RANGE RESOURCES CORPORATION

TO: Shareholders, Investors, Media and Interested Parties

FROM: Rodney L. Waller, Senior Vice President

DATE: January 8, 2010

RE: Information on Hydraulic Fracturing

This memo is designed to provide a greater understanding of the advanced and proven technologies utilized by the natural gas industry and Range Resources Corporation in developing clean burning, American natural gas.

At a time when society demanded a clean, abundant, reliable, versatile, and secure source of energy – American natural gas producers like Range Resources delivered. Thanks to the application of proven technologies and American ingenuity, the United States now enjoys a growing 100-year supply of clean burning natural gas. As such, we are experiencing an energy renaissance thanks to America's new natural gas.

Natural gas developed from layers of shale found more than a mile below the surface have become global game changers for clean energy development. These new resources have only begun to be recognized in recent years, but the technology is proven and well understood.

By many accounts, energy is the issue of our generation and with all of this newfound attention on natural gas it's normal for engaged stakeholders to want to learn more. The proven technologies employed today by our industry have been safely used and perfected since the 1940s. Specifically, hydraulic fracture stimulation is a safe, proven and important technology to developing America's natural gas.

More than 30 state and federal regulatory agencies have studied this technology, which involves injecting fracturing fluid into a deep formation to stimulate the release of natural gas. In short, these reports indicate the technology is safe and well regulated. More than 99.5% of the fracturing fluid is fresh water and sand, the rest is a blend of common additives that are a part of our everyday lives – or as one report indicates essentially "soap." All of these additives are public knowledge and are carefully managed and injected in a highly diluted blend through multiple layers of fully cemented steel casings to fully isolate from ground water.

This technology has been safely used in more than 1 million applications in the United States with an explemplary safety record. In fact, there are ***ZERO confirmed cases*** of water contamination or pollution from hydraulic fracturing.

Natural gas offers a once-in-a-generation opportunity to improve our nation's clean energy portfolio, while strengthening our economy and environment. As one of America's leading

natural gas producers, we are committed to responsibly develop this resource and to being open, honest and transparent. We trust that this document will help you gain a greater understanding of the advanced technology of hydraulic fracture stimulation and the extensive studies and reports that have been compiled by state and federal regulatory agencies.

ABOUT THE HYDRAULIC FRACTURE STIMULATION PROCESS

History of Hydraulic Fracturing

Hydraulic fracturing was first used more than 100 years ago in 1903, but the first commercial fracturing treatment was performed in 1949. By some accounts it took more than 40 years for geologists and engineers to perfect the process, but since then, the pay-off has been extraordinary. Its efficacy in bringing new life to old wells quickly made it an integral part of our nation's energy strategy, and by 1988, it had been applied more than one million times. As technology improved, hydraulic fracture stimulation applications did, as well. Now, the technology is used not only to stimulate production in old wells, but to jump start the production process in unconventional formations and in unfavorable locations. Operators now fracture about 35,000 wells each year with no record of harm to groundwater.

The entire process is closely regulated by state regulatory agencies and in most cases by multiple state regulatory agencies with overlapping federal authority.

The Process

Hydraulic fracturing is used to stimulate production from new and existing wells. By creating or even restoring fractures, the surface area of a formation exposed to the borehole increases and the fracture provides a conductive path that connects the reservoir to the well. These new paths increase the rate that fluids can be produced from the reservoir formations, in some cases by many hundreds of percent.

To ensure that neither the fluid that will eventually be pumped through the well, nor the oil or gas that will eventually be collected, enters the water supply, cemented steel casings are inserted into the well to fully isolate the wellbore. The casing, cement specifications and cementing process are governed by state and federal regulations as well as industry standards. Once the cement has set, then the wellbore is continued from the bottom of the first cemented steel casing to the next depth. This process is repeated using smaller steel casings each time until the oil and gas bearing reservoir is reached. The cement and steel prevent any impact of the water table.

With those and other precautions taken, fracturing fluids are pumped deep into the well at high pressures sufficient to cause the reservoir rock to break or fracture. While different well sites require different mixes of fluids depending on the composition of the rock bed and other factors, almost all mixtures are comprised of more than 99-percent freshwater and sand. As the pressure builds within the well, rock beds begin to crack. More fluid is added while the pressure is increased until the rock beds finally fracture, creating channels for trapped oil and natural gas to flow into the well and up to the surface. The fractures are kept open with proppants made of small granular solids (generally sand) to ensure the continued flow of resources.

Once the rock bed has been fractured, fracturing fluids are removed from the well. This allows the free flow oil and natural gas, and is one more step that ensures the environmental integrity of the process. Whatever fluid is not immediately recovered remains trapped in the rock bed found thousands of feet below the surface and water table or return slowly over time through the isolated wellbore.

HYDRAULIC FRACTURING REFERENCE EXCERPTS

Interstate Oil and Gas Compact Commission – The IOGCC is a consortium of 30 state regulatory agencies which currently regulate hydraulic fracturing in each of their respective states. This is their webpage on hydraulic fracturing, which reaffirms the United States Department of Environmental Protection's assertion "that the injection of hydraulic fracturing fluids poses little or no threat to underground sources of drinking water." Please note the link under "Expert Insight" to the compilation of their statements presented in testimony before Congress on June 4, 2009.

> "Although thousands of wells are fractured annually, the EPA did not find a single incident of the contamination of drinking water wells by hydraulic fracturing fluid injection. Additionally, IOGCC member states have all stated that there have been NO CASES [emphasis added] where hydraulic fracturing has been verified to have contaminated drinking water."

The following are excerpts from the IOGCC Supplemental Testimony submitted to the House Committee on Natural Resource Subcommittee on Energy and Mineral Resources on June 18, 2009. The full text of the materials can be accessed on the IOGCC's website below under the "Congressional Action" section.

> Hydraulic fracturing has been used safely to stimulate oil and gas production in the United States for more than 60 years and is thoroughly regulated by the oil and gas regulatory agencies of the member states of the Interstate Oil and Gas Compact Commission (IOGCC). Additional study is unnecessary, and in fact, would be a wasteful use of taxpayers' dollars. However, all future studies involving the regulation of oil and natural gas exploration and production must involve leadership by those officials who know it best – state regulators.
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> Claims that hydraulic fracturing has been linked directly to the contamination of underground sources of drinking water are untrue. If factual information exists to the contrary, the public, media and policymakers are urged to contact the appropriate state officials for further investigation.
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> Legislators and regulators did not intend to regulate the short-term process of well stimulation by hydraulic fracturing under the U.S. Environmental Protection Agency's requirements for long-term disposal of substances (underground injection control (UIC) program). Hydraulic fracturing plays a critical role in the development of virtually all unconventional oil and natural gas resources. The technology has significantly increased domestic reserves, especially clean-burning natural gas. Further regulatory burdens are unnecessary, and in fact, would delay the development of vital domestic natural gas resources and increase energy costs to the consumer with no resulting environmental benefit.

Since the early days of the industry, states have been acting individually and collectively to address emerging environmental issues. For example, shortly after the creation of hydraulic fracturing technologies in 1947, states began taking steps to prevent damage, particularly to precious drinking water supplies. These efforts precede by 20 years the creation of the Safe Drinking Water Act (SDWA).

As with every step in the exploration and production process, the process of hydraulic fracturing is regulated by ensuring sound engineering designs and verifying execution in the field. The process requires well bores and stimulations to be custom designed and takes into account the physical and chemical properties of the rock, fluids and the mechanical condition of the well. Wells are designed and constructed to provide protective barriers that prevent water contamination.

The fact that state agencies, the primary regulators of oil and gas E&P, have confirmed that there has not been a single instance of underground drinking water contamination resulting from hydraulic fracturing operations seems to have been lost amid a great deal of misinformation and scare tactics.

The IOGCC would prefer to have the record of the states stand on is own as confirmed by studies or surveys by the Ground Water Protection Council, the EPA and the IOGCC. However, some misstatements should be corrected. Some individuals have pointed to the possibility of failures during the hydraulic fracturing process of as high as 2 percent, resulting in thousands upon thousands of environmental disasters. To reiterate the facts, the correct failure percentage resulting in USDW contamination is 0 percent. The intentionally misleading use of "what if" numbers if not helpful to the construction of effective energy regulation and simply results in unnecessarily scaring innocent or uninformed individuals. Other statements popular to cite include cases that result from primary cementing failures, not from the fracturing process.

Perhaps the definitive study was conducted by the EPA and released after years of research and development in 2004. It is difficult to follow the argument that this study was somehow flawed by the omission of mysteriously missing sources of information or poor science. The agency researched over 200 peer-reviewed publications, interviewed abut 50 employees from state or local government agencies and communicated with another 40 citizens who were concerned that hydraulic fracturing impacted their drinking water wells. To repeat the key finding of the EPA's report:

> *"Based on the information collected and reviewed, EPA has concluded that the injection of hydraulic fracturing fluids into coalbed methane wells posses little or no threat to USDWs and does not justify additional study at this time."*

The states feel strongly that additional studies and certainly additional regulatory oversight are unnecessary. As documented by regulatory efforts in Alabama where fracturing falls under the UIC program, the result has been "increased administrative and production costs with no public health or environmental benefit."

If there are gaps in knowledge or instances believed to be legitimate, the states will be the first to volunteer their participation and services in any study of *anything* more than "perceived" problem. Conducting further studies or enacting legislation to address a "problem" that has *never* been documented -- contamination of drinking water as a result

of hydraulic fracturing – is simply a waste of taxpayers' money. The IOGCC favors addressing *real* problems.

LINK:
http://www.iogcc.state.ok.us/hydraulic-fracturing

Modern Shale Gas Development in the United States: A Primer – Study from the U.S. Department of Energy, Groundwater Protection Council, and the National Energy Technology Laboratory on the industry. April 2009.

This is an excellent overview of Shale Gas Development. The Primer covers the various shale development areas, the geology, regulatory and environmental frameworks, each of the various federal regulatory acts covering the industry and other environmental issues on horizontal drilling, hydraulic fracturing, water availability and use, NORM and air quality.

Specifically as to hydraulic fracturing, on page 53 their detailed risk probability analysis showed "Other studies in the Williston Basin found that the upper bound of probability of injection water escaping the well bore and reaching an underground source of drinking water is seven changes in one million well-years where the surface casings cover the drinking water aquifers." (I do not know of one state where casing pass drinking water aquifers has not been standard practice for over 50 years.) "These values do not account for the differences between the operation of shale gas well and the operation of an injection well. (A production well is less likely to have a casing leak because of the reducing pressure over time whereas an injection well is under pressure at all times during the injection process.) On page 54, "The potential for groundwater to be impacted by injection is low. It is expected that the probability for treatable groundwater to be impacted by pumping of fluids during hydraulic fracture treatments of newly installed, deep shale gas wells when a high level of monitoring is being performed would be even less than the 2×10^{-8} (one well in 200,000,000) estimated by API."

Pages 61 thru 64, discusses and identifies all the typical additives that are used with the water and sand in hydraulic fracturing. Sand and water compose 99.5% of the total volumes used. The additives are really "soap" (aka the reason the fracs are called "slick water" fracs) and biocides to kill the bugs and prevent corrosion. These are all standard products used in our homes and in manufacturing facilities everyday.

LINK:
http://www.gwpc.org/e-library/documents/general/Shale%20Gas%20Primer%202009.pdf

United States Department of Environmental Protection – EPA's safe assessment of hydraulic fracturing.

"In 2004, EPA conducted a study to assess the potential for contamination of [US Drinking Water] (USDWs) from the injection of hydraulic fracturing fluids by coalbed methane (CBM) wells. Based on the information collected and reviewed at the time, EPA concluded that the injection of hydraulic fracturing fluids by CBM wells posed little

> or no threat to USDWs and additional studies were not justified. EPA retained the right, however, to conduct additional studies in the future."

LINK:
http://www.epa.gov/safewater/uic/wells_hydrofrac.html

New York Department of Environmental Conservation – This is an exhaustive study done by NY DEC containing over 800 pages in September 2009. The draft report was prepared to satisfy the NY State Environmental Quality Review Act in anticipation of horizontal drilling with the State of New York in the Marcellus Shale. All drilling permits for Marcellus drilling were suspended while this study was conducted for almost one year. They refer to hydraulic fracturing as safe and well regulated and indicate their believed likelihood of water pollution from hydraulic fracturing to be 1 out of 50 million (page 6-35). It would take 1,000 years to drill 50 million wells. To date there are zero confirmed cases of water pollution from hydraulic fracturing and 1 million wells.

Section 9.1 of the draft study concludes:

> The prohibition of development of Marcellus Shale and other low permeability gas reservoirs by horizontal drilling and high volume hydraulic fracturing would be contrary to New York State and national interests. I would also contravene Article 23-0301 of the Environmental Conservation Law.

LINK:
http://www.hydraulicfracturing.com/Documents/Hydraulic_Fracturing_SGEIS_comments.pdf

State Oil and Gas Regulations Designed to Protect Water Resources – Study from the U.S. Department of Energy, Groundwater Protection Council, and the National Energy Technology Laboratory. May 2009

> Section 6 of this study, outlines the history of oil and gas wastes exemption from the 1976 Resource Conservation and Recovery Act (RCRA) as one of six "special wastes." The EPA Administrator issued a Regulatory Determination for Oil, Gas and Geothermal Exploration, Development and Production Wastes on July 6, 1988 that regulation of oil and gas wastes under RCRA was not warranted. A critical part of the 1988 exemption under RCRA from the EPA was the commitment to help the states improve their regulatory programs. The IOGCC along with the EPA formed the Council on Regulatory Needs in 1989 which is now been incorporated into the non-profit State Review of Oil and Natural Gas Environmental Regulations (STRONGER) in June 1999. STRONGER is the independent stakeholder governing body that manages the state review process. Its Board of Directors consists of three state regulators, three environmental/public interest representatives and three industry representatives. The EPA, DOE and Department of Interior participate as non-voting Board members. The IOGCC participates through its State Review Committee of which the three state regulators are selected. Therefore, each state has a baseline of regulations which conform to the STRONGER guidelines and the states can elect to make any regulations more stringent.
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> The concluding messages on page 37 states: "Claims that the oil and gas E&P industry in the U.S. is unregulated are not supported by the findings of this report. We believe

enactment of national regulations on oil and gas exploration and production would be costly to the states, duplicative of state regulation, and ultimately ineffective because such regulations would be too far removed from field operations. Current state regulation of oil and gas activities is environmentally proactive and preventive. All oil and gas producing states have regulations which are designed to provide protection for water resources such as those governing the authorization for drilling, completion, operation and closure of wells.

LINK:
http://www.gwpc.org/e-library/documents/general/State%20Oil%20and%20Gas%20Regulations%20Designed%20to%20Protect%20Water%20Resources.pdf

Energy in Depth – Industry website which chronicles various reported drinking water contaminations from hydraulic fracturing and the final determinations from state or federal investigations. **FRAC vs FICTION May 2009.**

LINK:
http://www.energyindepth.org/PDF/Frac_Fiction_May%2018.pdf

OTHER INDUSTRY AND REGULATORY LINKS

US Department of Energy, Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology
http://www.fossil.energy.gov/programs/oilgas/publications/environ_benefits/env_benefits.pdf

State Regulatory Bodies Letters on Hydraulic Fracturing
http://www.energyindepth.org/wp-content/uploads/2009/03/state-letters_hf-and-gwpc.pdf

State Regulatory Statements on Hydraulic Fracturing
http://www.dec.ny.gov/docs/materials_minerals_pdf/ogdsgeischap5.pdf

US Department of Energy, National Energy Technology Laboratory – policy statements on hydraulic fracturing
http://www.netl.doe.gov/publications/factsheets/policy/Policy001.pdf

List of Fracturing Fluids in Pa – PA DEP These lists have been available since June 2008.
http://www.dep.state.pa.us/dep/deputate/minres/oilgas/FractListing.pdf

Energy in Depth – industry website listing of publicly disclosed fracturing fluids, including sources.
http://www.energyindepth.org/frac-fluid.pdf

Marcellus Shale Coalition's page on Hydraulic Fracturing – listing of publicly disclosed fluids and other state and federal studies and reports
http://pamarcellus.com/fracing.php