector.
 - “...we have demonstrated that the fugitive emissions from the drilling process are very likely not substantially higher than for conventional gas. ...the greenhouse footprint of shale gas and other unconventional gas resources is about 11% higher than that of conventional gas for electricity generation, and still 56% that of coal.
- **“A commentary on “The greenhouse gas footprint of natural gas in shale formations” by R.W. Howarth, R. Santoro, and Anthony Ingraffea” – Cornell University, Lawrence M. Cathles, Larry Brown, Milton Taam & Andrew Hunter¹²**
 - **Study Scope:** Prof. Howarth et. al of Cornell University published a study in 2011 stating that the production of natural gas emits more greenhouse gasses from fugitive methane emissions, and in the long run is worse than coal or the environment. Upon the release of Howarth’s study, another group of professors, also from Cornell University, issued this critique.
 - “We argue here that their analysis is seriously flawed in that they significantly overestimate the fugitive emissions associated with unconventional gas extraction, undervalue the contribution of “green technologies” to reducing those emissions to a level approaching that of conventional gas”
 - “Using more reasonable leakage rates and bases of comparison, shale gas has a GHG footprint that is half and perhaps a third that of coal.”
- **“Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production” – National Energy Technology Laboratory (NETL) & U.S. Department of Energy, 2011¹³**
 - **Study Scope:** NETL/DOE examined the life-cycle analysis of natural gas extraction and combustion for electricity use, and accounting for associated methane emissions
 - “Natural gas-fired baseload power production has life cycle greenhouse gas emissions 42 to 53 percent lower than those for coal-fired baseload electricity, after accounting for a wide range of variability and compared across different assumptions of climate impact timing.” {emphasis added}

EXISTING STUDIES FOCUSED ON WATER

STUDIES IN COLORADO

- **Distribution and Origin of Groundwater Methane in the Wattenberg Oil and Gas Field of Northern Colorado- Journal of Environmental Science and Technology, January 2014¹⁴**
 - **Study Scope:** Understand and address the occurrence and origin of methane in groundwater in Wattenberg Field.
 - A press release from Colorado State University professor, Ken Carlson and lead investigator of the study stated, “Our study does not indicate a systemic problem with oil and gas activity polluting water wells with methane in the Denver-Julesburg Basin,” Carlson said. “As with any industrial activity, there does appear to be a low-level risk of impact to the surrounding environment. Regulations aimed at well drilling, casing and surface activity have changed significantly over the past five years, driving these risks to even lower levels.”

¹¹ <http://iopscience.iop.org/article/10.1088/1748-9326/6/4/044008/meta>

¹² <http://link.springer.com/article/10.1007%2Fs10584-011-0333-0>

¹³ <http://www.netl.doe.gov/energy-analyses/pubs/NG-GHG-LCL.pdf>

¹⁴ <http://pubs.acs.org/doi/abs/10.1021/es404668b>

- “Methane is pervasive in groundwater wells in the Wattenberg field with widely varying concentrations. Greater than 98% of dissolved methane measurements appear to have been generated from microbial processes, and the concentration and occurrence increased with increasing water well depth. The results of the study did not indicate systematic contamination of aquifers with methane due to oil and gas activities in the Wattenberg field, and elevated methane levels do not appear to be the result of increased drilling and fracturing. More likely, increased methane occurrence is due to aquifer utilization in areas with abundant sources of naturally occurring biogenic methane.”
- **“Pathway Analysis and Risk Assessment for Solids and Fluids Used in Oil and Gas Exploration and Production in Colorado” – Quality Environmental Professional Associates, June 2008¹⁵**
 - **Study Scope:** Address data gaps regarding chemicals used in oil and gas development, and their risk to human health.
 - “With regard to liquid discharge directly into groundwater, it is apparent that under reasonable predicted conditions, no significant risk is predicted.” {emphasis added}
 - “Information on baseline and post drilling water and monitoring wells within a ½ mile radius of the sampling sites were reviewed. None of the private well samples exceeded drinking water standards.”

OTHER STUDIES

- **“Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources- Executive Summary”- United States Environmental Protection Agency, June 2015¹⁶**
 - **Study Scope:** “The U.S. Congress urged the U.S. Environmental Protection Agency (EPA) to study the relationship between hydraulic fracturing and drinking water. This report synthesizes available scientific literature and data to assess the potential for hydraulic fracturing for oil and gas to change the quality or quantity of drinking water resources, and identifies factors affecting the frequency or severity of any potential changes.”
 - “We did not find evidence that these mechanisms have led to widespread, systemic impacts on drinking water resources in the United States.
 - “Of the potential mechanisms identified in this report, we found specific instances where one or more mechanisms led to impacts on drinking water resources, including contamination of drinking water wells. The number of identified cases, however, was small compared to the number of hydraulically fractured wells.”
- **“Elevated levels of diesel range organic compounds in groundwater near Marcellus gas operations are derived from surface activities”- Proceedings of the National Academy of Sciences of the United States of America, October 12, 2015¹⁷**
 - **Study Scope:** A study of purgeable and extractable organic compounds in the Marcellus Shale to determine if these chemicals reach shallow groundwater aquifers and affect water quality during the process of high-volume hydraulic fracturing.
 - “Using analyses of organic compounds coupled with inorganic geochemical fingerprinting, estimates of groundwater residence time, and geospatial analyses of shale gas wells and disclosed safety violations, we determined that the dominant source of organic compounds to shallow aquifers was consistent with surface spills of disclosed chemical additives.”
 - There was no evidence of association with deeper brines or long-range migration of these compounds to the shallow aquifers. Encouragingly, drinking water sources affected by disclosed surface spills could be targeted for treatment and monitoring to protect public health.

¹⁵ <http://energyindepth.org/docs/pdf/COGA%20Flowback.pdf>

¹⁶ http://www.epa.gov/sites/production/files/2015-06/documents/hf_es_erd_jun2015.pdf

¹⁷ <http://www.pnas.org/content/112/43/13184.abstract>

- **“Fact-Based Regulation for Environmental Protection in Shale Gas Development” –University of Texas Austin, 2012¹⁸**
 - **Study Scope:** Reviewed shale gas regulation, assessed media coverage and public perception, and addressed possibility of groundwater contamination - in partnership with Environmental Defense Fund
 - “The Waxman Committee Report is the most comprehensive publicly available study of the chemical makeup of additives used in hydraulic fracturing fluids. Many of the chemicals listed are no longer in use. The report indicates that from 2005 to 2009, some 95 products containing 13 different carcinogens were utilized in hydraulic fracturing. Four compounds, 2BE (a surfactant), naphthalene, benzene, and acrylamide (or polyacrylamide), were singled out in this report for special emphasis. As context for the analysis of the impact of these compounds, it should be noted that all four are widely used in the manufacture and use of many commercial products and other applications.”
 - “There is at present little or no evidence of groundwater contamination from hydraulic fracturing of shales at normal depths. No evidence of chemicals from hydraulic fracturing fluid has been found in aquifers as a result of fracturing operations.” {emphasis added}
 - “Iron and manganese are common naturally-occurring constituents in groundwater that are higher in concentration in some aquifers than others. Particularly in areas underlain by gas-producing shales, methane migrates out of the shales under natural conditions and moves upward through overlying formations, including water-bearing strata (aquifers). Such naturally-occurring methane in water wells has been a problem in shale gas areas for many years or decades before shale gas drilling began.” {emphasis added}
 - “A large number of the reports are anecdotal rather than the results of scientific investigation. In many situations, separating the health impacts of shale gas from other potential sources such as smoking, living conditions, and travel on busy streets and highways is a complex task. Our society faces a problem in that benzene (and other VOCs), polynuclear aromatic hydrocarbons (PAHs), hazardous air pollutants (HAPs), and a variety of endocrine disruptors are widespread pollutants in our environment. For most of the population individual exposure to benzene and other VOCs compounds is dominated by exposure to tobacco smoke, highway driving, time spent in gas stations, and time spent in urban environments.”
 - “In general, none of the studies reviewed for this initiative showed a clear link between shale gas activities and documented adverse health effects. It may also be worth noting that the gas industry has been using hydraulic fracturing for over 50 years, but the studies examined in this review did not find any direct evidence for health impacts on workers in the industry or the public living near oil and gas industry activity.” {emphasis added}
 - **Other notable summary points from the study**
 - “Claims of migration of fracturing fluids out of the target shale zone and into aquifers have not been confirmed with firm evidence.”
 - “The possible routes of escape such as induced or natural fractures or improperly plugged abandoned oil and gas wells as conduits for fracture fluid flow have not been substantiated.”
 - “Many claims of impacts on water wells by shale gas activities have been made, but none have shown evidence of chemicals found in hydraulic fluid additives.”
 - “Water wells in shale gas areas have historically shown high levels of naturally occurring methane long before shale gas development began.”
 - “Emissions of volatile organic carbon compounds are the primary area of concern for air quality; however, the shale gas contribution to VOC emissions is quite limited in comparison to other sources such as vehicle exhaust.”
 - “Methane releases during shale gas operations have caused concern over contribution to global climate change, since methane is a much stronger greenhouse gas than carbon dioxide. However, many operators already recover most methane during “green completions.”

¹⁸ http://www.velaw.com/UploadedFiles/VEsite/Resources/ei_shale_gas_reg_summary1202%5B1%5D.pdf

- **“The Impact of Marcellus Gas Drilling on Rural Drinking Water Supplies” – Pennsylvania State University, 2011¹⁹**
 - **Study Scope:** A large scale study of water quality in private water wells in rural Pennsylvania testing before and after drilling of nearby Marcellus Shale Gas wells.
 - “Results of the water quality parameters measured in this study do not indicate any obvious influence from fracking in gas wells on nearby private water well quality. Data from a limited number of wells also did not suggest a negative influence of fracking on dissolved methane in water wells. (p. 21)” {emphasis added}

REGULATORY SAFEGUARDS

The Oil and Gas Conservation Act (Colo. Rev. Stat. § 34-60-100, et seq.) governs oil and gas development in Colorado. The Colorado Oil and Gas Conservation Commission (COGCC)²⁰ is responsible for promulgating rules to regulate oil and gas development in Colorado.

The COGCC applies a multitude of rules and permit conditions to protect the public health and safety of the general public including, but not limited to, setbacks from dwellings for wells and production equipment, blowout prevention equipment, well and equipment safety specifications and design standards, security fencing, and special operations safety procedures.

In 2008, Colorado completely overhauled the COGCC rules. These regulations are continually evolving to address concerns and technological advancements.

RECENT NOTABLE RULEMAKINGS:

- **Hydraulic Fracturing Disclosure:** In December 2011, the COGCC passed a Hydraulic Fracturing Disclosure Rule that requires comprehensive public disclosure of the chemicals used in hydraulic fracturing treatments. Additional information can be found at www.fracfocus.org and on the [COGA website](#).
- **Baseline Water Sampling:** In January 2013, the COGCC approved the most rigorous statewide mandatory groundwater sampling and monitoring rules in the United States. This program requires operators to take groundwater samples pre and post drilling and submit all data to a [COGCC database](#) that is available to the public. These rules aide in the gathering of baseline water quality data prior to oil and gas activity and to gather further data upon completion of development activities. This program ensures that stakeholders are informed and may help with early detection of any adverse impacts.
- **Setbacks:** In February, 2013, the COGCC voted to approve new setback rules to mitigate perceived effects of drilling near buildings. The rules increase setback distances and impose technically advanced best management practices and protective measures to eliminate, minimize, or mitigate potential nuisances and other perceived impacts for all oil and gas locations within 1,000 feet of occupied buildings. The adopted rules also enhance notice to and communication with building owners within 1,000 feet of occupied buildings. The rules became effective August 1, 2013, are viewed [among the toughest](#) in the nation.

¹⁹http://www.rural.palegislature.us/documents/reports/Marcellus_and_drinking_water_2012.pdf

²⁰ <http://cogcc.state.co.us/#/home>

AIR REGULATIONS

Section 116 of the Clean Air Act reserves to the states the right to adopt more stringent standards than those found in the Act. State statutes are located in the Colorado Revised Statutes at Title 25, Article 7. State regulations concerning air pollution are found at 5 C.C.R. §§ 1001 -1 through -23.

The Air Quality Control Commission, through the CDPHE Air Pollution Control Division (APCD) regulates air quality over the entire state to minimize emissions from a variety of sources, and to ensure air quality on a statewide basis meets federal air quality standards.

Colorado has some of the most protective air emission regulations and resulting controls in the country. For example:

- **Regulation Number 7:** In 2004, the AQCC added Colorado's Regulation No. 7 to reduce ozone precursors.²¹ This regulation is overseen by the CDPHE Air Quality Control Division and was focused on reducing ozone precursors in the non-attainment area, but also includes some statewide requirements.
- **Green Completions:** On February 23, 2014, the AQCC fully adopted the EPA's New Source Performance Standard, OOOO ("NSPS OOOO") regulation. A main component of NSPS OOOO is green completions. This concept is not new to Colorado. In 2008, the COGCC added a rule concerning green completions - to be used when technically and economically feasible. Rules encourage the capture of natural gas and mitigate potential odors associated with well completion.
- **Leak Detection and Repair:** The revisions to Colorado's air regulations that included the adoption of NSPS OOOO included requirements, under Regulation 7 that open-ended valves or lines be sealed or become subject to leak detection and repair (LDAR) requirements, centrifugal compressors reduce hydrocarbon emissions by 95%, and reciprocating compressors at natural gas stations replace rod packing every 26,000 hours of operation OR every 36 months.
- **Storage Tanks:** The revisions to Colorado's air regulations, under Regulation 7 also require storage tanks with uncontrolled VOC emissions ≥ 6 tons per year to control hydrocarbon emissions by 95%, they also require all storage tanks, except temporary frac tanks, utilized during the first 90 days of production to to control emissions by 95%, unless emissions are less than 1.5 tons during that time period. These revisions have additional requirements for operating without venting during normal operation, audio, visual, and olfactory inspections, and the development of storage tank emissions management (STEM) plans.
- **Air Monitoring:** The APCD currently maintains and operates a network of air quality monitors throughout the state. These monitors help to protect the health and environment of Colorado and provide real-time air quality data which help the APCD to determine where there are immediate air quality issues.

WHAT ARE EXPERTS SAYING?

- "[The] rapid deployment of hydraulic fracturing and horizontal drilling technologies, which has increased and diversified the gas supply... is an important reason for a reduction of GHG [greenhouse gas] emissions in the United States." Intergovernmental Panel on Climate Change (IPCC) Study, 2015
- At the same time that we have undergone this energy boom, we have also seen a 10 percent reduction in carbon emissions from 2007 to 2013 — the largest absolute emissions reductions of any country in the world. While the recession was responsible for about half of these emissions reductions, the other half — which is still a large amount — is the result of the changing ways in which we produce and consume energy." Jason Furman, White House Economic Advisor, 2014

²¹[http://www.leg.state.co.us/clics2004a/csl.nsf/b404d50252f9cdcf85256d6d000d18cb/4a534f0e4c068b5d87256e15006884b4/\\$FILE/wptemp.txt](http://www.leg.state.co.us/clics2004a/csl.nsf/b404d50252f9cdcf85256d6d000d18cb/4a534f0e4c068b5d87256e15006884b4/$FILE/wptemp.txt)

- “I think it’s a fool’s choice to say either you develop natural gas and oil in the United States with hydraulic fracturing and horizontal drilling and live with the environmental consequences or stop because of the environmental consequences.” – Steven Chu, former Energy Secretary, 1997 Nobel Prize winner in Physics (September 2013)
- “I would say to everybody that hydraulic fracking is safe”; “My point of view, based on my own study of hydraulic fracking, is that it can be done safely and has been done safely hundreds of thousands of times.” – Ken Salazar, former Interior Secretary and Colorado Senator (September 2013)
- “About half of that progress we have made [on greenhouse gas emissions] is from the natural-gas boom.” Ernest Moniz, U.S. Secretary of Energy, 2013
- “I would say to everybody that hydraulic fracking is safe”; “My point of view, based on my own study of hydraulic fracking, is that it can be done safely and has been done safely hundreds of thousands of times.” Ken Salazar, former Interior Secretary and Colorado Senator (September 2013)