

Land Use

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BOULDER COUNTY BOARD OF COUNTY COMMISSIONERS

November 10, 2014, 2:00 p.m.

The Plaza Event Center 1850 Industrial Circle Longmont, Colorado

Public Hearing to receive a status update from staff on the matters discussed in Resolutions 2014-56 and 2013-55, and to consider whether to extend or otherwise amend the current temporary moratorium on Boulder County's processing of applications for oil and gas development in the unincorporated county

Coordinating County Staff: Land Use Department, Public Health, Attorney's Office

PACKET CONTENTS:

Item

- o Update on the Moratorium on Processing Applications for Oil & Gas Development
- o Addendum 1 Results of Scientific Studies
- Addendum 2 Ongoing Studies
- o Addendum 3 Oil and Gas Legislation from 2014 Legislative Session
- o Addendum 4 Executive Orders creating the Statewide Oil and Gas Task Force

AGENDA FOR NOVEMBER 10th PUBLIC HEARING

- I. County staff presentation: Status Update Related to the Current Moratorium
- II. Public Testimony will be taken

Note: No decision will be made by the Board of County Commissioners at the November 10th hearing. A public meeting has been scheduled for Thursday, November 13 at 9:30 a.m. in the Commissioners' Hearing Room for deliberation on the Commissioners' decision. No further public comment will be taken at that time.

PUBLIC COMMENT

All public comment received to date is available on the County's oil and gas website at: http://www.bouldercounty.org/dept/landuse/pages/oilgas.aspx

BACKGROUND

Today's Hearing

The Board of County Commissioners last held a public meeting on June 12, 2014, to receive a status update from staff on the matters discussed in Resolution 2013-55, which extended the temporary moratorium on processing oil and gas development applications in the unincorporated county until January 1, 2015, and to consider whether to extend or otherwise amend the moratorium.

At the June meeting, staff provided an update on a number of matters related to the current temporary oil and gas development moratorium, including impacts from the September 2013 Flood¹, the status of scientific studies and any reported results, and changes to the regulatory landscape. The moratorium was amended (Resolution 2014-56) to allow flood recovery, such as relocating facilities further away from flood-prone areas to reduce the risks to public health, safety, welfare and the environment when future severe weather events occur, and other health & safety work to proceed.

No action on extending the moratorium was taken in June 2014, but the Board indicated they wanted to revisit this question in the fall, which is the purpose of today's (Nov. 10, 2014) public hearing.

A summary of updates subsequent to the update provided on June 12, 2014, is provided below.

History

Boulder County has been involved in analyzing the impacts of hydraulic fracturing since early 2012. For a summary of the efforts and meetings to date please visit the Boulder County oil and gas webpage at: http://www.bouldercounty.org/dept/landuse/pages/oilgas.aspx

A temporary moratorium on the processing of local oil and gas permits under County Land Use Code was first approved by the Boulder County Commissioners on February 2, 2012 (Resolution 2012-16). The predominant reasons behind the moratorium included the rapid pace of development of the oil and gas industry in the Denver Julesberg Basin, generally, and the Wattenberg Field in particular; potentially major changes in drilling and resource recovery methods and technology; growing public concern, county-wide, statewide and nationally, over hydraulic fracturing operations including possible adverse water quality impacts and ineffective waste disposal methods; the impacts associated with evolving industry technologies in such areas as truck traffic and road usage, land surface disturbance and reclamation, location and extent of structures (well pads, tank batteries, fencing, and the like), noise and odor, and wildlife, soil, air and water resources; major amendments over the past five or so years to the Colorado Oil and Gas Conservation Commission's (and related state agencies') regulations, as well as the growing involvement of federal agencies such as the U.S. Environmental Protection Agency; the outdated nature of the County's oil and gas DPR regulations which were enacted in 1993 and never substantively amended thereafter; and the outpouring of letters, e-mails, and other expressions of concern by residents of Boulder County, worried about existing and future oil and gas development plans and questioning the ability of state and local regulation to deal with associated impacts.

¹ Boulder County commissioned its own third party assessment (by Terracon Consultants, Inc.) of oil and gas facilities within the county impacted by the floods, which did not reveal any major spills or releases within Boulder County but did identify some damaged facilities requiring cleanup or abandonment.

Staff therefore embarked on the process of updating the Comprehensive Plan (approved August 2012) and Land Use regulations (approved in December 2012 and amended in May 2013). On January 2, 2013, the Board of County Commissioners extended the temporary moratorium on the processing of applications for oil and gas development in the unincorporated county until June 10, 2013 in order to work on implementation of the newly approved regulations. On June 18, 2013, the Board extended the temporary moratorium on new oil and gas development applications another 18 months through January 1, 2015 (Resolution 2013-55).

Summary of Updated Oil and Gas Development Regulations Adopted in December 2013

The updated county Development Plan Review ("DPR") regulations addressing oil and gas development in unincorporated Boulder County were adopted in December 2012, and amended in May 2013, in order to provide sufficient to protect public health, safety, and welfare. The regulations are in the form of a new Article 12 to the Boulder County Land Use Code.

While the Board of County Commissioners understands that the public would like to see a ban on fracking, there is significant concern that such a ban would not be upheld by the courts. Consequently they wanted the County to adopt a protective set of regulations in order to have adequate rules in place to review any proposed oil and gas operations, while at the same time continuing to actively engage at the State in order to get better statewide rules and preserving and increasing authority for local governments. The Board has indicated they foresee that these regulations will need to continue to be improved upon and amended as more information and further studies become available and in response to changes at the State level.

Staff drafted the new oil and gas development regulations with several goals in mind. The regulations were intended to address issues raised by the Planning Commission in its update of the Comprehensive Plan policies applicable to oil and gas development; to reflect today's industry, its practices, and impacts on land use, transportation, public health, parks and open space, and other environmental and natural resources across the county; to respond to public questions and concerns; and to provide the maximum protection possible for local public health, safety, and welfare under current state and federal law. Lastly, an overarching goal is to require that impacts from oil and gas operations be mitigated to the greatest extent possible, where they cannot be entirely avoided.

To this end, the updated regulations include the following key substantive elements: <u>New or expanded regulatory areas:</u>

- Well siting provisions;
- Air quality provisions;
- Water quality provisions;
- An expansive emergency response and emergency preparedness plan;
- Refined transportation standards requiring operations to mitigate any adverse impacts to public and private roads, as well as transportation impact fees to offset impacts to public roads;
- More expansive plans involving the siting of wells to address compatibility and visual concerns;
- Newly identified areas for additional purview of cultural and historic resources, recreational activities, scenic and rural character impacts, wetland protection, and well abandonment.
- Certification, monitoring, and inspection throughout the oil and gas exploration and development process.

Transportation Impact Fees

In addition to updated oil and gas regulations, Boulder County also adopted a Transportation Impact Fee in the amount of \$37,900 per well for oil and gas activities in the unincorporated county. For details on the regulations and studies, please visit the Boulder County oil and gas webpage at: http://www.bouldercounty.org/dept/landuse/pages/oilgas.aspx

SUMMARY OF UPDATES RELATED TO THE OIL AND GAS DEVELOPMENT MORATORIUM

Inspections of Oil and Gas Operations

In February 2014, Boulder County Public Health filled a County-funded (two-year) term position to conduct inspections of oil and gas operations. After completing the necessary training and creating a detailed inspection checklist covering air quality, water quality, and basic site characteristics, the inspector began conducting site inspections and has completed inspections at 128 sites for a total of 219 site visits. 113 of these were performed with an Optical Gas Imaging camera on loan from the Regional Air Quality Council. The inspector observed air releases at 49 (43%) of the inspections and stains indicative of past or active water releases at approximately 39 (29%) of the inspections. Some of the key issues that have been identified are discussed in the sections on Air Quality Issues and Water/Soil Contamination Issues below.

Air Quality Issues

Boulder County has a significant number of smaller wells that are not required by state law to control air emissions. However, many small sources can add up to a large number. The Colorado Department of Public Health and Environment ("CDPHE") does not require well production facilities with less than 6 tons per year uncontrolled emissions to install air pollution controls. The recent updates to CDPHE's air quality regulations provide more specificity to operators in understanding what actions are necessary to control air emissions. There are also aspects of the new rule that the Local Government Coalition urged the Air Quality Control Commission to strengthen, including increasing Leak Detection and Repair (LDAR) frequency for smaller operators. An example of a change proposed to strengthen the regulation during the rulemaking includes requiring LDAR to be conducted at least semi-annually for the smaller sources versus one time in the life of the operation. In light of this new information, it makes sense to consider requiring greater monitoring frequency and controls for small operators based on proximity to human activity including homes and schools. The Optical Gas Imaging Camera has been a great tool used to identify leaks at production sites, and inspection staff is seeing signs of operators using the camera for their own inspections. If a leak is identified, County staff contacts the operator of the site and provides follow up to make certain the issue is resolved. New State regulations require operators to respond initially within five working days of identification of a leak starting January 1, 2015; Boulder County is currently observing an average initial response time of two days. The main release points observed are at the wellhead and the oil/gas/water separator.

Water/Soil Contamination Issues

Current COGCC requirements for spill reporting are 201 gallons within a containment area, 42 gallons property wide, and any amount that impacts or threatens to impact waters of the state, occupied structure, livestock or public byway. Research is ongoing to better understand the extent that smaller spills may impact shallow ground water. Since 2009, 25 spills have been reported in Boulder County according to the COGCC database. Twenty of these spills were not contained and 14 spills impacted groundwater. In the event that a spill occurs, even in small amounts, soil clean up and confirmatory soil sampling documenting the cleanup can ensure that spills are being addressed. When a spill or release does occur it is essential that containment and clean up procedures occur as soon as possible to prevent the migration and transport of the contaminants deep into soil or groundwater. In order to ensure proper containment and clean up, Public Health staff should be

notified as soon as possible. Staff recommends that, in the event of a spill or release that has the potential to leave the facility or threaten to impact waters of the state, the operator report the incident to emergency dispatch and the Land Use Director immediately.

Operators are also reporting that they are lining the containment areas at newer well sites and using steel instead of earth containment. The Denver Post previously reported (May 2014) that while an average of 200 gallons is spilled onto soil per day statewide, no federal or state agency has assessed the impact of the Colorado oil and gas boom on soil, whether from a human health or crop science perspective.

The use of partially buried cement vaults is an area of concern that has been seen in the field. The use of cement vaults is no longer a common practice, but some operators are continuing to use them. Because these vaults are partially buried, many times issues involving the integrity of the vault are not realized until impacts have occurred. This has the potential to have negative impacts to both water and soil quality. Staff is considering recommendations to assess and address this issue at the state and local level.

Evolution of Drilling Technology

The new regulations do not require operators to adopt new technology; however, new technology is rapidly becoming available that would lessen some of the various impacts of oil and gas development. For example, operators are reporting the use of natural gas or electric powered diesel rigs that significantly reduce air emissions and noise. Additionally, piping water to a site versus trucking it to the site has the potential to reduce associated emissions, but may create a different set of impacts to agricultural lands and other resources depending on its routing. Finally, new technology is allowing operators to increase horizontal drilling distances.

Scientific Studies Discussing Impacts on Health and Safety

Many of the studies discussed in Resolution 2013-55 have not yet been completed. However, a few results have been published. Most conclude oil and gas development may negatively affect health and safety. For example, a recent flyover study of the Front Range revealed that oil and gas operations leak as much as three times more methane and seven times more benzene as the predictions that regulators and policy makers use to evaluate air quality and climate impacts. A study of groundwater impacts of oil and gas drilling in Garfield County concluded a link over time to increased methane and chloride levels in water wells from oil and gas drilling. A number of other studies found various areas of concern related to the impacts of oil and gas development on groundwater. Finally, a study in Ohio found that sand and water injected into natural gas wells during the hydraulic fracturing likely led to at least 11 earthquakes in March, 2014, and research focused on the Raton basin found a higher frequency of earthquakes around oil and gas wastewater injection wells. A more detailed survey of the results of these recent studies is included at Addendum 1.

Other studies are still underway. Notable among these is an air quality monitoring study overseen by Boulder County Public Health and implemented by the University of Colorado's Institute for Arctic and Alpine Research and Mechanical Engineering Department. Three different types of monitoring devices collected data at five sites throughout the county over the summer months to field test new monitoring approaches and to compare emissions within the city of Boulder to five sites near oil and gas operations. The data collection stage of this study concluded in August, and early results are showing a correlation between the measurements of the summa canisters and the absorbent tubes. A preliminary report of the findings will be submitted to the Board in December. Other studies include an intensive study of the region's atmosphere conducted by the National Oceanic and Atmospheric Administration ("NOAA"); a study by the University of Colorado National Science Foundation Sustainability Research Network to research air and water quality as well as societal impacts of oil and gas development; and the Colorado State University and Garfield County Gas Emissions Study which will look at emissions from gas well development in the Garfield County region. CDPHE will be conducting an oil and gas emissions study of the north Front Range. However, currently no funding has been approved to evaluate the health risk impacts associated with the emissions being studied.

CDPHE, the University of Colorado ("CU"), Colorado State University ("CSU"), University of California Berkeley, and other university collaborators, local projects and agencies including local school districts, NASA, NOAA, and the National Center for Atmospheric Research ("NCAR") performed the the Front Range Air Pollution and Photochemistry Experiment ("FRAPPE") along with NASA's AQ Discover study where airplanes equipped with extensive and sophisticated air monitoring equipment as well as satellite data gathered the most robust data on atmospheric chemistry from all the pollutants that appear in the atmosphere over the Front Range during the summer months. The FRAPPE monitoring concluded in August, and early results are expected within the next year to five years to fully analyze this huge data set. Currently no funding has been approved to evaluate the health risk impacts associated with the emissions being studied.

In addition, CDPHE will continue its ongoing monitoring in Platteville to identify air quality issues and trends. Finally, the Environmental Protection Agency ("EPA") will conduct a study of the impact of hydraulic fracturing on drinking water. CSU, in September, also announced the launch of Colorado Water Watch, which is a "real time" groundwater monitoring pilot program. Descriptions of the studies that are underway are included at Addendum 2.

Changes to the Regulatory Landscape

The following changes have occurred at the federal, state, and local levels over the past year.

Federal

Environmental Protection Agency ("EPA") Actions

The EPA is creating a federal regulatory program that would require disclosure and reporting of the chemicals used in the hydraulic fracturing process. In May of 2014, the EPA released an Advanced Notice of Proposed Rulemaking under the Toxic Substances Control Act and is developing an approach to obtain information on chemical substances and mixtures used in hydraulic fracturing.

State

New Colorado Air Quality Rules Adopted by Colorado's Air Quality Control Commission On February 23, 2014, Colorado's Air Quality Control Commission ("Commission") fully adopted EPA's Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution found in 40 C.F.R. Part 60, Subpart OOOO ("NSPS OOOO"); adopted corresponding revisions to its emissions reporting and permitting framework; and adopted complementary oil and gas control measures. This rulemaking was the culmination of a year-long stakeholder process. These oil and gas control measures focus on identifying and repairing leaks in the oil and gas sector, and contain some recordkeeping and reporting requirements. This rulemaking received support from environmental groups and some companies within the oil and gas industry. In addition to extensive volatile organic compounds ("VOC") reductions, Regulation Number 7 revisions also regulate methane emissions from the oil and gas industry. These oil and gas control measures are estimated to reduce VOC emissions by approximately 93,500 tons per year and methane/ethane emissions by approximately 65,000 tons per year, at a cost of approximately \$42.5 million per year. EPA is under court order to update the National Ambient Air Quality Standard for Ozone by December 2014 which may result in a reduction of the standard and the requirement to produce a new State Implementation Plan which could impact oil and gas operations and other sources.

Colorado General Assembly 2014 Session

During the 2014 General Assembly's session, no bills related to the local control of oil and gas passed. A bill which would have directed CDPHE to analyze human health and quality of life in areas of the Front Range including Boulder County to understand any possible effects of oil and gas operations on communities within these counties was postponed indefinitely. The General Assembly did pass a bill which increases fines for violations of the Oil and Gas Conservation Act. A full summary of each bill introduced and its disposition is attached as Addendum 3. The special session that was contemplated as a possibility if a compromise could be reached on a local control bill did not materialize.

Proposed Statewide Ballot Initiatives

A number of ballot initiatives related to oil and gas were proposed for the 2014 general election, but all have now been withdrawn as part of a compromise announced by the Governor between the state, industry groups and their supporters, and local control and environmental advocates. One part of the compromise was a commitment by the Governor to establish a statewide oil and gas task force to address land use issues and the role of state and local government in siting oil and gas facilities.

Statewide Oil and Gas Task Force

As noted above, in September of 2014 Governor Hickenlooper established a Statewide Oil and Gas Task Force. The Governor charged the task force with crafting recommendations to help minimize land use conflicts that can occur when siting oil and gas facilities near homes, schools, businesses and recreational areas. The 21-person commission includes members of the oil and gas industry, agricultural industry, the home building industry, the conservation community, local governments, and civic leaders. The task force has the power to make recommendations to the Governor and the legislature with a two-thirds majority, or issue majority and minority opinions. Recommendations are anticipated by March 2015, in time for possible changes to state law by the end of the 2015 legislative session. The Executive Orders creating the Task Force and naming members, which include more details on its background and purpose, the Governor's directives on focus areas for the Task Force, and its membership and duration, are attached to this staff report as Addendum 4.

Local

Since our last hearing in June 2014, the lower courts have issued a number of rulings in the various lawsuits involving Front Range home rule municipalities. The cities had either adopted regulations through the City Councils or the citizens had passed 2013 ballot measures that banned or limited fracking.

In Longmont, COGCC and COGA have now dropped their complaints regarding the city's regulations, but the City is appealing the Boulder District Court order overturning the voter-approved fracking ban. Fort Collins is appealing the Larimer District Court's order overturning the voter-approved 5-year moratorium on fracking. In Lafayette, the Boulder District Court overturned the voter-approved fracking ban, and the City decided not to appeal. In Broomfield, the District Court held that the City's voter-approved 5-year moratorium on fracking doesn't apply to Sovereign Operating Company's memorandum of understanding with the City, which was signed prior to the vote. Further proceedings and decisions on the remaining claims in that suit are still pending.

Staff is not aware of any new or ongoing suits against a statutory county since the last Boulder County moratorium hearing.

Lastly, on June 24, 2014, a proposed two-year moratorium on fracking in Loveland failed to pass.

Addendum 1 Results of Recent Scientific Studies

Flyover Study of Colorado's Front Range – NOAA (2014)

An intensive two-day study of airborne measurements revealed that oil and gas operations leak nearly as much as three times more methane and seven times more benzene than predicted, based on inventory estimates. Inventory estimates are the primary tool that regulators use to evaluate air quality and climate impacts. The study confirmed findings from research performed from 2008 – 2010 on the magnitude of air pollutant emissions from oil and gas activities in northeastern Colorado. The earlier study determined that methane emissions were about twice the estimated amounts and that benzene levels were several times higher. Oil and gas activities are responsible for about 75 percent of the methane emissions and are a significant source of benzene emissions. The research also revealed that emissions for a subset of VOCs were almost double the predicted amount in northeastern Colorado. Oil and Gas activities are responsible for about half the VOC emissions in northeastern Colorado.

Mamm Creek Groundwater Impact Conclusions – Garfield County, Colorado (2014)

This study was commissioned for Garfield County, performed by URS and S.S. Papadopulos & Associates, and written by Dr. Geoffrey Thyne. The study concluded a link over time to increased methane and chloride levels in water wells from oil and gas drilling.

<u>The Energy-Water Nexus- Groundwater Quality Degradation Associated with Production of Shale Gas- Y.K.</u> <u>Kharaka, J.J. Thordsen, C.H. Conaway, & R.B. Thomas (2013)</u>

This study reviewed the huge growth in production of unconventional sources of oil and natural gas and their potential impacts on groundwater. The study found that oil and gas sources associated with shale and tight sand formations have a higher potential for groundwater contamination, and called for greater attention to this issue.

<u>Geochemical and Isotopic Variations in Shallow Groundwater in Areas of the Fayetteville Shale</u> Development, North-Central Arkansas- N.R.Warner, et al. (2013)

This study examined the changing landscape of energy development in the United States. As horizontal drilling and hydraulic fracturing have accelerated; so to have the concerns associated with environmental impacts of these practices. The authors investigated the possible degradation of water quality in shallow aquifers that overlay shale formations. The conclusions suggested the need for in-depth site specific investigations that take into account the basin formation and specific geology to avoid water quality impacts.

An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnet Shale Formation- The University of Texas at Arlington, B. Fontenot, et al. (2013)

This study presented an assessment of private drinking water wells in North Texas that overlie the Barnett Shale formation. Over 100 water samples were taken and assessed using analytical chemistry techniques. The study reported in 2013 identified some wells, which exceeded the EPA's Drinking Water Maximum Contaminant Level, but found that a variety of sources and oil and gas as well as industrial operations could all be sources of the contamination.

Impacts of Shale Gas Wastewater Disposal on water Quality in Western Pennsylvania- N.Warner (2013)

A common issue that states are encountering is the proper disposal of wastewater associated with the production of oil and gas. In Pennsylvania, this water is sometimes treated in brine treatment facilities and then discharged into local streams. This study examined the water quality and isotopic composition of discharged effluents, stream sediment, and surface waters associated with a treatment facility in Western Pennsylvania. The study found that the treated water actually had the same composition of the produced waters from the Marcellus Shale formation prior to treatment.

Shale Gas Development Impacts on Surface Water Quality in Pennsylvania- S. Olmstead (2013)

This study is a large scale examination into the extent to which shale gas development activities affect surface water quality. Focusing on the Marcellus Shale formation, in Pennsylvania, this study finds the potential for surface water impacts from development of shale gas, and suggests further research and monitoring efforts.

Ohio Earthquake Study (2014)

Geologists with the Ohio Department of Natural Resources (ODNR) confirmed that sand and water injected into natural gas wells during the hydraulic fracturing process may have increased pressure on an unknown micro-fault in Ohio, likely leading to at least 11 minor earthquakes experienced in March, 2014. As a result, the ODNR announced new, stronger permit conditions for drilling.

Increased Stray Gas Abundance in a Subset of Drinking Water Wells Near Marcellus Shale Gas Extraction-R.B. Jackson (2013)

Researchers sampled 141 drinking water wells across the Appalachian Plateau, and found evidence that distance to a natural gas well was an important factor in the potential for stray gases in water. The data suggests that homeowners living within 1 km of a natural gas well may have an increased risk of drinking water contamination from stray gases.

<u>Noble Gases Identify the Mechanisms of Fugitive Gas Contamination in Drinking-Water Wells Overlying the</u> <u>Marcellus and Barnett Shales</u> -T.Darrah(2014)

The potential for the migration of stray gases into drinking water is a concern shared in all areas of oil and gas exploration. This study examined the potential sources of contamination. The research concluded that proper well integrity, including casing and cementing, is an important factor in protecting water quality. The research found no correlation between hydraulic fracturing and stray gas contamination, but did call for further research into the effects of well integrity from the fracturing process.

<u>A New Look at Methane and Nonmethane Hydrocarbon Emissions from Oil and Natural Gas Operations in</u> the Colorado Denver- Julesburg Basin -G. Petron(2014)

Using aircraft measurements, NOAA and CU scientists examined methane emissions from oil and gas operations, over a two day period, in the Denver-Julesburg Basin. Results found that total oil and gas hourly methane emissions are nearly 3 times higher than Environmental Protection Agency Greenhouse Gas Reporting Program data for 2012. Researchers also found that the state inventory for total volatile organic compounds emitted is nearly 2 times too low, and that the total emissions for benzene is nearly 7 times more than the state inventory.

Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania – P. Rabinowitz(2014)

In this study, health surveys were sent out to random people living in close proximity to natural gas wells, in Pennsylvania. Surveys were sent to people using ground fed water wells, and asked a series of questions concerning health conditions. The prevalence of upper respiratory issues and skin conditions were found to

be higher for those people living less than 1 km from an active gas well. The study is only a hypothesis, but finds that the results support the need for greater research.

<u>The 2001-Present Induced Earthquake Sequence in the Raton Basin of Northern New Mexico and Southern</u> <u>Colorado</u> -J.Rubinstein(2014)

This study examined the increase frequency of earthquakes with a magnitude greater than 4, and its relation to the injection of wastewater from oil and gas operations in the area. The use of wastewater injection wells, in the Raton Basin, dates back to 1999. From 1972-2001, the area experienced 1 earthquake with a magnitude higher than 4. Between 2001 and 2013, the number of earthquakes with a magnitude greater than 4 increased to 12, in the region. All of the earthquakes occurred in industrial areas, and all of the wastewater injection wells were found to be at high volume and used at a high rate.

Four Corners- The Largest US Methane Anomaly Viewed from Space - E. Kort (2014)

Scientists from NASA and the University of Michigan reviewed satellite data taken from 2003-2009, and found that methane measurements, in the Four Corners area, were 3.5 times larger than the European Union's Database for Global Atmospheric Research. The authors attribute the increase in methane emissions to coal bed methane production, in the area. The study shows the value of space based observations to identify anomalous methane sources, and the need to recognize the full line of production of oil and gas as a contributor to methane emissions.

Addendum 2 Ongoing Studies

Boulder County Public Health: Air Quality Monitoring Study (2014)

This study, funded by the Boulder County Commissioners, is being overseen by Boulder County Public Health (BCPH) and implemented by the University of Colorado's (CU) Institute for Arctic and Alpine Research and Mechanical Engineering Department. Three different types of monitoring devices collected data at five sites throughout the County from June through August of 2014.

The study used traditional Suma canisters to collect ambient air samples. The study also field tested Oil and Gas-Pod samplers which were created by CU to collect continuous samples. The third technique was the use of adsorbent tubes which are smaller than Suma canisters and could be used to collect exposure data.

BCPH worked to identify and secure the locations for the monitoring to be conducted. The locations include a background level site at Boulder County Public Health to compare emissions to four additional sites in the eastern county nearest oil and gas operations. BCPH is meeting with CU scientists monthly to discuss developments. INSTAAR researchers have concluded the data gathering stage of this study, and are currently interpreting their findings. Early results show correlations between some of the findings of the traditional Suma canisters and the field tested adsorbent tubes. A preliminary report will be made in December.

NOAA Study of Sources of Atmospheric Pollutants (2014)

In the summer of 2014, atmospheric scientists from NASA, the National Center for Atmospheric Research, NOAA, CIRES and others gathered in the Front Range, to participate in an intensive study of the region's atmosphere. With research aircraft, balloon-borne measurements, mobile laboratories and other ground-based equipment, the scientists plan to further characterize the emissions of many possible sources, including motor vehicles, power plants, industrial activities, agriculture, wildfires and transported pollution. This will provide us the information necessary to understand key processes that contribute to air pollution in the Front Range. This study has concluded the data gathering portion, and researchers are now working to interpret their findings.

University of Colorado National Science Foundation Sustainability Research Network (2017)

The University of Colorado Boulder is the lead institution for a Sustainability Research Network (SRN) funded by the National Science Foundation. The Network will engage twenty-seven researchers at nine institutions to research air and water quality as well as societal impacts of oil and gas development. This is a five year study funded through a \$12 million grant from the National Science Foundation.

The Water Quality team is working to calculate the probability of groundwater contamination from natural gas extraction in areas of intensive energy development, such as the Denver Julesburg Basin. The team will investigate whether water quality has changed in shallow aquifer systems near natural gas wells in areas that have already been heavily drilled. Water quality sampling will measure pre-drilling (or "baseline") water quality in places that have not yet been drilled and samples will be taken from water wells near proposed drilling sites.

Sampling began in 2013 with the gathering of samples from 40 wells. Six of these wells are located in Boulder County. Sampling will continue in 2014, when an additional 80 samples will be collected. Analysis includes thermogenic methane (an oil and gas indicator) as well as total dissolved solids and benzene and

sample size will grow to 120 wells. Sampling will continue into 2015 and 2016 with the potential to expand sample collection in targeted areas.

Colorado State University, Garfield County Gas Emissions Study (2016)

Colorado State University's Atmospheric Science Department is conducting a study of emissions from gas well development in the region of Garfield County. This three-year study, begun in 2013, is sponsored by Garfield County and local industry. It will quantify emissions of air toxics, ozone precursors, and methane from well drilling, hydraulic fracturing, and flowback. The study will also examine near-field dispersion of emissions and the ability of dispersion models to reproduce field-measured concentrations. The study is being conducted on-site in partnership with industry to understand emissions from different types of oil and gas operations. Results may reflect a "best-case" scenario, as opposed to normal operating conditions.

CDPHE North Front Range Oil and Gas Emissions Study (2016)

The Air Pollution Control Division of the Colorado Department of Public Health and Environment is implementing a study conducted by Colorado State University to conduct an emissions and dispersion study similar in concept to the Garfield County study. Sources and locations to be monitored have been determined by a technical panel, and will include development, production, and processing activities related to oil and gas. The study began in 2014 and concludes in 2-3 years. Results may reflect a "best-case" scenario, as opposed to normal operating conditions and no funding has been identified to analyze the health risks from the emissions being studied.

Front Range Air Pollution and Photochemistry Experiment (Data Collection Summer 2014)

The Front Range Air Pollution and Photochemistry Experiment (FRAPPÉ) field campaign took place in summer 2014. This is a collaborative effort between the Colorado Department of Public Health and the Environment, the University of Colorado and Colorado State University, UC Berkeley, and other university collaborators, local projects and agencies including local school districts, NASA, NOAA, and NCAR. It's an unprecedented effort only available to four communities across the country. Air planes equipped with extensive and sophisticated air monitoring equipment as well as satellite data gathered the most robust data on atmospheric chemistry from all the pollutants that appear in the atmosphere over the Front Range during the summer months and prevent the metro area from meeting federal air quality standards. The data gathering portion of the study concluded in August, and early results are expected within the next year to five years to fully analyze this massive data set.

CDPHE's Ongoing Monitoring in Platteville

CDPHE conducts air quality sampling and analysis from a network of 60 monitoring sites across the state to identify air quality issues and trends. The monitoring site in Platteville provides a representation of emissions from oil and gas activities. Since 2003, monitoring of air toxics associated with oil and gas has shown a significant reduction. Benzene, for example, was tested at 4 parts per billion in 2003 and 0.6 parts per billion in 2012. Sampling in 2012 was conducted during winter versus summer months. Additional data is necessary, captured under like conditions, to confirm this result.

EPA Study of the Impact of Hydraulic Fracturing on Drinking Water

At the request of Congress, the EPA is conducting an ongoing study of the impact of fracking on drinking water resources. The site touts EPA's work with states and other key stakeholders to help ensure that natural gas extraction does not come at the expense of public health and the environment. It has examples of the agency's focus and obligations under the law to provide oversight, guidance and, where appropriate, rulemaking that achieve the best possible protections for the air, water and land. It includes

examples where the EPA is investing in improving our scientific understanding of hydraulic fracturing, providing regulatory clarity with respect to existing laws, and using existing authorities where appropriate to enhance health and environmental safeguards. A draft report of the study, mentioned in Resolution 2013-55, is expected to be released for public comment and peer reviewed in 2014.

Colorado State University's Colorado Water Watch

The Colorado Water Watch (CWW) is a real-time groundwater monitoring pilot program developed by the Center for Energy Water Sustainability at Colorado State University. The monitoring system is comprised of a network of water quality sensors capable of detecting changes in groundwater quality due to natural or operational impacts. The data is monitored, gathered, analyzed and reported by CWW and posted on its website to provide information to communities in the DJ Basin.

Addendum 3 Oil and Gas Legislation Introduced in the 2014 State Legislative Session

HB14-1064	Sev Tax Distribution To Local Gov Limits Oil & Gas
Short Title:	Sev Tax Distribution To Local Gov Limits Oil & Gas
Sponsors:	SONNENBERG / BROPHY
Summary:	Moneys in the local government severance tax fund are primarily used for 2 purposes: * For the executive director of the department of local affairs to provide grants and loans to political subdivisions impacted by development, processing, or energy conversion of minerals and mineral fuels; and * For direct distributions to counties and municipalities based on factors related to oil and gas production. The bill prohibits any local government that has a moratorium or a permanent prohibition on the extraction of oil and gas from receiving more direct distributions or grants and loans than the local government received in the fiscal year during which the moratorium or permanent prohibition was enacted.
Status:	01/22/2014 House Committee on Local Government Postpone Indefinitely
HB14-1077	Raise Cap Oil Gas Conservation & Env Response Fund
Short Title:	Raise Cap Oil Gas Conservation & Env Response Fund
Sponsors:	GEROU / HODGE
Summary:	The bill increases the statutory cap on the 2-year average of the unobligated portion of the oil and gas conservation and environmental response fund from \$4 million to \$6 million.
Status:	03/27/2014 Governor Signed
HB14-1297	Analyze Health Data Regarding Front Range Oil Gas
Short Title:	Analyze Health Data Regarding Front Range Oil Gas
Sponsors:	GINAL / AGUILAR
Summary:	The bill directs the department of public health and environment to conduct an analysis of human health and quality of life within the counties of Larimer, Weld, Boulder, and Adams with the intent of understanding any possible effects of oil and gas operations on communities within these counties. The department must consult with a newly created scientific oversight committee regarding the design and conduct of the analysis and preparation of interim and final reports on the analysis. The analysis will be conducted in 2 stages. Stage 1 will:

* Include a review of existing medical literature from peer-reviewed scientific publications on the effects of oil and gas operations on human health and quality of life;

* Identify conditions of interest that existing medical literature indicates might be related to oil and gas operations; and

* Culminate in a written report due December 1, 2014, and presented orally to committees of the general assembly by January 30, 2015. Stage 2 will include institutional review board (IRB) approval, surveys, and case studies as follows: * Tier 1 will include IRB approval by December 31, 2014; mailed and on-line surveys with individuals in the identified communities; and an interim report due January 1, 2016, and orally presented to committees of the general assembly by January 30, 2016; and

* Tier 2 will include IRB approval by February 1, 2016; case-control studies on at least 2 relevant conditions of interest identified in tier 1; and a final report due January 1, 2017, and presented orally to committees of the general assembly by January 30, 2017.

Status: 04/29/2014 Senate Committee on Appropriations Postpone Indefinitely

HB14-1334	Petroleum Cleanup & Redevelopment Fund
Short Title:	Petroleum Cleanup & Redevelopment Fund
Sponsors:	HAMNER / JAHN
Summary:	The bill specifies that revenues in the petroleum cleanup and redevelopment fund are exempt from the generally applicable limit on cash funds' uncommitted reserves and are continuously appropriated to the division of oil and public safety.
Status:	06/06/2014 Governor Signed
<u>HB14-1356</u>	Strengthen Penalty Authority Oil & Gas Commn
Short Title:	Strengthen Penalty Authority Oil & Gas Commn
Sponsors:	FOOTE / JONES
Summary:	Current law specifies that a violation of the "Oil and Gas Conservation Act" is punishable by a maximum daily penalty of \$1,000, subject to a penalty schedule promulgated by the oil and gas conservation commission that considers aggravating and mitigating circumstances. The maximum total penalty is capped at \$10,000 for violations that do not result in significant waste of oil and gas resources, do not damage correlative rights, and do not result in a significant adverse impact on public health, safety, or welfare. The bill: * Increases the maximum daily penalty to \$15,000; * Directs the commission to: * Adopt rules that specify a process for determining the dates on which a

	violation begins and ends; and * Publish a quarterly report on its web site that specifies certain information about each penalty assessed in the previous quarter and discuss these reports at the department of natural resources' SMART Act hearings; and * Repeals the cap on the maximum total penalty. The commission must hold a hearing if an operator is responsible for gross negligence or knowing and willful misconduct that results in an egregious violation or a pattern of violations. The commission may issue an order that prohibits the issuance of any new permits to the operator, suspends any or all of the operator's certificates of clearance, or both. The commission may vacate the order after the operator has come back into compliance and paid all penalties.
Status:	06/06/2014 Governor Signed
<u>HB14-1371</u>	Wellhead Point Of Property Valuation & Taxation
Short Title:	Wellhead Point Of Property Valuation & Taxation
Sponsors:	YOUNG / GRANTHAM
Summary:	The bill specifies that for property tax purposes, the wellhead is the point of valuation and taxation for oil and gas leaseholds and lands.
Status:	06/06/2014 Governor Became Law
<u>SB14-009</u>	Disclose Separate Ownership Mineral Estate
Short Title:	Disclose Separate Ownership Mineral Estate
Sponsors:	HODGE / MORENO
Summary:	The bill requires a seller to disclose in the sale of real property that a separate mineral estate may subject the property to oil, gas, or mineral extraction. This requirement does not include a duty to investigate.
Status:	03/27/2014 Governor Signed
<u>SB14-093</u>	Pipeline Right-of-Way
	ripeine right-or-way
Short Title:	Pipeline Right-of-Way
Short Title: Sponsors:	Pipeline Right-of-Way JAHN / MAY

the exercise of the power of eminent domain, companies that operate pipelines that convey oil, gasoline, or other petroleum or hydrocarbon products are pipeline companies granted the right of eminent domain. A pipeline company must also comply with all applicable laws and regulations including, but not limited to, federal pipeline safety regulations.

Status:04/02/2014 House Second Reading Special Order - Laid Over to 05/09/2014 -
No Amendments

<u>SB14-198</u>	Mineral Extraction Study Group
Short Title:	Mineral Extraction Study Group
Sponsors:	HODGE
Summary:	The bill creates the mineral extraction study group (study group) to research and study matters relating to the imposition and allocation of, and credits available against, the severance tax and the distribution of federal mineral leasing revenues. The study group consists of members of the general assembly and stakeholder members of the public. To carry out its duties, the study group, at a minimum, is required to: * Evaluate the severance tax structure on oil and gas; * Evaluate credits against the severance tax on oil and gas in current law; * Compare severance tax rates and revenue on oil and gas from regional states; * Evaluate trends by commodity based on such things as geography, timing, and net state revenues; * Evaluate the distribution model for the severance tax on oil and gas; * Evaluate whether the general assembly's legislative intent expressed when the severance tax was enacted in 1977 that a portion of the revenues derived from the severance tax be used by the state for public purposes, that a portion be held by the state in a perpetual trust fund, and that a portion be made available to local governments to offset the impact created by nonrenewable resource development is being met; * Evaluate the distribution model for federal mineral lease revenues, including direct distribution and impact grants and contributions to the impact fund; * Evaluate how increased revenue to the state could benefit water infrastructure projects, education, or other opportunities; and * Review findings and make legislative recommendations each year.
Status:	04/23/2014 Senate Committee on Agriculture, Natural Resources, & Energy Postpone Indefinitely

Addendum 4

Page 19 of 25

STATE OF COLORADO

OFFICE OF THE GOVERNOR

136 State Capitol Denver, Colorado 80203 Phone (303) 866-2471 Fax (303) 866-2003



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John W. Hickenlooper Governor

EXECUTIVE ORDER

MEMBERS

TASK FORCE ON STATE AND LOCAL REGULATION OF OIL AND GAS OPERATIONS

ORDERED:

That the following named persons be and they are hereby appointed to the:

TASK FORCE ON STATE AND LOCAL REGULATION OF OIL AND GAS OPERATIONS

for terms expiring July 1 2015:

Honorable Gwen Lachelt, Durango, Colorado, to serve as co-chair, appointed;

Randy Cleveland of Sterling, Colorado, to serve as co-chair, appointed;

Brad Holly of Lone Tree, Colorado, to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

Daniel E. Kelley of Littleton, Colorado, to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

Peter Dea of Golden, Colorado to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

Winston "Perry" Pearce of Denver, Colorado, to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

Kent Peppler of Platteville, Colorado, to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

R. Scot Woodall of Henderson, Colorado, to serve as a member representing the oil and gas industry, the agricultural industry, and the home building industry, appointed;

Sara Barwinski of Greeley, Colorado, to serve as a member representing local government and the conservation community, appointed;

Matt Sura of Boulder, Colorado, to serve as a member representing local government and the conservation community, appointed;

Jeffrey P. Robbins of Durango, Colorado, to serve as a member representing local government and the conservation community, appointed;

Jon Goldin-Dubois of Denver, Colorado, to serve as a member representing local government and the conservation community, appointed;

Jim Fitzgerald of Bayfield, Colorado, to serve as a member representing local government and the conservation community, appointed;

Will Toor of Boulder, Colorado, to serve as a member representing local government and the conservation community, appointed;

Bruce Rau of Centennial, Colorado, to serve as a member representing a variety of interests, appointed;

Elbra M. Wedgeworth of Denver, Colorado, to serve as a member representing a variety of interests, appointed;

Russell B. George of Rifle, Colorado, to serve as a member representing a variety of interests, appointed;

Honorable Rebecca Love Kourlis of Englewood, Colorado, to serve as a member representing a variety of interests, appointed;

Bernie Buescher of Grand Junction, Colorado, to serve as a member representing a variety of interests, appointed;

Honorable Patrick Quinn of Broomfield, Colorado, to serve as a member representing a variety of interests, appointed;

Addendum 4



Steve Moreno of Greeley, Colorado, to serve as a member representing a variety of interests, appointed.

GIVEN under my hand and the Executive Seal of the State of Colorado, this eighth day of September, 2014.

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John W. Hickenlooper Governor

STATE OF COLORADO

OFFICE OF THE GOVERNOR

136 State Capitol Building Denver, Colorado 80203 Phone (303) 866 - 2471 Fax (303) 866 - 2003



B 2014 005

EXECUTIVE ORDER

Creating the Task Force on State and Local Regulation of Oil and Gas Operations

Pursuant to the authority vested in the Office of the Governor of the State of Colorado, and in particular, pursuant to Article IV, Section 2 of the Colorado Constitution, I, John W. Hickenlooper, Governor of the State of Colorado, hereby issue this Executive Order creating the Task Force on State and Local Regulation of Oil and Gas Operations.

I. Background and Purpose

The state and local jurisdictions share an interest in efficient and effective regulations that provide for the responsible development of the state's oil and gas resources. The Colorado Oil and Gas Conservation Commission ("COGCC") is charged with fostering the responsible development of Colorado's oil and gas resources in a manner consistent with the protection of public health, safety and welfare, including protection of the environment and wildlife. At the same time, counties and municipalities ("local jurisdictions") provide planned and orderly development within Colorado and have broad statutory authority to balance basic human needs and environmental concerns when regulating the use of land within their boundaries.

The increased oil and gas activity that is occurring in new areas of Colorado's Front Range and that involves new technology such as horizontal drilling combined with hydraulic fracturing has caused a number of local jurisdictions to revisit the adequacy of their own regulations associated with oil and gas operations.

Colorado case law has established preemption rules that create a priority between potentially conflicting laws enacted by various levels of government, and industry, the state and local jurisdictions have operated within the parameters established by the courts. Occasionally, however, parties disagree whether a local rule is preempted by a state rule. Parties often hesitate to pursue resolution in court because proving and defending against preemption claims is an adversarial, cumbersome, time consuming, and expensive process. Instead, the state and local jurisdictions, in collaboration with the oil and gas industry, seek to fashion mechanisms through which they can coordinate their efforts and achieve a complimentary regulatory structure that

Addendum 4

benefits Colorado's economy, quality of life, health, environment and wildlife. It is in the interest of all parties to seek ways in which the concerns of local jurisdictions, operators, and the state can be addressed collaboratively.

With this as the backdrop, and recognizing the state's interest in resolving issues that involve mixed regulatory jurisdiction between local governments and the state in an amicable manner between all parties, including entities wishing to develop oil and gas mineral resources, there is a need to establish this Task Force to examine the many facets of these issues and provide recommendations for policy or legislation on how best to achieve these goals.

II. <u>Declaration and Directives</u>

- A. The Task Force on State and Local Regulation of Oil and Gas Operations is hereby created for the purposes described in section I, above.
- B. The Task Force shall identify and strive to reach agreement on recommendations for policy or legislation to harmonize state and local regulatory structures as to activities associated with oil and gas operations with particular focus on the following objectives:
 - 1. the benefit of oil and gas development on the state's economy;
 - 2. protecting public health, water resources, the environment and wildlife;
 - 3. avoiding duplication and conflict between state and local regulations of oil and gas activities; and
 - 4. fostering a climate that encourages responsible oil and gas development.
- C. The issues that the Task Force addresses shall include, but not be limited to:
 - distances between oil and gas wells and any occupied structure, or other restrictions on the location of an oil or gas well and its related production facilities, including but not limited to the requirement in COGCC Rule 604(c)(2)(E) regarding setting multiple well-pad facilities as far away as possible from occupied structures;
 - 2. adoption of laws or regulations by a local jurisdiction that are more or less stringent than those adopted by state government;
 - 3. adjustments to regulations that may reflect population density, geographic diversity and the unique conditions that may distinguish urban, suburban and rural communities;
 - 4. interaction between surface owners and energy companies when planning and locating oil and gas facilities;

- 5. floodplain restrictions;
- 6. noise abatement;
- 7. operational methods employed by oil and gas activities;
- 8. air quality and dust management;
- 9. traffic management and impacts; and
- 10. fees, financial assurance, and inspection.
- D. The Task Force shall explore options that address the issues in section II(C), above, and that help clarify and/or better coordinate the regulatory jurisdiction over activities associated with oil and gas operations between state and local jurisdictions. Such options examined shall include, but not be limited to:
 - 1. memorandums of agreement, intergovernmental agreements, and letters of cooperation and consent between the state and local jurisdictions;
 - 2. changes to existing laws or regulations; and
 - 3. suggested new laws and regulations.
- E. Recommendations of the Task Force regarding new or amended legislation shall be made by a two-thirds vote of the membership. If necessary and appropriate, those members in the minority may issue a separate report containing their recommendations.
- III. Membership
 - A. The Task Force shall consist of twenty-one total members, two of whom shall cochair the Task Force. The nineteen additional members of the Task Force shall represent the following organizations or subject-matter areas, as follows:
 - 1. six members representing the oil and gas industry, the agricultural industry, and the home building industry;
 - 2. six members representing local government and the conservation community; and
 - 3. seven members representing a variety of interests.
 - B. The Task Force shall meet as determined necessary by the co-chairs.

C. The members of the Task Force shall receive no compensation nor shall they be reimbursed for travel or other expenses incurred in the performance of their duties.

IV. <u>Duration</u>

The Task Force shall report its recommendations and findings to the Governor by no later than February 27, 2015.

GIVEN under my hand and the Executive Seal of the State of Colorado, this eighth day of September, 2014.

Historyper

John W. Hickenlooper Governor