

MODEL OIL AND GAS LAWS, REGULATIONS AND ORDINANCES





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Thank you for reading our report!

Natural gas should be developed in Arkansas using the best safeguards available to protect landowners, water quality, air quality and public health. Natural gas is an important resource that can be developed responsibly, but Arkansas is full of communities, families and valuable resources that deserve protection. We have some of the highest water quality in the world, attracting people from far and wide to Arkansas lakes, rivers and communities.

This report looks at how other states with thriving natural gas industries protect their residents. We found that many states and communities enjoy far better safeguards than Arkansas. The findings refute claims by the natural gas industry that improved safeguards for Arkansans will drive them out of business and hurt economic development.

We believe Arkansas communities deserve the best protections available.

There is a way to balance natural gas development with landowner and environmental protection. This report highlights some of the best practices other states use to find that balance. We hope you find it helpful.

For a better Arkansas,

Bill Kopsky, Executive Director
Arkansas Public Policy Panel

Front cover photos:

Top: State of Arkansas, Sattelite image from Google Maps.

Bottom: Shale Gas Plays, Lower 48 States. Energy Information Administration, March 10, 2010.

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EXECUTIVE SUMMARY

This report compares protections for land owners, air quality, water quality and public health from the negative impacts of natural gas development using hydraulic fracturing of shale formations, as used in the Arkansas Fayetteville Shale play. The report finds that many states offer their residents stronger safeguards than those found in Arkansas, with a few notable exceptions.

In each section of this report, we make recommendations for new policies that have been used in other states or localities to strengthen protections for air, land, water and public health. We view the following proposals as the highest priorities for Arkansas to address in the near term:

1. **Surface Owner Rights:** In order to ensure that surface owners are fairly consulted about the course of development and minimization of negative effects, and compensated for damages to their property, we recommend that oil and gas operators be required to:
 - a. Notify surface owners in writing at least 30 days before disturbance of the surface.
 - b. Compensate surface owners for lost income and expenses incurred as a result of inability to use or access land; the value of damaged crops, water supplies or personal property; and the decreased value.
2. **Water:** In order to protect Arkansas' clean water resources, we recommend that:
 - a. The legislature clarify that the Arkansas Pollution Control and Ecology Commission has the authority and duty to make rules that prevent oil and gas operations from polluting the waters of the State, and that the Arkansas Department of Environmental Quality has the authority and duty to enforce such rules, and
 - b. Oil and gas operators be required to conduct water quality and quantity tests before well construction begins, and at least annually while the well is in production, and that the results of all water monitoring tests be made available to the public.
3. **Hydraulic Fracturing:** In order to protect groundwater resources from contamination with chemicals used in drilling and fracturing, we recommend that:
 - a. Intermediate casing be required to protect freshwater, particularly for wells that pass through freshwater that is being used or could be used for drinking water.
 - b. Specific, strong standards for casing and cementing be adopted.
4. **Air:** In order to protect oil and gas field residents from the serious health effects of air pollution, we recommend that Arkansas update its standards for oil and gas exploration and production operations to:
 - a. Require oil and gas developers to implement technology and practices that have been proven cost effective to reduce or eliminate air emissions during the oil and gas exploration and production process, such as requiring green completions for all wells unless not technically or economically feasible, and requiring low- or no-bleed valves on all new, replaced or repaired pneumatic devices.
 - b. Make the entire production system, including separators, compressors, dehydration units and other equipment currently defined as "insignificant" sources of pollution, a part of emissions calculations and the permitting program.
 - c. Lower regulatory thresholds that trigger permit and emission control requirements.
5. **Noise:** To protect against the serious health effects of noise from oil and gas operations, we recommend that Arkansas implement a noise standard of 55 decibels during the day and 45 decibels at night.

6. **Inspections:** In order to ensure that Arkansas laws and regulations to protect clean air, land, water and public health are being implemented, we recommend that:
 - a. Every well should be inspected as often as necessary to ensure compliance with laws and regulations, but at least once per year, with an emphasis on inspecting: 1) New wells prior to being put into production (with an emphasis on ensuring proper cementing and casing); 2) wells while hydraulic fracturing is occurring; 3) wells that have been put into production within the prior year; and 4) wells going into final reclamation.
 - b. Agencies identify the staff required to meet their inspection goals and communicate these needs to legislators in budget requests.
7. **Waste Sites:** To protect against contamination from oil and gas waste sites, we recommend adoption of comprehensive oil and gas site standards similar to those passed in New Mexico, including requiring:
 - a. Use of double liners with leak detection systems in storage and disposal pits.
 - b. Temporary pits to close within six months of completion of drilling.
 - c. Signs, fencing and netting around all pits.
8. **Disclosure:** In order to provide residents with information needed to test their water, and to understand the impacts of oil and gas development and any contamination that does occur, we recommend that the new Arkansas disclosure requirements be updated to require disclosure of:
 - a. Chemical Abstract Service (CAS) numbers, as well as the volume of each substance used.
 - b. Drilling chemicals, as well as those used in the hydraulic fracturing process.
 - c. Initial reports to all local residents with sufficient time in advance of drilling or stimulation to test their wells for contaminants to establish a baseline, in addition to final reports after drilling or stimulation, with chemicals actually used.
- d. The volume and source of water used in the operation, as well as the total amount of fluid used and the amount returned to the surface.
- e. The location of all surface and underground water sources within one mile of the drill site, as well as the location of all fault lines and fissures within one mile of the drill site or injection site.
- f. Protections for proprietary information must be minimized, as established in the federal Emergency Planning and Community Right to Know Act and its implementing regulations.
9. **Financial Assurance:** In order to ensure that oil and gas sites are reclaimed in a timely manner, and that reclamation is paid for by operators and not taxpayers, we recommend that Arkansas' bonding requirements be updated to:
 - a. Increase single well bond amounts to \$10,000 per well and blanket bond amounts to \$250,000 statewide.
 - b. Institute a single well bond equal to the cost of plugging and reclamation for idle wells.
10. **Best Management Practices:** In order to ensure that oil and gas operators use equipment and practices that will prevent and minimize impacts to the environment, we recommend that:
 - a. Oil and gas developers be required to use the Best Management Practices described in the U.S. Bureau of Land Management's *Gold Book*, as well as the American Exploration and Production Council's *Reasonable and Prudent Practices for Stabilization*.
11. **Setbacks:** Because proximity to oil and gas operations often contributes to negative impacts, we recommend that oil and gas wells be set back at least 1,000 feet from habitable dwellings, schools, places of worship, hospitals, water sources and bodies of water.

INTRODUCTION

As the nation and the world search for cleaner fuel supplies and energy independence, and new technologies and techniques open previously uneconomic natural gas deposits to development, the U.S. natural gas industry has expanded steadily, despite the current recession. In Arkansas, natural gas production from the Fayetteville Shale continues to increase, but the play is seen by some to be at a crossroads as more new shale plays are opened and natural gas developers have more options for investment. As companies balance the risks and returns of various plays, the pace of new drilling in the Fayetteville Shale has slowed, leading some to question whether the Arkansas play will be as productive or profitable as initially projected.¹

At the same time, new questions and concerns about the effects of natural gas development are being raised. Much of this attention has focused on the controversial industry practice of hydraulic fracturing because of the toxic chemicals and massive quantities of water used, but many other aspects of natural gas development also pose the risk of serious impacts to water, air and land. In the daily operations of drilling sites and waste disposal sites and in the transportation of gas, chemicals and wastes, there is always a potential for leaks, spills and accidents. All phases of development can affect people's health and quality of life, reduce property values, and even adversely affect other industries, including agriculture, recreation and tourism.

Our previous report, *Arkansas In The Balance: Managing the Risks of Shale Natural Gas Development in the Natural State*, looked at some of these threats, using the experience of other natural gas producing states to illustrate the kinds of impacts citizens of Arkansas can expect, with a focus on water quality and quantity. In summary, from the point when land is leased to the end of gas production to well closure and reclamation, the potential for environmental impacts is enormous. Given these threats, it is critical that efforts to promote

development of the Fayetteville Shale be coupled with an equally strong emphasis on protecting the state's people, private property, natural resources and environment.

The role of government agencies is critical, as they plan for development, establish standards, issue permits, establish bond amounts, monitor sites and enforce the law. Because the oil and gas industry has received special exemptions from so many federal environmental standards, including portions of the Clean Air Act; Clean Water Act; Comprehensive Environmental Response, Compensation and Liability Act (toxic site cleanup); and Resource Conservation and Recovery Act (waste management), state agencies are the primary regulators. In Arkansas, the Arkansas Oil and Gas Commission and Arkansas Department of Environmental Quality shoulder the main responsibility for oversight of the natural gas industry.

Local governments can and often do play important roles, as well, in many states. Cities and counties can control where development is allowed to occur, and some local governments enact ordinances that regulate noise and establish other operating conditions.

While no state or local government has a comprehensive program that is lauded by gas field residents as adequately protective in all areas, many states have strengthened protections in some areas. Some of these states updated their policies after years of production in order to mitigate specific impacts; others responded to public concerns early and worked to put new policies in place at the outset. All have had to struggle to create their own protections in the absence of a uniform federal regulatory regime.

In all states, regulatory requirements have changed over time and continue to evolve as the scale, locations, technology and practices in the industry change, along with the people and landscapes surrounding the industry. What was considered common and appropriate practice fifty years, ten years or even one or two years ago may no longer be considered acceptable. Just as production technologies change making formations that were once

1 Alison Slider, "Fayetteville Shale approaches crossroad," *Arkansas Democrat-Gazette*, 5 September 2010, Business, p. 69.

off limits accessible, new technologies and practices that minimize or eliminate the negative impacts of development become available and affordable, and new information leads to a better understanding of the impacts of development, fostering a new sense of what is and is not acceptable.

These changes prompt evolutions in best management practices, or BMPs, that are recommended on a voluntary basis or incorporated into permits or leases as required conditions of operation. As BMPs become accepted practice, they are more likely to be incorporated into laws or regulations and made mandatory, particularly when they are established as affordable ways to effectively address significant negative impacts, and are embraced by some within the industry itself.

Arkansas In The Balance included a partial set of recommendations for protecting the health of Arkansas' citizens by protecting the natural ecosystems and the air, land and water on which we depend. This report builds on our previous recommendations by examining the policies of other oil and natural gas producing states,

profiling model laws, regulations and local ordinances designed to offer these important protections, and making recommendations for reforms to Arkansas' laws and regulations. Many of these policies elevate proven BMPs to mandatory standards.

Fortunately, Arkansas is in a position to learn from the experiences of other states and their successes. As the Fayetteville Shale play slows, our state's citizens, elected officials and regulators have the opportunity to craft a new model for responsible natural gas development. The Arkansas Oil and Gas Commission's new hydraulic fracturing chemical disclosure rules are one step in the right direction, as are the new rules regulating waste pits, but these areas could be stronger and many other issues still need to be addressed. If we continue to plan responsibly and move forward together, we can meet the challenges before us and ensure that the legacy of the Fayetteville Shale is not only one of reaping the benefits of this tremendous energy resource, but also protecting the health and environment and preserving the natural legacy of our state.

SURFACE OWNER RIGHTS

In most states, ownership of oil, gas and other minerals can be held separately from ownership of the surface of the land. Some states have more split estate lands than others. It has been estimated that mineral rights are split from surface rights for 85% of the land in Colorado² while, in Kansas, the landowner usually owns the subsurface rights, too.³ It is unclear what percentage of estates in Arkansas are split, but the problems of split estates do occur here.

Rights of surface owners vary widely from state to state as well, and tend to be stronger and more specific in states with more split estate land.



In Arkansas, surface owners are afforded basic rights of written notification before entry for exploration⁴ and ten days before entry to conduct seismic operations. Under AOGC rules, surface owners are entitled to damages in only the most limited of circumstances caused by seismic operations only, and must prove damages and that the damages were caused by negligence, a violation, or unreasonable or excessive use of the surface owner's land.⁵

Surface owners are also entitled to reasonable compensation for damage from spills, and may bring an action for restoration or remediation from a spill if the responsible party fails to restore the surface in accordance with AOGC and ADEQ rules.⁶

Surface owners have a lien upon fixtures and equipment

to secure payment for damages,⁷ and may file a claim to recover damages caused by operator neglect from the bond, but must do so within one year of issuance of the permit. These claims are subordinate to the rights of AOGC.⁸ Other protections may be available under common law and/or case law.

Many states give surface owner greater rights, including the right to expanded notification, surface use agreements or bonds, damage compensation or even to pursue ownership of mineral rights.

Surface Owner Notification

Many states require notification of surface owners at different points in the oil and gas development process.

Surface Owner Notification Requirement

Colorado Requires written notice of expected date of commencement of operations, location of the well, and any associated roads and production facilities at least 30 days before commencing operations.⁹

Montana Requires notice at least 15 days before initial entry for activities that do not disturb the surface¹⁰ and written notice 20-180 days before any activity that disturbs the surface.¹¹

New Mexico Requires five days notice prior to entry for activities that do not disturb the surface and 30 days notice prior to commencing operations.¹²

North Dakota Requires written notice of the drilling operations contemplated at least 20

2 John Peel, "Buyers get warning on gas-well drilling," 24 October 1999, Durango Herald

3 Kansas Geological Survey, Public Information Circular 19, "Natural Gas from Coal in Eastern Kansas," http://www.kgs.ku.edu/Publications/pic19/pic19_2.html (8 March 2011)

4 Arkansas Code Annotated 15-72-203

5 Arkansas Oil and Gas Commission Rule B-42(h)

6 Arkansas Code Annotated 15-72-219

7 Arkansas Code Annotated 15-72-213

8 Arkansas Code Annotated 15-72-214

9 Colorado Revised Statutes 34-60-106(14)

10 Montana Code Annotated 70-16-111

11 Montana Code Annotated 82-10-503

12 New Mexico Statutes Annotated 70-12-5

days before commencing operations.¹³

South Dakota

Requires written notice at least 30 days prior to the date operations commence, other than exploration activities.¹⁴

Wyoming

Requires notice at least 5 days notice before initial entry for non-surface disturbing activities¹⁵ and written notice 30-180 days before commencing operations (including exploration).¹⁶



Federal Bureau of Land Management (BLM) will mail notice of a lease sale to surface owners when they post the notice of the sale, at least 45 days prior to the sale.¹⁷

North Dakota

The oil and gas developer must make a written offer of damage compensation.²⁰

Wyoming

Requires the oil and gas operator and surface owner to attempt good faith negotiations to reach a surface use agreement.²¹

Financial Assurance

None of these statutes prevents oil and gas development in the event a surface agreement is not reached. Instead, each of these states specifies procedures or other protections in the event a surface use agreement is not reached. Often a bond or other financial assurance is required to ensure that the landowner is compensated for damages, although these bonds are generally minimal. These bonds are not intended to cover the costs associated with compliance with lease terms, plugging the well, abandonment or reclamation, which are covered by a separate reclamation bond.

Oklahoma takes another approach, relying on court appointed appraisers to recommend damages in the event that mineral owners do not negotiate a written contract with the surface owner for payment of any damages that are caused by a drilling operation.²²

Financial Assurance Requirements

Colorado

A reasonable security must be provided if the surface owner is not a party to a lease, to protect such owner from unreasonable crop losses or land damage and to restore the condition of the land as nearly as is possible to its condition at the beginning of the lease and in accordance with the surface owner.²³

Surface Use Agreement Negotiation

The federal government and a number of states require oil and gas lessees or mineral owners to attempt to negotiate surface use agreements with surface owners.

Negotiation Requirement

Montana

Requires surface owners and oil and gas developers to attempt to negotiate an agreement on damages.¹⁸

New Mexico

Requires oil and gas operators to make an offer of a surface use and compensation agreement. The surface owner may accept the proposed agreement or reject it and enter into negotiations with the operator, including, if the parties agree, binding arbitration or mediation.¹⁹

13 North Dakota Century Code 38-11.1-05

14 South Dakota Statutes 45-5A-5

15 Wyoming Statutes 30-5-402(b)

16 Wyoming Statutes 30-5-402(d)-(e)

17 U.S. Bureau of Land Management Instruction Memorandum 2009-184

18 Montana Code Annotated 82-10-504

19 New Mexico Statutes Annotated 70-12-5(D)

20 North Dakota Century Code 38-11.1-08

21 Wyoming Statutes 30-5-402(f)

22 Oklahoma Statutes Annotated 52 4-318.2 to 318.9

23 Colorado Revised Statutes 34-60-106(3.5)

New Mexico

If, after 30 days from a surface owner receiving notice, no surface use and compensation agreement has been entered into, the operator may enter the surface owner's property and conduct oil and gas operations after depositing a financial assurance of \$10,000 per well location or \$25,000 statewide.²⁴

Wyoming

In the absence of surface owner consent, waiver or agreement, the operator shall post a bond to secure payment of damages.²⁵ The bond shall be not less than \$2,000 per well site. A blanket bond may be established. The surface owner shall be notified of the receipt of the bond, and have 30 days to object to the amount or type before it is approved. Bond decisions may be appealed to district court.²⁶



If a surface use agreement cannot be reached, the operator must post a bond to "indemnify the surface owner against the reasonable and foreseeable damages for loss of crops and tangible improvements caused by the proposed operations."²⁷ The bond must be at least \$1,000. Surface owners are given the opportunity to object to the bond amount.

Damage Compensation

Several states have statutes with nearly identical damage compensation requirements.

Damage Compensation Requirements



Before beginning operations, an oil and gas company must provide for full payment to the surface owner for all damages resulting to entering the surface estate. The surface

owner may institute legal proceedings to determine damages that the surface owner may suffer.²⁸

Illinois and Kentucky

The surface owner is entitled to reasonable compensation for damages to growing crops, trees, shrubs, fences, roads, structures, improvements and livestock caused by the drilling of a new well, as well as subsequent production operations.²⁹

Montana, North Dakota and South Dakota

Require compensation for lost agricultural production and income, lost land value, and lost value of improvements caused by oil and gas operations on land directly affected by oil and gas operations and production.³⁰

New Mexico

Similar to Montana, North Dakota and South Dakota, but does not limit compensation to land that is directly affected by oil and gas operations.³¹

Tennessee and West Virginia

The oil and gas developer must pay the surface owner for lost income or expenses incurred as a result of being unable to use or access land for the pre-development uses; the market value of crops destroyed, damaged or prevented from reaching the market; damage to water supply; cost of repair of personal property; and the diminution of value after completion of the surface disturbance.³²

Wyoming

Similar to Montana and North Dakota, but does not limit compensation for lost production an income to agriculture.³³

24 New Mexico Statutes Annotated 70-12-6

25 Wyoming Statutes 30-5-402(c)(iv)

26 Wyoming Statutes 30-5-404

27 43 CFR 3814

28 Alaska Statute 38, Chapter 5

29 Illinois Compiled Statutes Chapter 765, 530 and Kentucky Revised Statutes Annotated 353.595(5)

30 Montana Code Annotated 82-10-504, North Dakota Century Code 38-11.1-04 and South Dakota Statutes 45-5A-4

31 New Mexico Statutes Annotated 70-12-4(A)

32 Tennessee Code Annotated 60-1-601 to 608 and West Virginia Code 22-7-3

33 Wyoming Statutes 30-5-405(a)

Dormant Minerals

Minerals are considered dormant if they have not been developed for some period of time. At least 22 states have statutes that limit the ownership of dormant severed minerals – California, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Nebraska, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Virginia, Washington and West Virginia.³⁴

While the intent of these acts is to make it easier to locate mineral owners since, after a number of years have passed, it can be difficult to identify and find a mineral owner, they also provide an opportunity for surface owners to regain control of the minerals beneath their property.

Although many of these laws were passed or updated in the 1970s and 1980s, at least one (Virginia's) dates back to 1924. Several states, including Arkansas, considered dormant mineral legislation within the past five years, but only Ohio and Pennsylvania enacted new statutes.

Dormant Mineral Provisions



Mineral rights are terminated if dormant for seven years or more.³⁵



Mineral rights can only be held by the seller of the surface property for ten years. If there is no mineral development on the property within the ten years, the mineral rights then automatically transfer to the surface owner.³⁶



If minerals have lain dormant for 20 years the surface owner may claim them.³⁷



If not held by a governmental entity, after notification of the mineral holder and filing with the county, the surface owner may claim the mineral interest if the mineral holder does not file a claim the mineral interest within 60 days.³⁸



Dormant mineral interests can only be held for ten years, and non-producing oil and gas leases can only be held for ten years.³⁹

Local Government Role

An ordinance passed by the **Mat-Su, Alaska** Borough Assembly allows surface owners to deny access until a surface use agreement is signed.⁴⁰

The City of **Norton, Ohio**, has instituted a city ordinance that states that, “No permit may be issued until all property owners and residents within 1,000 feet of the wellhead are notified, a public hearing is held, and at least 51% of the owners of the real estate units within 1,000 feet of the wellhead approve (in writing) the drilling of the oil or gas well.”⁴¹

Recommendations

- » In order to ensure that surface owners are fairly consulted with about the course of development and how to minimize negative effects, and compensated for damages to their property, we recommend that oil and gas operators be required to:
- » Notify surface owners in writing at least 30 days before disturbance of the surface.
- » Compensate surface owners for lost income and expenses incurred as a result of inability to use or access land; the value of damaged crops, water supplies or personal property; and the decrease in value.

34 Agelio Networks, “Dormant Minerals,” 3 March 2009, <http://www.agelio.net/dormant-minerals/> (8 March 2011)

35 Georgia Code Annotated 85-407.1

36 Louisiana Revised Statutes Annotated 31:5, 31:6, 31:15, and 31:27

37 North Dakota Century Code 38-18-1.01

38 Ohio Revised Code 5301.56(B)

39 Tennessee Code Annotated 66-7-103

40 Mat-Su Ordinance Serial No. 04-175 (AM), www.matsugov.us/Assembly/documents/04-175AMor.pdf (8 March 2011)

41 Norton, Ohio Code of Ordinances Chapter 848.13

Arkansas has abundant water resources, but these resources must be allocated among multiple, sometimes competing uses. Some areas of Arkansas currently, or may in the future, find themselves with inadequate supplies of water of sufficient quality to support demand, creating competition for limited water resources between various users. Significant threats to water quality are also a fact of life with natural gas development – from sediment runoff of thousands of miles of roads and pipelines to the potential for chemicals and waste to be spilled.

Most, if not all, oil and gas producing states have similar concerns. More states are taking action to ensure that this precious resource is protected for future use, in both quality and quantity, including some protections highlighted in other sections of this report (such as the casing recommendations in the Hydraulic Fracturing section to protect groundwater from toxic contamination).



Ensuring proper regulation of stormwater runoff from oil and gas sites is a major concern because sediment is the largest cause of impairment to water quality in Arkansas streams and because of the sheer scale of the Fayetteville shale development. The issue of regulation of stormwater runoff from oil and gas sites is a complex one, however. The proper role of ADEQ to protect water quality from gas development is murky at best, with very knowledgeable experts disagreeing on the extent of the agency's authority.

Oil and gas exploration and production sites are exempt from the federal Clean Water Act's stormwater permitting requirements. Prior to 2005, oil and gas construction activities were covered by the federal law, but the Environmental Protection Agency (EPA) postponed the date by which oil and gas companies must obtain stormwater permits for construction activities. Then, in

2005, Congress passed the Energy Policy Act of 2005, which broadened the exemption from the stormwater permitting program to include construction.

Arkansas's state water laws appear to give broad authority to ADEQ to protect water quality without a gas industry exemption, but the agency claims that the gas industry is nonetheless exempt from the Arkansas Water and Air Pollution Control Act because the 2005 Congressional exemption superseded Arkansas law.

ADEQ does, however, require general permits that contain some stormwater protections because the discharge of fluids generated by any activity associated with oil and natural gas exploration or production into surface water, groundwater or any designated waters of the state is still prohibited under state law.

These general permits are less protective than more site-specific individual permits in several ways. They are blanket permits given for a range of similar activities without regard to the different characteristics of each site. In a state with as varied terrain and ecosystems as Arkansas has, this is a serious deficiency. The permits also contain far less detail than more specific permits require, with little or no opportunity for public review, so inspectors and even private landowners have a harder time holding the gas companies accountable for operating responsibly.

ADEQ regulations also require permits for owners or operators of reserve pits related to oil and gas drilling. In addition, permits must be obtained from ADEQ for land application of drilling fluids produced during the exploration and production of oil and gas.

Stormwater

Despite the federal Clean Water Act exemption for oil and gas activities from the stormwater permitting program, several states require stormwater permits based on state statutory authority. Although, like Arkansas, these states require general permits, some of their permit requirements are more detailed, and stronger.

Stormwater Permitting Requirements

Colorado

Requires stormwater discharge permit coverage for all construction activities that disturb one acre or greater (or that are part of a larger common plan of development), including construction of well pads, roads, pipelines, pumping stations, etc.⁴²

Montana

Requires stormwater discharge permit coverage for all oil and gas exploration, production, processing, treatment, operation, or transmission facilities. The permit includes detailed requirements for a description of potential pollutant sources, site map, drainage patterns, exposed material inventory, list of prior spills and leaks at the site, stormwater quality data, receiving surface waters, risk assessment based on types of materials handled, comprehensive BMP requirements, and a site inspection and compliance evaluation report.

Water Replacement Requirements

North Dakota

If the domestic, livestock or irrigation water supply of any landowner within one-half mile of where geophysical or seismograph activities have been conducted or one mile of an oil and gas well site has been disrupted or diminished in quality or quantity, the landowner is entitled to recover the cost of repairs, alterations or construction that will ensure the delivery of that quality and quantity of water prior to the commencement of drilling operations. A certified water quality and quantity test must have been performed by the landowner within one year preceding the commencement of drilling operations. Evidence of injury may be established by showing that the drilling operations penetrated or disrupted an aquifer in such a manner as to diminish water quality or quantity within the radius covered by the law.⁴³

Pennsylvania

Any well operator who affects a public or private water supply by pollution or diminution shall restore or replace the affected supply with an alternate source of water adequate in quantity or quality for the purposes served by the supply. It shall be presumed that a well operator is responsible for the pollution of a water supply that is within 1,000 feet of the oil or gas well, where the pollution occurred within six months after the completion of drilling or alteration of such well.⁴⁴

Water Replacement

Both North Dakota and Pennsylvania have clear requirements that, if nearby water sources are damaged during the course of development, oil and gas operators must either restore or replace those supplies or reimburse the landowner for the cost of doing so. Both states require a pre-drilling water quality and quantity test to establish a baseline.

42 Colorado Department of Public Health and Environment Water Quality Control Division Stormwater Program, "Stormwater Fact Sheet – Construction at Oil and Gas Facilities," July 2007, <http://www.cdph.state.co.us/wq/permitsunit/POLICYGUIDANCEFACTSHEETS/factsheets/OGfactsheet.pdf> (16 March 2011)

43 North Dakota Century Code 38-11.1-06

44 Pennsylvania Code 78.51(a)

Local Government Role – Water Monitoring

A number of local governments require monitoring of water resources to watch for contamination from oil and gas sites, including:

- » **La Plata County, Colorado** requires monitoring of domestic water wells within one-half mile of the gas well before and after drilling. If contamination is found, the company must fix the problem.⁴⁵
- » **Lovington, New Mexico** requires weekly monitoring of and monthly reporting of brine disposal wells, and monthly monitoring of secondary recovery injection wells.⁴⁶
- » **Rio Arriba County, New Mexico** requires operators to drill a groundwater monitoring well at any well located within a critical management zone. Samples must be taken immediately after construction and at least annually afterward, subjected to laboratory analysis, and any increase in specified compounds must be reported to the county.⁴⁷
- » **Santa Fe County, New Mexico** requires that a water test be conducted prior to construction of a drilling facility, that at least three monitoring wells be constructed to specifications supplied by the county hydrologist, and that annual water tests be conducted.⁴⁸
- » **Norton, Ohio** requires that all freshwater wells within 1,000 feet of the wellhead be tested by the operator.⁴⁹

45 Josh Hoppe Josh. "Bellflower Ranches gas well wins approval," *Durango Herald*, 28 April 2000

46 Lovington, New Mexico Municipal Code 8.30.440

47 Rio Arriba County, New Mexico Ordinance 2009-01, 6.18 to 19

48 Santa Fe County Oil and Gas Amendments to the Land Development Code, Ordinance No. 2008-19 9 December 2008, 11.22

49 Norton, Ohio Code of Ordinances Chapter 848.20

Local Government Role – Watershed Protection

In 2005, the federal Bureau of Land Management (BLM) offered nearly 12,000 acres of minerals for lease within the watershed that supplies drinking water to 55,000 people in western Colorado. BLM finalized the leases despite protests from local residents and officials (including a failed attempt by community leaders to buy some of the leases themselves), but agreed to place a one-year suspension on the leases to allow stakeholders to create a watershed plan. The two-year collaborative process resulted in a unique document that has been touted as a possible model for other local governments across the country, although the true test of the Plan will come when the leases in the Palisade-Grand Junction watershed moves beyond exploration into full development

The Palisade-Grand Junction Watershed Plan's⁵⁰ primary components include communication and coordination with local communities, analysis of risks of surface and groundwater contamination, third party water studies and monitoring throughout the entire gas development process, commitments by the gas company (Genesis Oil and Gas) beyond mandated requirements (including voluntarily agreeing to a no surface occupancy condition on 960 acres of land in the watershed), and use of BMPs to mitigate risks.

The BMPs to be implemented to protect water resources include:

- » Clustered development as the primary plan if development proceeds, with the minimum number of drilling pad locations or one well pad per 160 acres.
- » Collaborative storm water management planning including input and feedback from stakeholders to minimize impacts.

50 Palisade-Grand Junction Watershed Plan, http://s3.amazonaws.com/propublica/assets/natural_gas/colorado_watershed_plan.pdf (8 March 2011)

- » Closed loop drilling systems to reduce the potential for spills.
- » Cementing and casing programs to effectively isolate the aquifer and water zones.
- » Green fracturing materials in the watersheds.
- » Fracture tracing during the exploration phase to ensure fracturing fluids are contained to hydrocarbon zones.
- » Produced water disposal using methods other than on-site recovery pits.

Before the Watershed Plan was finalized, however, the local citizens' organization, Western Colorado Congress, organized to collect nearly 4,300 signatures to place a watershed protection ordinance on the November 2006 ballot. Rather than send the ballot to the voters, however, the Grand Junction City Council passed the ordinance unanimously at its September meeting.

The ordinance offers additional protections for the watershed, including prohibiting future oil and gas activity (and that of other potential polluting industries) without a Watershed Permit. To receive a permit, the applicant must establish that the proposed development will not affect stream flow, sediment load or erosion, injure the aquatic environment or degrade water quality. The operator must also provide cash or a letter of credit to ensure compliance with the ordinance and regulations, including the cost of maintenance, operation, re-vegetation and reclamation, as well as fund inspectors and testers to evaluate each permit application and ensure compliance with the ordinance and regulation. And, the ordinance requires compliance with the Watershed Plan.⁵¹

Recommendations

In order to protect Arkansas's clean water resources, we recommend that:

- » Given the questions about ADEQ's statutory authority to protect Arkansas' waters, the legislature should clarify that the Arkansas Pollution Control and Ecology Commission has the authority and duty to make rules that prevent oil and gas operations from polluting the waters of the State, and that the Arkansas Department of Environmental Quality has the authority and duty to enforce such rules.
- » ADEQ should review and update its stormwater general permit requirements, listing more detailed, site-specific protections designed to fully assess risks, and identify and implement protective measures, similar to the Montana general permit requirements.
- » Oil and gas operators be required to conduct water quality and quantity tests before well construction begins, and at least annually while the well is in production, and that the results of all water monitoring tests be made available to the public.
- » A provision be enacted to provide a clear standard of evidence for proof of loss of water quantity or quality that can reasonably be expected to be met by an individual landowner with typical financial resources and access to information.

⁵¹ Grand Junction, Colorado City Council Ordinance No. 3961

HYDRAULIC FRACTURING

Hydraulic fracturing is a process used to stimulate oil and gas production by creating fractures in rock, commonly used in tight sands and shale formations. Tens of thousands or, as is generally the case the hydraulic fracturing of shale formations, millions of gallons of fluid are injected into a well at great pressures, causing the formation to fracture. A proppant in the fluid, such as sand, ceramic or other particles prevents the fractures from closing. Pressure is then released, some fluids are aerosolized into the atmosphere or pumped out, but 20 to 40 percent may remain underground.⁵²

Hydraulic fracturing has become increasingly controversial because of concerns that the fluid, commonly containing toxic chemicals, can contact groundwater resources, especially if well casing and cementing are faulty, and because Congress exempted the practice from the Safe Drinking Water Act in 2005.

Heightened public scrutiny and concern prompted the EPA to launch a study of the effects of hydraulic fracturing on water supplies in 2010, scheduled to be completed in 2012.



The practice of hydraulic fracturing itself has not been formally regulated in Arkansas,⁵³ but AOGC recently updated its well completion requirements for hydraulic fracturing, as well as disclosure requirements.⁵⁴ The new

regulations⁵⁵ include significant improvements, including requirements that:

- » Drilling permits shall indicate intent to perform hydraulic fracturing and provide information on the proposed casing program, cementing plans and pressure ranges.
- » Hydraulic fracturing treatment pressure shall not exceed 80 percent of the minimum internal yield pressure for the production casing.
- » Surface casings shall be set to at least 100 feet below the deepest encountered freshwater zone.
- » Permit holders shall notify AOGC as soon as practicable but not more than 24 hours after the event if the integrity of the cementing is questionable, or of indications of movement of fluids into the surface casing annulus.

Casing and Cementing

There is widespread acknowledgement by many citizens, environmentalists, state and federal regulators and some within oil and gas industry itself that proper casing and cementing on oil and gas wells is critical to protecting against groundwater contamination from hydraulic fracturing. The primary purpose of the layers of metal casing and cement is to isolate the oil or gas well from the surrounding formation, and protect seepage of oil, gas and the fluids and chemicals used in the production process from seeping into groundwater. Intermediate casing, in particular, provides an additional barrier between the surface and production casings and is required by some states to offer added protection in freshwater zones.

52 U.S. Environmental Protection Agency, Draft Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, August, 2002, EPA 816-D-02-006.

53 Thomas E. Kurth, Michael J. Mazzone, Mary S. Mendoza and Christopher S. Kulander, "Law Applicable to Hydraulic Fracturing in the Shale States," *The Oil, Gas and Energy Resources Law Journal*, June 2010, p. 21.

54 See "Chemical Disclosure" section for more information on disclosure.

55 Arkansas Oil and Gas Commission Rule 19-B

Intermediate Casing Requirements



Requires intermediate casings.⁵⁶

In addition to setting pressure limits, many states require pressure testing of the well casing string. A few require pressure testing of the cementing and not the casing. Texas requires pressure testing of both. Many states require testing to an exact strength, from 300psi to 1200psi.⁵⁷

Pressure Testing Requirements



American Petroleum Institute Technical Standards – All casing materials should be designed and tested to ensure that they have tensile strength and other properties with sufficient to withstand collapse, bursting, bending, buckling, corrosion, erosion, and all other stresses expected during the entire lifetime of the well. Providing this level of protection may require the use of coated piping or thicker-walled or other higher-grade piping with a sufficient corrosive allowance for local conditions.⁵⁸



Steel used in casing must be hydrostatically tested prior to use. Operator must pressure test surface casing strings that are longer than 200 feet. After the surface casing is cemented, the operator must pressure test the zone of critical cement (the bottom 20% of the casing string) before the plug is drilled.⁵⁹

56 Michigan Administrative Rules, Part 615 R 324.413(f)

57 Kelly Corcoran, Katherine Joseph, Elizabeth Laposata and Eric Scott, "Selected Topics in State and Local Regulation of Oil and Gas Exploration and Production," <http://www.uchastings.edu/public-law/docs/OGEP.pdf>, (8 March 2011), p. 40.

58 API, Spec 5CT: Specification for Casing and Tubing (5th ed. 2006)

59 16 Texas Admin.Code 3.13

Local Government Role

Santa Fe County's oil and gas ordinance, enacted in December 2008, regulates hydraulic fracturing, among other things, limiting fracturing to the hours between 8 a.m. and 5 p.m. and to 80 decibels at 300 feet from the source. Only fresh water meeting drinking standards may be used, and fracturing fluid may not contain hydrocarbons or other toxic components, synthetics or brine.⁶⁰

Recommendations

We recommend that AOGC inspect all sites when the casing is being set and cemented, to ensure proper installation.

We also endorse the recommendations of the Sierra Club in the comments⁶¹ submitted regarding AOGC's well completion rules, including:

- » Intermediate casing should be required to protect freshwater, particularly for wells that pass through freshwater that is being used or could be used for drinking water.
- » Adopt specific, strong standards for casing and cementing.
- » Require operators to conduct and record daily, or at least weekly, inspections of pressure and operating conditions, with regular reports.
- » Clarify that blowout preventers are required for hydraulic fracturing.
- » Require well operations to cease as soon as a problem has been detected.
- » Make casing and cementing applications publicly available.

60 Santa Fe County Oil and Gas Amendments to the Land Development Code, Ordinance No. 2008-19 9 December 2008, 11.25.2, 3, 4 (8 March 2011)

61 http://sierraclub.org/naturalgas/rulemaking/AR.WellCompletionFracturing.Rule%2019-B/Comments_Arkansas_Rule_B19.pdf

Natural gas production generates significant air emissions from venting, flaring and other releases, as well as compressors, engines, glycol dehydrators, condensate tanks and waste pits. Pollutants may include volatile organic compounds (VOCs), nitrogen oxides (NOx), particulates, carbon monoxide, hydrogen sulfide, hazardous air pollutants (or HAPs, which include benzene, toluene, ethylbenzene, xylene), hydrocarbons, ozone and methane.

Air pollution can compromise the health and welfare of people who live in gas-producing areas by causing or contributing to respiratory problems, asthma, cancer and other conditions. The growing concern about air pollution from natural gas production sites in Texas' Barnett Shale was quantified in a January, 2009 report by Al Armendariz, then a Southern Methodist University professor and currently Administrator of EPA's Region 6. The Armendariz report inventoried oil and gas air pollution emissions, as well as cost-effective control options. Armendariz found that air emissions from oil and natural gas production exceed previous estimates, with emissions of VOCs and NOx from gas production in the Dallas-Fort Worth area alone in 2009 greater than the total volume of such emissions from cars and trucks in the area.⁶²

Fortunately, Armendariz and others have documented numerous measures to control emissions have been demonstrated to be cost-effective because implementation costs are low relative to the value of the gas that is recovered and marketed.⁶³

According to EPA, 61 percent of the natural gas industry is already participating in the Agency's voluntary Natural

Gas STAR Program to reduce natural gas emissions.⁶⁴ Some states have raised the bar to make some of these practices mandatory.

In Colorado, the Air Pollution Control Division of the state's Department of Public Health and Environment adopted new regulations in 2006 to control releases of methane from well completions and VOCs from condensate tanks, crude oil and produced water tanks and glycol dehydration units used to store produced water and other fluids. Wyoming issued similar updates to its permitting guidelines in 2010.

EPA is also taking a new look (under a court order) at the air quality impacts of natural gas exploration and production, as well as other industry sectors, and has said that it will make a decision soon as to whether it will issue new standards for toxic pollutants associated glycol dehydrators, tanks and equipment leaks.⁶⁵



The Arkansas Department of Environmental Quality (ADEQ) regulates air emissions. Under ADEQ Regulation No. 18, only sources that emit at least 40 tons per year (tpy) of VOCs, 40 tpy of NOx, 25 tpy of particulate matter, 5 tpy of HAPs, or 25 tpy of any other air contaminant are required to obtain a permit.⁶⁶ Some types of equipment that have been found to be significant sources of air pollution at oil and natural gas exploration and production sites are not included in these emissions

64 United States Environmental Protection Agency, "Natural Gas STAR Program Accomplishments," 14 December 2010, <http://www.epa.gov/gasstar/accomplishments/index.html> (17 February 2011)

65 United States Environmental Protection Agency, "Public Meetings on EPA's Review of Air Regulations for the Oil & Natural Gas Industry" Arlington, Texas – August 2, 2010 | Denver, Colorado – August 3, 2010," n.d., <http://www.epa.gov/airquality/oilandgas/pdfs/pubmeetinghandout2010.pdf> (17 February 2011)

66 Arkansas Pollution Control and Ecology Commission, Regulation 18.301.

62 Al Armendariz, "Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements," 26 January 2009, 43 p.

63 Environmental Defense Fund, "Air Pollutants Linked with Barnett Shale Gas/Oil Production The case builds for emission controls," October 2009, http://www.edf.org/documents/10488_Denton%20County%20Air%20Pollution%20presentation%20Final%2010_09.pdf (17 February 2011)

calculations or covered by the permitting program, including separators, dehydration units, natural gas fired compressors and pumping units.⁶⁷

As noted above, several other major oil and gas producing states have recognized the need to regulate air emissions from oil and gas production sites, and have implemented enforceable standards, permitting requirements and oversight programs.

Glycol Dehydrators

Glycol dehydrators are used to separate excess water from gas. As part of the separation process, methane is typically vented to the atmosphere. EPA estimates that glycol dehydrators vent approximately 15 Bcf of methane to the atmosphere annually as well as significant amounts of HAPs and VOCs. Numerous technologies can reduce emissions from glycol dehydrators including vapor recovery units, flash tank separators and electric pumps.⁶⁸

Glycol Dehydrator Requirements

Colorado Emissions from glycol dehydrators with VOC emissions of 15 tpy or more,⁶⁹ as well as those with VOC emissions of 5 tpy or more in located within one-quarter mile of a public place in Garfield, Mesa and Rio Blanco Counties,⁷⁰ must be controlled by 90%.

Wyoming

AP and VOC emissions from glycol dehydrators must be controlled by 98%. Controls may be removed after a year if emissions are less than 6 tpy and units are equipped with still vent condensers, except in the Jonah and Pinedale Anticline Development Areas. Alternatively, dehydrators must be equipped with reboiler still vent condensers and glycol flash separators. Emissions must be monitored and if, after 30 or 60 days, VOCs are greater than 6-8 tpy, they must be controlled by 98%.⁷¹

Green Completions

When a natural gas well is in the final stage of being completed, it is “cleaned up,” a process that produces methane, HAPs and VOCs that are typically vented to the atmosphere. EPA estimates that 25.2 Bcf of methane that is being vented to the atmosphere each year can be recovered using “green completions,” in which gas is captured and sold rather than vented or flared.⁷²

Green completions are becoming accepted practice in the Barnett Shale, after the Dallas/Fort Worth Airport required them when it signed a major agreement with Chesapeake Energy in 2006.⁷³ Devon Energy has reported using green completions on its wells in the Barnett Shale, and has generated \$20 million in profits from natural gas and condensate recovered over a three-year period.⁷⁴

67 Arkansas Pollution Control and Ecology Commission, Regulation 18, Appendix A, Insignificant Activities List, Group B, #76.

68 United States Environmental Protection Agency, “Lessons Learned from Natural Gas STAR Partners Optimize Glycol Circulation and Install Flash Tank Separators in Glycol Dehydrators,” October 2006 http://www.epa.gov/gasstar/documents/ll_flashtanks3.pdf (17 February 2011)

69 Colorado Department of Public Health Air Pollution Control Division, “Oil and Gas Exploration and Production Regulations No. 7 Requirements,” January 2009, <http://www.cdph.state.co.us/ap/sbap/SBAPoiligastankguidance.pdf> (7 March, 2011)

70 Colorado Oil and Gas Conservation Commission, Rule 805(b)(2)(C)

71 Wyoming Department of Environmental Quality Air Quality Division, “Oil and Gas Production Facilities, Chapter 6, Section 2 Permitting Guidance,” March 2010, pp. 6-7, 12-13, 18.

72 United States Environmental Protection Agency, “Reduced Emission Completions (Green Completions) Lessons Learned from Natural Gas STAR,” Producers Technology Transfer Workshop, Houston, TX, 26 October 2005.

73 Chris Vaughn, “Some Drillers Avoid Flaring Gas Wells With ‘Green Completions,’” Fort Worth Star-Telegram, 4 October, 2009.

74 Devon Energy, “EPA Natural Gas Star Program,” http://www.spe.org/spe-site/spe/spe/meetings/EPESC/2007/GreenhouseGas_BrianWoodward.pdf (7 March 2011)

Green Completions Requirements

Colorado Requires use of green completions on oil and gas wells unless not technically and economically feasible.⁷⁵

Wyoming Requires use of green completions in all areas of concentrated oil and gas development in the state.⁷⁶

Texas In 2009, SB 902, which would have required green completions on all wells in Tarrant County, Texas passed the Texas state Senate but was not acted on in the House of Representatives.⁷⁷ State Senator Wendy Davis re-introduced her legislation in 2011 as SB 104.⁷⁸

Pneumatic Device Valves

Pneumatic devices are used to control pressure by venting gas as needed, but some valves release gas at rates significantly lower than others. EPA data show that that pneumatic devices used in the natural gas production sector account for 37 Bcf of methane releases each year, over one-third of all production sector emissions, as well as significant emissions of HAPs and VOCs.⁷⁹ Replacing high-bleed valves with low-bleed valves could capture a significant percentage of these emissions.

75 Colorado Oil and Gas Conservation Commission Rule 805.b(3)(A)

76 Wyoming Department of Environmental Quality Air Quality Division, "Oil and Gas Production Facilities, Chapter 6, Section 2 Permitting Guidance," March 2010, p. 15.

77 Chris Vaughn, "Some Drillers Avoid Flaring Gas Wells With 'Green Completions,'" *Fort Worth Star-Telegram*, 4 October, 2009.

78 <http://www.capitol.state.tx.us/BillLookup/Text.aspx?LegSess=82R&Bill=SB104> (7 March 2011)

79 United States Environmental Protection Agency, "Natural Gas STAR Program Basic Information," 14 December 2010, <http://www.epa.gov/gasstar/basic-information/index.html#overview1> (7 March 2011)

Pneumatic Device Requirements

Colorado All new, replaced or repaired pneumatic devices at production facilities must be low- or no-bleed.⁸⁰

Wyoming All new pneumatic controllers and existing pneumatic controllers located at a modified facility must be low- or no-bleed or pump discharge streams to a closed loop system.⁸¹

Tanks

Crude oil, condensate and produced water storage tanks are another significant source of methane, HAPs and VOCs.⁸²

Storage Tank Requirements

Colorado Emissions from condensate, crude oil and produced water tanks with the potential to emit more than 5 tpy of VOCs within one-quarter mile of a public place in Garfield, Mesa and Rio Blanco Counties must be controlled by 95%.⁸³ Owners or operators of condensate tanks with VOC emissions of 20 tpy or more must control emission reductions by 95%.⁸⁴

80 Colorado Oil and Gas Conservation Commission Rule 805(b)(2)(E)

81 Wyoming Department of Environmental Quality Air Quality Division, "Oil and Gas Production Facilities, Chapter 6, Section 2 Permitting Guidance," March 2010, pp. 10, 15, 19.

82 Al Armendariz, "Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements," 26 January 2009, p. 25.

83 Colorado Oil and Gas Conservation Commission Rule 805(b)(2)(A) and (B)

84 Colorado Department of Public Health Air Pollution Control Division, "Oil and Gas Exploration and Production Regulations No. 7 Requirements," January 2009, <http://www.cdphe.state.co.us/ap/sbap/SBAPoiligastankguidance.pdf> (7 March, 2011)

Emissions from condensate, crude oil and produced water tanks that emit 10 tpy of VOCs must control emissions by 98% (unless located in certain areas where thresholds are lower.) Controls may be removed after a year if emissions are less than 8-10 tpy.⁸⁵

Local Government Role

The town of **DISH, Texas** sits in the heart of the Barnett Shale, with three metering stations, 11 compressor stations and over 20 pipelines in the small town. The DISH Board of Commissioners passed a series of ordinances to address local residents' complaints about smells, noise and other aspects of development. The most recent ordinance addressed concerns raised by new documentation of extremely high air emissions and associated health effects, and prohibits the venting or flaring of gas, bans open pits and requires reduce emission completion techniques and vapor recovery equipment for tank batteries.⁸⁶

Recommendations

Given the seriousness of potential health effects of air emissions and the effective precedents set by other states, particularly Colorado and Wyoming, we recommend that Arkansas update its standards for oil and gas production operations to:

- » Require oil and gas developers to implement technology and practices that have been proven cost effective to reduce or eliminate air emissions during the oil and gas exploration and production process, such as requiring green completions for all wells unless not technically or economically feasible, and requiring low- or no-bleed valves on all new, replaced or repaired pneumatic devices.
- » Make the entire production system, including separators, compressors, dehydration units and other equipment currently defined as "insignificant" sources of pollution, a part of emissions calculations and the permitting program.
- » Lower regulatory thresholds that trigger permit and emission control requirements to be comparable with Colorado and Wyoming: 5-6 tpy of VOCs and HAPs for glycol separators and 5-10 tpy of VOCs for tanks.

85 Wyoming Department of Environmental Quality Air Quality Division, "Oil and Gas Production Facilities, Chapter 6, Section 2 Permitting Guidance," March 2010, pp. 5, 11, 18.

86 DISH Ordinance No. 10-13A, <http://townofdish.com/index.php?id=EKC4LS3O4> (7 March 2011)

Noise from trucks, drilling, pumps and compressors is often one of the top complaints for many landowners living close to oil and gas facilities. In addition to being annoying, loud noise can cause adverse physical and mental effects. Yet, noise is an area not regulated by federal law or by most states. For this reason, regulation of noise from oil and gas sites is an area where local governments have been particularly active to protect the health and well being of nearby residents.



Arkansas does not currently regulate noise produced by oil and gas equipment and operations at the state level, and we are not aware of any local noise standards.

In 2005, the **Colorado Oil and Gas Conservation Commission** enacted a new rule regulating noise from oil and gas operations, including a new requirement that prohibits noise levels above 45 decibels in rural, agricultural and residential areas. Residents of the state hailed the measure as a tough but achievable standard based on precedents in Sacramento County, California and Alberta, Canada. Then, two months later, oil and gas industry representatives asked COGCC to re-open the rule and allow them to challenge the 45 decibel limit. The challenge was allowed because COGCC had failed to properly advertise the rule, and the 45 decibel requirement was vacated in 2006.⁸⁷

Still, the final rule included important new protections and is touted as the strongest standard in the U.S. It includes:⁸⁸

- » Expansion of the residential standard to those living in rural and agricultural areas, setting allowable levels at 55 decibels during the day and 50 decibels at night.
- » Allowing citizen complaints for low frequency noise (often felt as a vibration) – the first state in the nation to do so.⁸⁹
- » Expansion of the requirement for use of quiet design mufflers within 400 feet of occupied buildings in high density areas to all sites where engines are operating within 400 feet of occupied buildings.

The Louisiana Department of Natural Resources Office of Conservation also addresses noise concerns by limiting operating hours for oil and gas exploration and production in urban areas of the Haynesville Shale to daytime hours, and prohibiting noise levels from exceeding average ambient noise levels by more than 10 decibels.⁹⁰

Local Government Role

In New Mexico, at least three cities regulate noise levels: **Aztec, Bloomfield and Farmington**, as well as **Rio Arriba, Santa Fe and Valencia Counties**.⁹¹

Recommendations

To protect against the serious health effects of noise from oil and gas operations, we recommend that Arkansas implement a noise standard of 55 decibels during the day and 45 decibels at night.

87 EARTHWORKS, "Colorado Noise Rule Benefits Landowners," <http://www.earthworksaction.org/COnoisevictory.cfm> (8 March 2011)

88 Colorado Oil and Gas Conservation Commission Rule 802

89 Mike McKibbin, "Noise limits lifted for oil and gas drilling," 20 September 2006, [Grand Junction Daily Sentinel](http://www.grandjunctiondaily.com)

90 Louisiana Department of Natural Resources, Office of Conservation, Order No. U-HS, 3(1)(2)(b), dnr.louisiana.gov/cons/orders/U-HS.pdf, (8 March 2011)

91 Intermountain Oil and Gas BMP Project, "New Mexico County and Municipal Law," http://www.oilandgasbmps.org/laws/new_mexico_localgovt_law.php (8 March 2011)

INSPECTIONS

As oil and gas production expands, most regulatory agencies are overwhelmed by new demands on their time for planning, permitting, updating regulatory requirements and oversight. Policymakers tend to focus on facilitating production, often offering tax incentives, sometimes easing environmental regulations and putting pressure on regulators to focus on issuing permits. Budgets for inspection and enforcement staff are often outpaced by the pace of development. As a result, most wells in most states are not inspected every year, or even every decade. As regulators' workloads grow, they cannot keep up with inspections, and enforcement actions often drop, often by more than half.⁹²

Numerous studies have documented these trends. The Western Organization of Resource Councils⁹³, ProPublica⁹⁴ and the U.S. Government Accountability Office⁹⁵ have issued reports documenting the inadequacy of inspection and enforcement resources in multiple state and federal agencies.



Both the Arkansas Department of Environmental Quality (ADEQ) and the Arkansas Oil and Gas Commission (AOGC) are operating with minimal inspection and enforcement staff. According to agency reports, AOGC has four inspectors and one supervisor.

The ADEQ website lists 17 water inspectors and one supervisor, and 16 air inspectors and 9 supervisors for all industries across the state. Four of the water inspectors are specifically assigned to Game and Fish lands in the Fayetteville Shale region.

In September of 2010, the ADEQ announced that it would add four new inspectors, one supervisor and one enforcement analyst to monitor natural gas drilling, production and disposal activities. The new inspectors were funded by a two-year grant from the Arkansas Game and fish Commission.⁹⁶

Although the new inspectors will be helpful, significant additional long-term increases are needed to ensure that oil and gas sites have sufficient oversight.

Neither of the agencies has provided Arkansas law makers with a comprehensive proposed inspection and enforcement program that will adequately protect Arkansans water, air and health, or the staffing levels that would be needed to meet such a program.

Other States

A few states have responded to criticisms, investing in inspectors, as has the federal Bureau of Land Management (BLM), although further improvements are needed even in these agencies.⁹⁷

Inspection Resources



Hired several new inspectors in 2006 and eight more in 2009, and began computerizing its records and equipping inspectors with laptops.⁹⁸

92 Abraham Lustgarten, "State Oil and Gas Regulators Are Spread Too Thin to Do Their Jobs", *ProPublica*, 30 December 2009.

93 Western Organization of Resource Councils, "Law and Order in the Oil and Gas Fields," May 2009, <http://www.worc.org/userfiles/file/Oil%20Gas%20Coalbed%20Methane/LAO-2009.pdf>, (8 March 2011)

94 Abraham Lustgarten, "State Oil and Gas Regulators Are Spread Too Thin to Do Their Jobs", *ProPublica*, 30 December 2009

95 U.S. Government Accountability Office, "Oil and Gas Development Increased Permitting Activity Has Lessened BLM's Ability to Meet Its Environmental Protection Responsibilities," June 2005, GAO-05-418

96 NWA Media, "More Inspectors for Fayetteville Shale area", 28 September 2010, <http://www.nwaonline.com/news/2010/sep/28/more-inspectors-fayetteville-shale-area> (8 March 2011)

97 Western Organization of Resource Councils, "Law and Order in the Oil and Gas Fields," May 2009, <http://www.worc.org/userfiles/file/Oil%20Gas%20Coalbed%20Methane/LAO-2009.pdf>, (8 March 2011)

98 Abraham Lustgarten, "State Oil and Gas Regulators Are

Recommendations



Michigan Increased funding for oil and gas oversight in 1999, and has maintained level funding since then. With 36 oil and gas inspectors in 2009, Michigan had more regulators than states with significantly more oil and gas production, such as Colorado and Wyoming.⁹⁹



More than doubled the number of inspectors in 2008, paid for by higher fees on oil and gas companies. Governor Rendell proposed hiring 68 more enforcement staff in 2010,¹⁰⁰ for a total of 130 enforcement staff and 65 inspectors in 2011.¹⁰¹



From 1999 to 2009, the BLM more than doubled the number of staff with environmental inspection duties. The time spent on environmental inspections barely kept pace with the increase in the number of active wells, however, because these inspectors spent an average of 35 percent less time on environmental inspections in 2009, and more time on other activities, such as permitting.¹⁰² The Obama Administration proposed further increasing funding for oil and gas inspection and enforcement in its fiscal year 2010 and 2011 budgets, but these increases have yet to be approved by Congress.

- » Every well should be inspected as often as necessary to ensure compliance with laws and regulations, but at least once per year, with an emphasis on inspecting: 1) New wells prior to being put into production (with an emphasis on ensuring proper cementing and casing), 2) wells while hydraulic fracturing is occurring, 3) wells that have been put into production within the prior year; and 4) wells going into final reclamation.
- » Agencies should identify the staff required to meet their inspection goals, and communicate these needs to legislators in budget requests.
- » The legislature should fully fund requests for inspection and enforcement staff, and authorize regulatory agencies to implement and increase user fees to pay for oversight.

Spread Too Thin to Do Their Jobs”, *ProPublica*, 30 December 2009

99 Abraham Lustgarten, “State Oil and Gas Regulators Are Spread Too Thin to Do Their Jobs”, *ProPublica*, 30 December 2009

100 Jon Hurdle, “Pennsylvania plans more gas regulation,” 28 January 2010, www.reuters.com/article/idUSN2812147220100128 (8 March 2011)

101 Nicholas Kusnetz, “Many PA Gas Wells Go Unreported for Months,” *ProPublica*, 3 February 2011.

102 Western Organization of Resource Councils, “Law and Order in the Oil and Gas Fields,” May 2009, <http://www.worc.org/userfiles/file/Oil%20Gas%20Coalbed%20Methane/LAO-2009.pdf>, (8 March 2011)

Oil and gas exploration and production generates significant quantities of waste, much of which is hazardous and toxic. Major sources include hydraulic fracturing fluids, drilling mud and produced water. Proper management of these wastes is imperative, yet most of these wastes are exempt from the Resource Conservation and Recovery Act, the federal law designed to ensure appropriate waste management and disposal. . Because of this gap at the national level and the inherently dangerous nature of the wastes involved, it is critical that state agencies provide strong, specific standards for oil and gas waste management.



In Arkansas, oil and gas wastes are either disposed of on-site in reserve pits, land farmed by permit or injected into underground disposal wells. AOGC regulates injection wells, ADEQ regulates land farms and the agencies now jointly regulate waste pits.

Each of these regulatory programs has been subject to increased scrutiny and updates in recent years. The state's 11 permitted land farms were all closed down after investigations in 2008 and 2009 revealed all to be out of compliance with state standards. The legislature subsequently passed a bill to require adequate financing to guarantee compliance with environmental standards, and ADEQ implemented new, stricter regulations for land farms.

After a series of over 400 earthquakes occurred, AOGC placed a moratorium on new injection wells in a 600 square mile area, to allow time to explore possible connections between the earthquakes and injection wells in the region, and later ordered two companies to halt operations at two wells.

Finally, AOGC has proposed new rules for pits that will facilitate joint regulation with ADEQ. The change is designed, at least in part, because ADEQ has historically not had enough inspectors to inspect pit sites. AOGC's draft rules, however, have been criticized on a number of fronts, including:

- » Requiring only 48 hours notification before construction begins, rather than requiring that a permit be submitted for approval.
- » Not encouraging closed loop, pitless systems.
- » A confusing array of overlapping pit types.
- » Inconsistent application of siting requirements.
- » Not requiring synthetic liners and leak detection systems.
- » Not requiring signs, fences and netting.
- » Not requiring approval for storm water and sedimentation plans before construction begins.
- » Allowing permanent onsite disposal.
- » Restoration requirements not comprehensive.
- » Limited emergency and leakage notification requirements.
- » Not applying new rules to existing pits.¹⁰³

Regulatory programs in several other states offer stronger models.

Comprehensive Waste Rules in New Mexico

In 2006, after more than a year of stakeholder meetings, hearings and political pressure, the New Mexico Oil Conservation Commission adopted revisions to

103 Sierra Club Public Comments on Proposed Amendments to Commission General Rule B-17, 26 July 2010, <http://www.sierraclub.org/naturalgas/rulemaking/documents/AR.PitRules/2010.7.26.PitComments.pdf> (8 March 2011)

the state's surface wastes facility rules for oil and gas wastes¹⁰⁴ that set out four types of surface waste facilities, with rules for each type: landfills, centralized facilities, commercial land farms and small land farms. The rules also strengthened a number of related provisions:

- » Notice: The rule contains improved citizen notice provisions, including surface owners within one-half mile, counties, municipalities and tribal lands within a half mile, and any citizen requesting notice.
- » Bonding: The bond amount is set as the estimated actual cost of closure.
- » Permit denial: A permit may be denied if it may be detrimental to freshwater, public health, safety or the environment, or if the applicant has a history of violations.
- » Facility location:
 - No landfill may be located where groundwater is within 100 feet.
 - No land farm (commercial or small) may be located where groundwater is within 50 feet.
 - None of the facilities may be located within 200 feet of a watercourse, 500 feet of a wetland or 500 feet of a residence, school, etc.
 - Only one small land farm is allowed per section of land, and it must be built within one mile of an oil or gas well or facility.
- » Operational issues: All tanks eight feet in diameter or larger must be netted or screened, and there are specific monitoring requirements for detection of leaks.
- » Closure standards: Land farms and small land farms have specific numeric closure standards for total petroleum hydrocarbons and chlorides (500 ppm). If the operator cannot meet the closure standards, the contaminated soil must be moved to a landfill.

Pits

Many states have permit applications that are short. Several states, however, have more detailed requirements.

Permit Requirements

Colorado

Operators must evaluate the potential impact of production pits, centralized facilities and certain reserve pits on groundwater and surface water.¹⁰⁵ For centralized facilities, requires topographic, geologic, and hydrologic descriptions of the proposed site, a complete site plan, an operation plan, an inspection plan, an emergency plan, and a closure plan. Also requires nearby baseline water well quality.¹⁰⁶

New Mexico

An engineer must certify the design of plans, including operating and maintenance plans, closure plan and emergency response plan, and provide a hydrogeological report detailing the site's topography, soils, geology, surface hydrology and ground water hydrology.¹⁰⁷ For centralized facilities, requires topographic, geologic and hydrologic descriptions of the proposed site, a complete site plan, an operation plan, an inspection plan, an emergency plan and a closure plan.¹⁰⁸

Some states have also established siting requirements in an effort to decrease the likelihood of oil and gas waste disposed of in pits from contaminating water resources or affecting the health of nearby residents.

105 2 Code of Colorado Regulations 401-1-901(e)

106 2 Code of Colorado Regulations 401-1-908(b)(9)

107 New Mexico Code of Regulations 19.15.17.9(B)

108 New Mexico Code of Regulations 19.15.36.8 to 36.14 and 36.17

104 New Mexico Administrative Code 19.15.17

Siting Requirements

Colorado

Requires that that production equipment such as pits be located at least 350 feet from a building, or 500 feet from any school, hospital, nursing home or designated outdoor activity area.¹⁰⁹ Requires pitless drilling for operations within certain designated areas that could affect a drinking water supply system.¹¹⁰

Michigan

In-ground pits are prohibited in areas is designated principally for permanent or recreational residences.¹¹¹

New Mexico

Limits pits to locations at least 50 feet above groundwater, at least 300 feet from any continuously flowing watercourse, 200 feet from most other bodies of water, at least 500 feet from a water source that serves fewer than five households for domestic or stock purposes 1000 feet from any other fresh water well or spring, and not less than 500 feet from a wetland. Temporary pits must be located at least 300 feet from any home, school, hospital, institution or church, and permanent pits must be located at least 1000 feet from the same.¹¹²

Several states have additional, sometimes unique requirements to prevent contamination from pits.

Other Pit Requirements

Colorado

Colorado Requires liners (minimum 24 mils) at drilling pits designed for use with fluids containing high concentrations of hydrocarbons or chloride, production pits, special purpose pits (except

emergency pits), skim pits, and multi-well pits, and minimum 60 mils liners at pits at centralized facilities and injection facilities.¹¹³

Michigan

Machine oil, refuse, completion and test fluids, liquid hydrocarbons and solid salt cuttings may not be placed in pits.¹¹⁴ Reserve pits must be closed as soon as practicable, but at least within six months of the cessation of drilling activities.¹¹⁵

New Mexico

Storage and disposal pits must be double-lined, with a leak detection system. Reserve and production pits must be fenced.¹¹⁶ Temporary pits must be closed within six months of release of the rig.¹¹⁷

Local Government Role – Closed Loop Drilling Systems

The **City of Lovington, New Mexico** requires the use of closed loop drilling systems, which prevent on-site storage and disposal of often toxic drilling fluids. Companies operating within Lovington's water field are required to remove from the site and properly dispose of all drill cuttings and fluids. (At the time Lovington passed this ordinance, the state of New Mexico allowed for storage and burial of drilling fluids on-site, in unlined pits.)¹¹⁸

Lovington also banned the drilling of new disposal wells on lands within the city's water field in 2003 and banned the conversion of existing wells into disposal wells.¹¹⁹

113 2 Code of Colorado Regulations 404-1-904

114 Michigan Administrative Code 615.324.407(7)(a) and (d)

115 Michigan Administrative Code 615615-324-407(9)(c)

116 New Mexico Code of Regulations 19.15.17.11(D) and (G)(2)

117 New Mexico Code of Regulations 19.15.17.13(A)

118 Lovington, New Mexico Municipal Code 8.30.390 and 410

119 Lovington, New Mexico Municipal Code 8.30.370

109 2 Code of Colorado Regulations 404-1-6-3(e)

110 2 Code of Colorado Regulations 401-1-317B(d)(1)

111 Part 615 Michigan Code of Laws R 324.407

112 New Mexico Code of Regulations 19.15.17.10(A)(1) and (2)

Recommendations

To protect against contamination from oil and gas waste sites, we recommend adoption of comprehensive oil and gas site standards similar to those passed in New Mexico, including requiring:

- » Use of double liners with leak detection systems in storage and disposal pits.
- » Temporary pits to close within six months of completion of drilling.
- » Signs, fencing and netting around all pits.

Open pit at a drilling site

Arkansas Department of Environmental Quality



A closed loop sytem with tanks for waste.

US Fish and Wildlife Service



CHEMICAL DISCLOSURE

As concerns about air, water and land contamination from oil and gas production mount, the issue of chemical disclosure has become a rallying point for the public. Although not a substitute for the effective regulation of chemical use, this information enables testing of wells for pollutants, diagnosis and treatment of health conditions, and better understanding of the effects of chemicals used..

Many states require oil and gas operators to submit reports of some type, but most are focused on waste injection wells rather than production wells. Just two states – Arkansas and Wyoming – have mandated reporting of specific chemicals on a well-by-well basis. Both limit reporting requirements to chemicals used in hydraulic fracturing.



With the implementation of AOGC's Rule B-19 on January 15, 2011, Arkansas became the most recent state to require reporting of the chemicals used in hydraulic fracturing on a well-by-well basis. Rule B-19 requires reporting of the types and volumes of fluids and proppants; types, names, and rates or concentrations of chemical additives, as well as chemical constituents and Chemical Abstract Service (CAS) numbers (unique identifiers that are specific to a chemical compound). In "limited situations" where chemical constituents and associated CAS numbers are entitled to be withheld as a trade secret under the federal Emergency Planning and Community Response Act, permit holders may submit a confidentiality claim.¹²⁰

Advance Public Disclosure Requirements

Wyoming's 2010 regulations require reporting of similar information to the Wyoming Oil and Gas

Conservation Commission, including disclosure to the public. However, Wyoming's regulations also require operators to provide proposed plans for well stimulation in advance of fracturing, as well as additional detail after well stimulation, and this information is made available to the public.¹²¹

Drilling Chemical Reporting Requirements

Although their overall reporting requirements are not as strong or specific as those in Arkansas and Wyoming, and information is not disclosed to the public, the following states are unique in that they require recordkeeping and/or reporting of chemicals used in the drilling process and other aspects of development beyond hydraulic fracturing, where the chemicals can be as dangerous.

Drilling Chemical Reporting Requirements



Requires operators to maintain an inventory by well site of chemicals used or stored for use during drilling, completion and workover operations, in an amount exceeding 500 pounds in a quarterly reporting period.¹²²



Requires operators to include drilling additives used and a description of their toxicity in drilling applications.¹²³



Requires operators to prepare a Preparedness, Prevention and Contingency Plan that includes a list of chemicals or

121 Wyoming Oil and Gas Conservation Commission Rules and Regulations Chapter 3, Section 45

122 Colorado Oil and Gas Conservation Commission Rule 205(c)

123 Maryland Department of Environment, Application for Gas Exploration and Production, <http://www.mde.state.md.us/programs/Permits/LandManagementPermits/LandPermitApplicationsandOtherForms/Documents/www.mde.state.md.us/assets/document/permit/MDE-LMA-PER045.pdf> (7 March 2011)

120 Arkansas Oil and Gas Commission Rule B-19(k)

additives used and wastes generated during the drilling, stimulation, production, plugging and servicing phases.¹²⁴

Water Supplies

The increasing use of hydraulic fracturing has prompted concerns about water quantity, as well, because of the large amounts of water required. Several states require operators to report the source and volume of water used, in order to better understand the demands placed on the region's water supplies.

Water Source Reporting Requirements



Requires operators to report the source of water and volume used, including the water well number or water body name from which the water is drawn.¹²⁵



Requires operators to report the following for wells that use over 750,000 gallons of water in the hydraulic fracturing process: the amount of water withdrawn, the location where it was withdrawn, the amount injected into the well, the well's location, the amount of flow-back water recovered and the method and location of disposal, treatment or recycling.¹²⁶

Recommendations

Although an important first step, all current disclosure requirements have limitations. The newly-implemented Arkansas disclosure requirements should be updated to include:

- » Chemical Abstract Service (CAS) numbers must be reported, as well as the volume of each substance used.
- » Drilling chemicals must be disclosed, as well as those used in the hydraulic fracturing process.
- » Information must be reported to all local residents and disclosed with sufficient time in advance of drilling or stimulation to test their wells for contaminants to establish a baseline, in addition to a final report after drilling or stimulation, with chemicals actually used.
- » The volume and source of water used in the operation must be reported, as well as the total amount of fluid used and the amount returned to the surface.
- » The location of all surface and underground water sources within one mile of the drill site must be disclosed, as well as the location of all fault lines and fissures within one mile of the drill site or injection site.
- » Protections for proprietary information must be minimized, as established in the federal Emergency Planning and Community Right to Know Act and its implementing regulations.

124 Pennsylvania Department of Environmental Protection, Oil and Gas Operators Manual, <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-48243/chap4.pdf>, Chapter 4, p. 3 (8 March 2011)

125 News Release: "State Office of conservation requiring reporting of water source in hydraulic fracturing operations," DNR Public Information Office, dnr.louisiana.gov/sec/execdiv/pubinfo/newsr/2009/1008con-water-source.ssi, (8 March 2011)

126 WV State Agency Directory, News, oil and Gas Companies Must Register Marcellus Shale Hydraulic Fracturing Water Use www.dep.wv.gov/news/Pages/OilandgascompaniesmustregisterMarcellusShalefracwateruse.aspx, (8 March 2011)

FINANCIAL ASSURANCE

States generally require oil and gas operators to post a bond or other financial assurance mechanism to ensure that operators complete reclamation. In most cases, operators reclaim the site but, in the event an operator fails to do so, the agency may use the bond to help defray the costs of reclamation which, according to the U.S. Government Accountability Office, averages \$12,788 per well.¹²⁷

In most states, bond amounts are based on a minimum amount established by regulation. These amounts vary from state to state, and generally cover either all wells within a state, multiple wells in a state (referred to as blanket bonds) or an individual well. In some states, bond amounts take into account characteristics such as well depth or the status of a well, or the number of wells an operator has within the state.

Oil and gas bonding policies are different from those for other extractive industries, such as coal and hard rock mining. In most states, bonds for these industries are site specific and based on actual reclamation costs. Unlike mining, minimum oil and gas bond amounts are typically set significantly lower than actual reclamation costs, relying in large part on an operator's need to avoid association with orphaned sites, which can affect the ability to win future leases and permits.

According to University of Wyoming professors Matt Anderson and Roger Coupal, the decision to reclaim or not to reclaim depends on whether the costs of final reclamation are outweighed by the bond and reputation costs.¹²⁸ Reliance on reputation costs, rather than a solid bond becomes increasingly risky as boom periods end, particularly if operators are not consistently moving wells into interim and final reclamation once they become inactive. Anderson and Coupal note that the

fact that the current boom involves substantially more wells, roads, infrastructure and land than previous booms “suggests that reclamation issues will become increasingly important in the future” as production slows at these wells and they requiring plugging, abandonment and reclamation.¹²⁹



In Arkansas, Rule B-2 requires financial assurance of \$3,000 for each producing well or a blanket bond as follows: \$25,000 for 1-25 wells, \$50,000 for 26-100 wells or \$100,000 for 101 wells or more. Most oil and gas-producing states require higher levels of financial assurance than required by Rule B-2 in Arkansas. Like most states, Arkansas has an Abandoned and Orphaned Well Plugging Fund.¹³⁰

Single Well Bonds

Many states tie levels of single well bonds to well depth because of the strong relationship between the cost of reclamation and well depth.¹³¹ Single well bonds in states whose policies were reviewed for this report ranged from a low of \$1,500 for wells of less than 1,000 feet in depth in Utah to a high of \$60,000 for the deepest wells of 10,000 feet or more, also in Utah, although some states, such as New York, require higher bonds.

Single Well Bond Amount



\$10,000 for wells less than 3,000 feet deep
\$20,000 for wells 3,000 or more feet deep.¹³²

127 U.S. Government Accountability Office, “Oil and Gas Bonds Bonding Requirements and BLM Expenditures to Reclaim Orphaned Wells,” January 2010, GAO-10-245, p. 16.

128 Matt Anderson, Roger Coupal and Bridgette White, “Reclamation Costs and Regulation of Oil and Gas Development with Application to Wyoming,” Western Economics Forum, Spring 2009, p.41.

129 Anderson et al, p. 40.

130 A.C.A. 15-71-115

131 Anderson et al, p. 43.

132 Colorado Oil and Gas Conservation Commission Rule 706



\$5,000 plus \$1 per foot of well depth or \$10,000 plus \$1, depending on the county.¹³³



For wells over 6,000 feet deep, bond is based on the anticipated cost of plugging and abandoning the well, up to \$250,000 per well or \$2 million for all wells in the state.¹³⁴



\$1,500 for wells less than 1,000 feet deep
\$15,000 for wells 1,000 to 3,000 feet deep
\$30,000 for wells 3,000 to 10,000 feet deep
At least \$60,000 for wells over 10,000 feet deep.¹³⁵



Up to \$10,000 for wells less than 2,000 feet deep
\$20,000 or more for wells over 2,000 feet deep.¹³⁶



over 6,000 feet deep (see above)¹³⁸

At least \$250,000 statewide, with discretionary authority to set blanket bonds at higher levels¹³⁹



\$75,000 statewide, with discretionary authority to set blanket bonds at higher levels¹⁴⁰

Inactive Wells

In some cases, an operator may delay performing reclamation and allow a well to remain idle. For example, an operator may expect that higher prices in the future will make a well economically viable to operate. Many regulators recognize that idle wells are at greater risk for being orphaned, however, and several states have laws or regulations that require bond reviews and increases or additional fees for inactive wells to help ensure adequate funds are available for reclamation of these sites.

Inactive Well Bond Amount



Requires either payment of an annual fee of \$100-500, depending on the length of time the well has been idle, a \$5,000 escrow account (with annual deposits of \$500), a \$5,000 bond or a plan to eliminate all long-term idle wells.¹⁴¹



Increases bonds if an operator has excess inactive wells¹⁴² to \$10,000 for excess inactive wells less than 3,000 feet deep and

138 New York Department of Environmental Conservation Rules and Regulations 6.551.5-6

139 Washington Administrative Code 344-12-060

140 Wyoming Oil and Gas Conservation Commission Rules, Chapter 3, Section 4(b)

141 California Public Resources Code 3206

142 When an operator's inactive well count exceeds their financial assurance amount divided by ten thousand dollars (\$10,000) for inactive wells less than three thousand (3,000) feet in total measured depth or twenty thousand dollars (\$20,000) for inactive wells greater than or equal to three thousand (3,000) feet in total measured depth, the additional wells are considered "excess inactive wells."

Blanket Bonds

All states whose policies were reviewed offer blanket bonds to cover multiple wells. Although some states set statewide blanket bond amounts at levels comparable to the levels in Arkansas, many set higher rates and/or provide agencies with discretionary authority to set bonds at higher levels.

Blanket Bond Amount



\$250,000 for more than 50 wells¹³⁷



\$5,000 to \$250,000, based on the number of wells and well depth, except for wells

133 New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division 19.15.8.9.(2)

134 New York Department of Environmental Conservation Rules and Regulations 6.551.6

135 Utah Administrative Code R649-3-1

136 Wyoming Oil and Gas Conservation Commission Rules, Chapter 3, Section 4(a)

137 Arizona Administrative Code R12-7-103(A)(2)

\$20,000 for excess inactive wells 3,000 feet deep or more.¹⁴³

North Dakota

Requires wells that have not produced in paying quantities in one year to be returned to production, approved for temporarily abandoned status, plugged and reclaimed, or placed on a single-well bond in an amount equal to the cost of plugging and reclaiming the well site.¹⁴⁴

Wyoming

May require an additional bond, currently in the amount of \$10 per foot of well depth, when a well is not producing, injecting or disposing after an operator's total footage of idle wells reaches a certain threshold. The amount of this additional bond will increase every three years, based on Wyoming consumer price index.¹⁴⁵

Other types of bonds

Some states require other sorts of bonds for specific purposes.

Other Bonding Requirements



The West Virginia Division of Highways requires natural gas drilling companies to anticipate and pay for the wear and tear their repeated heavy loads are causing to rural roads, some of which have deteriorated to the point that they are unsafe for vehicles. DOH personnel trying to maintain roads with small crews and limited budgets geared toward regular upkeep, not major repairs and construction. Oil and gas developers are now required to meet with local highway supervisors and agree on major improvements required before, during and after a drilling job. Operators with sites requiring 5,000 barrels of

liquids per well are more are required to post road-repair bonds of \$25,000 per mile of graveled road, \$35,000 per mile of tar and chipped road and \$100,000 per mile of paved road, up to \$250,000 district-wide or \$1,000,000 state-wide.¹⁴⁶

Local Government Role

Gunnison County, Colorado enacted temporary oil and gas regulations in 2003 to address concerns about the high level of oil and gas development in the area. Those temporary regulations were updated in 2004, and are still in effect. Among other things, they require a bond or other financial assurance if an operation's use of public roads will result in the need for increased maintenance or snow removal.¹⁴⁷

Recommendations

We recommend that Arkansas's bonding requirements be updated to:

- » Increase single well bond amounts to \$10,000 per well and blanket bond amounts to \$250,000 statewide.
- » Institute a single well bond equal to the cost of plugging and reclamation for idle wells.

We also recommend that Arkansas counties review costs of road maintenance related to oil and gas industry traffic and implement policies to share those costs with oil and gas operators, including requiring bonds.

143 Colorado Oil and Gas Conservation Commission Rule 707

144 North Dakota Century Code 38-08-04.1(l)

145 Wyoming Oil and Gas Conservation Commission Rules, Chapter 3, Section 4(c) and U.S. Government Accountability Office, "Oil and Gas Bonds Bonding Requirements and BLM Expenditures to Reclaim Orphaned Wells," January 2010, GAO-10-245, p. 44.

146 West Virginia Department of Transportation, Division of Highways Memorandum, 1 February 2011, <http://www.lgcr.com//shared/content/DOH%20memorandum.pdf> (8 March 2011)

147 Gunnison County, Colorado Temporary Regulations for Oil and Gas Operations, Section 1-107(C)(2)

As more and more reports surface of citizens living in the gas fields across the country suffering from asthma and other respiratory ailments, skin conditions, nose bleeds, seizures and multiple other health conditions, concern about the health effects of natural gas development is growing and fueling the reform efforts that have led to implementation of the protective standards highlighted in other sections of this report. Many citizens, elected officials and government regulators are attempting to better understand the health effects of oil and gas development using two relatively new tools – health surveys and impact assessments.

Battlement Mesa, Colorado

Battlement Mesa is a retirement community in western Colorado that is home to approximately 5,500 residents. Local citizens felt their well being would be jeopardized when, in 2008, Antero Resources announced plans to drill up to 200 wells from 10 pads within the community. Over 400 residents petitioned the county to conduct an independent health impact assessment (HIA) on potential impacts of the proposed development before drilling began, building off a 2008 Colorado School of Public Health study of air quality impacts from oil and gas development elsewhere in the county that identified an increased risk to older populations from drilling.¹⁴⁸ Researchers called for of a HIA in advance of any development near populated areas.

In early 2010, Garfield County officials allocated up to \$257,000 to fund two studies: the HIA and the first phase of a longer-term, more in-depth community health study, both to be conducted by the Colorado School of Public Health. The goal of the HIA was to use existing data, as well as input from the community and Antero, to establish recommendations about the potential health impacts of the proposed development.

The HIA, released in September, found that the proposed wells pose potential health risks for local residents: “The Antero natural gas development plan is likely to change air quality and produce undesirable health impacts in residents living in close proximity throughout the community,” the study stated. “Air quality is most likely to be acutely impacted during well pad construction and well completion stages and by truck traffic ... Long term compromise of air quality is possible if fugitive emissions from production equipment are not controlled.” According to the HIA, impacts of air emissions could include respiratory disease, neurological problems and possibly elevated risks of cancer. The study predicts that water quality impacts are not likely to result in broad-based contamination of the water supply.¹⁴⁹

The HIA also details a number of other potential effects of intensified gas and oil development and makes a number of recommendations for Garfield County officials regarding possible mitigation of effects on local residents. The County accepted public comment on the HIA, and is currently considering what conditions to place on Antero.

A second draft of the HIA was released on February 28, 2011 for a second round of public comment. It is expected to be finalized in April, 2011.

DISH, Texas

The town of DISH, Texas sits in the heart of several compressor stations, a gas processing plant, metering stations and gas wells. Local residents have complained about the associated smells and noise for years. In 2009, after years of inaction from state or federal agencies, DISH Mayor Calvin Tillman commissioned an air study that revealed toxic emissions exceeding regulatory limits in DISH.¹⁵⁰

148 Roxana Witter, Kaylan Stinson, Holly Sackett, Stefanie Putter, Gregory Kinney, Daniel Teitelbaum, Lee Newman, “Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper,” 15 September 2008, http://docs.nrdc.org/health/files/hea_08091702a.pdf, (8 March 2011)

149 “Battlement Mesa Health Impact Assessment (2nd Draft),” Executive Summary, Page VI, <http://www.garfield-county.com/public-health/battlement-mesa-health-impact-assessment-draft2.aspx>, (8 March 2011)

150 DISH press release, “Texas state government responds to results of DISH health survey, Recent revelations that Barnett

Recommendations

We recommend that health impact assessments be conducted before drilling is authorized in any residential area.

In December of 2009, the Town of DISH released the results of a community-based health survey it had also commissioned. The survey, conducted by EARTHWORKS and the Texas Oil & Gas Accountability Project, compiled information on residents' medical background, proximity to shale gas infrastructure, experience of odor events and associated health symptoms. The report reveals that area residents are experiencing odor events as often as two times per day and experiencing respiratory ailments, headaches, brain disorders, pre-cancerous lesions and impairment of motor skills – symptoms that overlap significantly with the known health effects of chemicals being detected in air sampling.¹⁵¹

Soon after the report's release, the Texas Commission on Environmental Quality (TCEQ) acknowledged the need for new protections for citizens living in and around the Barnett Shale gas deposit, and announced new procedures under which TCEQ will respond to odor complaints on the same day the complaint is received, or within 12 hours. The new procedures were touted by Tillman as a step in the right direction. "We can't lose sight, however, that companies and regulators need to prevent pollution in the first place. I'm not going to be totally satisfied until the people of the Barnett Shale stop smelling these odors in the first place."¹⁵²

Shale residents' health at risk prods TCEQ to adopt new oil & gas policy," 18 December 2009, http://www.earthworksaction.org/PR_DISH_HealthSurveyRelease_TCEQ.cfm, (8 March 2011)

151 DISH press release, "Groups, Town of DISH urge Texas regulators to act immediately in behalf of impacted citizens," 17 December 2009, http://www.earthworksaction.org/PR_DISH_HealthSurveyRelease.cfm, 8 March 2011)

152 DISH press release, "Groups, Town of DISH urge Texas regulators to act immediately in behalf of impacted citizens," 17 December 2009, http://www.earthworksaction.org/PR_DISH_HealthSurveyRelease.cfm, 8 March 2011)

BEST MANAGEMENT PRACTICES

Best management practices, or BMPs, are practices proven to eliminate or minimize adverse impacts of natural gas development. All natural gas companies are encouraged to use BMPs to help ensure that their activities are conducted in a responsible manner. BMPs are developed by numerous sources – legislative bodies or government agencies, companies or industry associations, and environmental or citizens’ organizations – and are updated over time. Gas companies and regulatory agencies select specific BMPs for mitigating impacts at specific sites.

Although BMPs are generally not mandatory, certain BMPs may be required when included in a permit or other enforceable document. Some regulatory agencies have made certain BMPs obligatory.

The following examples profile the use of BMPs to eliminate or minimize adverse impacts, reduce conflict and even maximize production and profit.

Air Emissions: EPA’s Natural Gas STAR program

EPA’s Natural Gas STAR Program is a “flexible, voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce methane emissions... the primary component of natural gas and a potent greenhouse gas.”¹⁵³

According to EPA, since the program’s inception in 1993, participating natural gas companies have eliminated more than 904 billion cubic feet (Bcf) of methane emissions in the U.S. through the implementation of approximately 150 cost-effective technologies and practices. For calendar year 2009, participating companies reported domestic emissions reductions of 86 Bcf, 81 percent of which came from the production sector.¹⁵⁴

153 United States Environmental Protection Agency, “Natural Gas STAR Program Basic Information,” 14 December 2010, <http://www.epa.gov/gasstar/basic-information/index.html#overview1> (17 February 2011)

154 United States Environmental Protection Agency,

Recommended practices, most of which recover the initial investment in less than three years, include:

- » Replacing high bleed valves on pneumatic devices with low- or no-bleed valves.
- » Green completions, in which the gas that is produced during the process of “cleaning up” the well bore before producing gas for sale is captured and sold rather than vented or flared.
- » Using pipeline pump-down technology to lower gas line pressure before maintenance.
- » Replacement of wet seals with dry seals in centrifugal compressors.
- » Directed inspections and maintenance at compressor stations.
- » Converting gas pneumatic controls to instrument air.
- » Installing vapor recovery units on crude oil storage tanks.

Federal Lands: BLM Gold Book and USFWS Fayetteville Shale BMPs

The federal Bureau of Land Management’s *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*, commonly referred to as the “Gold Book,” are a well-established set of BMPs that provide “operators with a combination of guidance and standards for ensuring compliance with agency policies and operating requirements...”¹⁵⁵

“Natural Gas STAR Program Accomplishments,” 14 December 2010, <http://www.epa.gov/gasstar/accomplishments/index.html> (17 February 2011)

155 United States Department of Interior and United States Department of Agriculture. 2007. *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*. BLM/WO/ST-06/021 +3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.

The Gold Book includes a number of voluntary BMPs, as well as requirements that:

- » Pit liners “must be installed so they will not leak and must be composed of materials compatible with all substances to be placed in the pit.”
- » “To ensure successful growth of plants and forbs, topsoil must be salvaged where available during road construction and respread to the greatest degree practical on cut slopes, fill slopes, and borrow ditches prior to seeding.”
- » “Drainage must be maintained, where appropriate, to avoid erosion or the creation of a muddy, braided road.”
- » “After [pipeline and flowline] construction, cut-and-fill slopes must be regarded to conform to the adjacent terrain and reclaimed.”
- » At final reclamation, the site “must be free of State- or county-listed noxious weeds, oil field debris, contaminated soil and equipment.”
- » “All pits must be reclaimed to a safe and stable condition and restored to a condition that blends with the rest of the reclaimed pad area. If it was necessary to line the pit with a synthetic liner, the pit must not be breached (cut) or filled (squeezed) while still containing fluids. Pits must be free of oil and other liquid and solid wastes prior to filling. Pits may be allowed to air dry or may be solidified in place with BLM or FS approval. The pit liner must be removed to the solids level or treated to prevent its reemergence to the surface or its interference with long-term successful revegetation.”
- » “To achieve final reclamation of a formerly producing well, all topsoil and vegetation must be restripped from all portions of the old well site that were not previously reshaped to blend with the surrounding contour. All disturbed areas are then recontoured back to the original contour or a contour that blends with the surrounding landform, topsoil is redistributed, and the site revegetated.”

The U.S. Fish and Wildlife Service published a set of BMPs specific to the Fayetteville Shale. These BMPs were developed by a multi-agency workgroup to “ensure all Arkansans benefit from the additional energy and the conservation of important public resources such as wildlife, rare plants, clean air and water, and aesthetic values while achieving the goals of state and federal laws that protect these resources.”¹⁵⁶ While the Fayetteville Shale BMPs encourage many practices, there are few, if any, actual requirements to ensure that these invaluable resources will be appropriately protected.

Clustered Development: Rifle/ Silt/New Castle Community Development Plan

Natural gas production expanded rapidly in Garfield County, Colorado after 2000, with the number of wells nearly tripling from 2001 to 2005. The area is now one of Colorado’s largest natural gas producing counties, bringing money and jobs as well as many negative impacts to the quality of life of local residents.

When drilling was proposed in early 2005 for the area north of the Colorado River between the towns of Rifle and New Castle which had previously not seen development, some local residents saw an opportunity. Members of the Grand Valley Citizens Alliance, a grassroots community organization, spearheaded a collaborative process with the two companies developing the field – Antero Resources Corporation and Galaxy Energy. The resulting non-binding agreement, the Rifle/Silt/New Castle Community Development Plan, or RSNC-CDP¹⁵⁷, includes numerous protections, relying heavily on clustered development to reduce surface impacts.

Clustered development takes advantage of advances in drilling technology that make it possible to drill

156 U.S. Fish and Wildlife Service. 2007. Best management practices for Fayetteville Shale natural gas activities. U.S. Fish and Wildlife Service. Conway, Arkansas. 30 pp.

157 “Rifle, Silt, New Castle Community Development Plan,” n.d., <http://www.garfield-county.com/oil-gas/rifle-silt-new-castle-community-development-plan.aspx> (17 February 2011)

thousands of feet horizontally or at an angle in some areas, reducing the number of well pads, roads and other infrastructure required, limiting the impacts to agricultural lands and wildlife habitat, and allowing placement of facilities farther away from residents. While directional drilling is more costly than traditional vertical wells, studies have shown that these wells have been able to extract 2-25 times more oil or gas, generally offsetting increased costs.¹⁵⁸

Under the RSNC-CDP, surface site planning would begin with the assumption of one pad per 160 acres, recognizing that in some areas other surface spacing may be required. In particular, clustered development would be used if reasonable and possible in sensitive areas, including rural residential areas, subdivisions, within city or town limits, near waterways, dams or irrigation systems, near wildlife areas or migratory corridors, and near wetlands or flood plains.

Antero and Galaxy also agreed to use a series of BMPs, recognizing that there may be some instances where technical constraints or landowner preferences override a particular practice. These BMPs are focused on improving community information and engagement; minimizing traffic; consolidating infrastructure; reducing air and water emissions, noise, light, weeds, mud, dust, and visual impacts; managing waste; conducting baseline and ongoing water quality and quantity testing; and using “green frac” materials.

This visionary plan is currently being tested, with Antero applying for permits that rely on spacing of wells every ten acres, setting off a furor of opposition and triggering formal objections from Garfield County.

Recommendations

While many sets of BMPs detail technologies and practices that have the potential to prevent or minimize impacts from development, a common critique from gas field citizens is that, because BMPs are voluntary, they are often either not applied at all, or are applied inconsistently. In order to ensure that the potential of BMPs is maximized, we recommend that the Arkansas Pollution Control and Ecology Commission require oil and gas developers to utilize the BMPs detailed in the BLM’s *Gold Book*, as well as the *American Exploration and Production Council’s Reasonable and Prudent Practices for Stabilization*, or its own set of mandatory BMPs that are as or more effective in minimizing undesirable impacts.

158 Molvar, E.M. 2003. Drilling smarter: Using minimum-footprint directional drilling to reduce oil and gas impacts in the Intermountain West. Laramie, WY: Biodiversity Conservation Alliance, 32 pp.

Setbacks from oil and gas sites protect against damages and help reduce effects such as air releases, spills and noise. While setbacks are most often designed to protect residences and public places, they have also been used to protect water resources, wildlife habitat and other important natural resources.



Arkansas state statutes and regulations have not established setbacks, and we are not aware of any examples of local government setbacks in the state.

State Setbacks

Although many states leave setbacks to local governments, at least a few have set statewide requirements.

Setback Requirements



Permits may not be issued to wells closer than 1,000 feet to bordering properties except by written agreement with the landowners and royalty owners of that property, unless necessary due to site constraints and all landowners and royalty owners within 2,000 feet have been notified.¹⁵⁹



In 2011, House-passed version of SB 424 would have increased the current West Virginia statewide setback of 200 feet from homes and wells to 1,000 feet, but the legislature adjourned without reconciling the House and Senate versions of the bill.¹⁶⁰

Local Government Role

Setbacks are often left to local governments, and many local governments have enacted ordinances to help protect people and private property.

Setback Requirements

Flower Mound, Texas No oil or gas wells shall be located 1,000 feet from a residence or water well whose owner has no mineral interest, 500 feet from a residence or water well whose owner does have a mineral interest, 750 feet from a floodplain or environmentally sensitive area, 500 feet from a public road or 500 feet from a property line.¹⁶¹

Rio Arriba County, New Mexico Oil and gas development is prohibited in floodplains, and must be sited 650 feet from dwellings, 300 feet from surface water, 200 feet from highways, 200 feet from wells used by less than five residents or 1,000 feet from wells used by five or more people.¹⁶²

160 Alison Knezevich, "Time is short to resolve the many Marcellus conflicts," *Charleston Gazette-Mail*, 11 March 2011.

161 Flower Mound, Texas, Code of Ordinances, Part II, Chapter 34, Article VII.

162 Rio Arriba County, NM, Ordinance no. 2009-01 6.2(d)

159 Code of Maryland Regulations 26.19.01.09(C)

Santa Fe County, New Mexico No oil or gas facility shall be located closer than 750 feet from inhabited dwellings, buildings used as a place of assembly, schools or institutions; 400 feet from non-residential use or buildings; 200 feet from public roads or highways; 1000 feet from groundwater recharge areas, alluvial aquifers, perennial, seasonal or ephemeral water courses, creeks, arroyos, playa lakes or wetlands; 500 feet from 100 year floodplain line; 750 feet from historic or archaeological resources; 200 feet from county trails or designated open space; or 250 feet from parks, trails and recreation areas.¹⁶³

Recommendations

Because proximity to oil and gas operations often contributes to negative impacts, we recommend that oil and gas wells be set back at least 1,000 feet from habitable dwellings, schools, places of worship, hospitals, water sources and bodies of water.

163 Santa Fe County, NM Ordinance no. 2008-19 11.26

LOCAL GOVERNMENT AUTHORITY

In many states, local governments play important roles in regulating the oil and gas industry, regulating where facilities can be sited; controlling noise and dust; or requiring best management practices, road repairs and monitoring. In Colorado, for example, many communities have taken action to regulate oil and gas development over the past two decades.

The role of local governments varies from state to state. In some states, local governments have broad authority. In other states, the role of local governments has been sharply limited by state laws. Legislatures and courts in some states have carved out specific authorities for local governments, and restricted others. In other states, local government authority is not clearly defined, and is subject to interpretation by the courts. Most states have provisions prohibiting local governments from preventing oil and gas development outright, and some prohibit local ordinances that duplicate or conflict with state regulations.

Working within these restrictions, local governments in many states have taken action to ensure that the health and wellbeing of their residents are protected, as well as their property rights. Several of these ordinances and other local programs are profiled in other sections of this report.



Arkansas counties have broad authority to regulate oil and gas development within their boundaries in any area not in conflict with state law, including the authority to pass stronger standards than state standards. Authority of Arkansas cities is more limited, except for those granted home rule.¹⁶⁴

In 2010, Van Buren County approved the creation of an advisory board on natural gas drilling issues that is conducting a study of the oil and gas industry in the county and issue a report with recommendations. The county's action was prompted by concerns about water contamination and road conditions.¹⁶⁵

Model Ordinances

Since 1999, the Oil and Gas Accountability Project (OGAP) has worked with people to protect their homes and environment from the impacts of oil and gas development, and has worked with a number of local governments to strengthen their oil and gas regulations. Because state laws sometimes limit local government authorities, OGAP has prepared model county regulations for three states – Colorado, Montana and New Mexico¹⁶⁶ – and encourages residents of other states to contact them for additional information.

164 Arkansas Municipal League, "Guidebook for Municipal Officials of Mayor/Council Cities," May 2007 <http://www.celdf.org/downloads/Arkansas%20-%20Guidebook%20for%20Municipal%20Officials%2007.pdf> (17 February 2011)

165 Anita Tucker, "JPs approve advisory board for drilling issues," Van Buren County Democrat, 27 August 2010.

166 Oil and Gas Accountability Project, "Progressive Oil and Gas Regulations," n.d., <http://www.earthworksaction.org/bestregs.cfm> (17 February 2011)

MORATORIA

When new oil and gas development is proposed, government regulatory programs may not be prepared, particularly if a proposal is the first development in a region, would move into a residential area for the first time or would significantly increase an existing development. Temporary delays in permit issuance can provide time for elected officials and regulators to review their standards and programs and ensure that the appropriate protections are in place before development proceeds. Similarly, a pause in permitting and drilling activity can be helpful at times when development is underway and sudden, unexpected impacts arise. There are numerous examples of permit moratoria being used to defuse controversies around proposed development.



The Arkansas Oil and Gas Commission (AOGC) issued a temporary ban on permits for new disposal wells in a portion of the Fayetteville Shale formation in December of 2010 to give scientists an opportunity to study whether the wells are contributing to a series of more than 400 minor earthquakes in the area. The initial moratorium extended until the AOGC's next meeting the following month, and has been extended again.

Delaware River Basin Commission

The Delaware River Basin Commission (DRBC) covers a 13,539 square mile area that includes parts of Delaware, New Jersey, New York and Pennsylvania, and provides drinking water to 14 million people. In May of 2010, the DRBC issued a moratorium on new gas wells within territory pending issuance of drilling regulations. The DRBC allowed only a handful of exploratory wells to be drilled while the moratorium was in place.¹⁶⁷

167 Laura Legere, "Basin commission releases draft gas-well rules," 10 December 2010, <http://thetimes-tribune.com/news/gas-drilling/basin-commission-releases-draft-gas-well-rules-1.1075005#ixzz1AJ8tbANW> (8 March 2011)

The draft regulations issued in December of 2010 include numerous provisions designed to protect the watershed, including requiring:

- » Operators proposing more than five wells to submit development plans to address cumulative effects.
- » Pre- and post- drilling monitoring of surface and groundwater around wells that have been hydraulically fractured.
- » Disclosure of chemicals used in hydraulic fracturing/
- » Use of tanks rather than pits for wastewater.
- » A \$125,000 bond per well, in addition to financial assurance required by the host state.¹⁶⁸

The draft rules are currently undergoing a 90-day public comment period after which they will be finalized.

Divide Creek, Colorado

In the spring of 2004, residents of Silt in Garfield County, Colorado discovered flammable natural gas bubbling to the surface of Divide Creek. A lighted match held over the bubbles and nearby stream bank vents would flame six to ten inches high. Water tests revealed the creek water contained 99 micrograms of benzene per liter of water (mg/l) – significantly higher than the amount considered safe in drinking water, 1.2 mg/l.¹⁶⁹

The Colorado Oil and Gas Conservation Commission (COGCC) issued a notice of violation to EnCana Oil and Gas for failing to prevent the contamination of fresh water, improperly cementing wells, failing to notify COGCC when public health or safety was jeopardized and failing to report a gas release.¹⁷⁰ The COGCC

168 DRBC Draft Natural Gas Development Regulations, "At-a-Glance" Fact Sheet, December 9, 2010, <http://www.state.nj.us/drbc/naturalgas-draftregs-factsheet.pdf> (8 March 2011)

169 Jeremy Heiman, "Gas found bubbling up in Divide Creek, Landowners suspect drilling operations to be the cause," *Glenwood Springs Post Independent*, 9 April 2004

170 Mike McKibbin, "EnCana disputes cause of gas seep,"

ultimately issued a \$371,200 fine, the largest in the state's history at the time, and issued a year-long moratorium on the drilling and hydraulic fracturing of wells in the area while water wells and springs were being tested for contamination.¹⁷¹ Although no impact to any drinking water source was found at the time,¹⁷² subsequent studies have documented increasing methane in local domestic wells.¹⁷³

New York State

When natural gas drilling was proposed for the Marcellus Shale, a 54,000 square mile shale field that extends from northern New York to West Virginia, controversy ensued. While some residents supported gas development, many others were very concerned about the environmental effects and began calling for a moratorium on drilling until the regulators could devise standards to prevent contamination of the state's water resources – particularly the New York City watershed, a unique resource so clean it supplies unfiltered drinking water for nine million people.

A defacto moratorium on permitting prevented drilling while the New York Department of Environmental Conservation (DEC) conducted a generic environmental impact statement.

In December of 2010, the New York Assembly approved a six-month ban on hydraulic fracturing that would stop development until the New York Department of Environmental Conservation (DEC) finishes a review and issue new guidelines.

Then-Governor Paterson vetoed the bill, however, instead issuing an Executive Order direction the DEC to conduct further review and analysis of high-volume

horizontal hydraulic fracturing in the Marcellus Shale and delaying permitting until July 1, 2011 at the earliest. The Executive Order made New York State the first state to formally prohibit high volume hydraulic fracturing because of concerns about environmental impacts, but allows hydraulic fracturing of vertical wells to continue.¹⁷⁴ Conservation groups warned that vertical wells were responsible for contaminating nine square miles of aquifer in the neighboring state of Pennsylvania and pledged to call on then-Governor-elect Andrew Cuomo to close the loophole.¹⁷⁵

Local Government Role

Many local governments have used moratoria to give themselves time to review their oil and gas regulations.

Copperas Cove, Texas

The City Council of Copperas Cove, Texas issued a six-month moratorium on new drilling permits in 2006 when drilling within the city limits was first proposed. At that time, the city updated its ordinances to include a \$1,000 permit fee, increased environmental restrictions and a \$2 million liability insurance policy.¹⁷⁶

Two years later, the Council felt the need to address additional issues, such as noise abatement, setbacks and road maintenance. The Council had delayed action on pending drilling permits to gather citizen input, but felt forced to issue 20 permits after being sent a letter by an attorney for two oil and gas companies reminding them of their duty to approve applications that meet the requirements of the existing ordinances. The Council then implemented a 180-day moratorium on new drilling permits to allow time to review the city's

Silt Daily Sentinel, 13 May 2004

171 John Colson, "EPA says wells in Wyoming show possible pollution from frac'ing, Scientists have found methane gas, hydrocarbons, lead and copper," Glenwood Springs Post Independent, 28 August 2009

172 McKibbin, "EnCana disputes cause of gas seep," Silt Daily Sentinel, 13 May 2004

173 John Stroud, "Monitoring wells will be last phase of Mamm Creek study," Glenwood Springs Post Independent, 22 August 2009

174 Catskill Mountainkeeper News Analysis, "Gov. Paterson's Executive Order on Drilling - What Does It Mean?," 14 December 2010.

175 Press Release: "Gov Paterson Sets National Precedent, Calls for Timeout on Fracking, Gov-Elect Cuomo Must Close Loophole, Enact Long-Term Protections," 11 December 2010, <http://www.riverkeeper.org/news-events/news/safeguard-drinking-water/gov-paterson-sets-national-precedent-calls-for-timeout-on-fracking/> (8 March 2011)

176 Joshua Winata, "Cove postpones drilling permits," 24 August 2008, Killeen Daily Herald

ordinances.¹⁷⁷ Eight months later, the Council approved a series of changes to its ordinances, including creating a new system of well classifications based on proximity to residences, and increasing setbacks from 300 feet to 600 feet.¹⁷⁸

Santa Fe County, New Mexico

Although New Mexico is one of the largest oil and gas producing states in the country, Santa Fe County had not seen oil and gas development firsthand until 2007, when Houston-based Tecton Energy announced that it had leased 65,000 acres in the county. After widespread public outcry about the need to protect the region's rich archaeological resources, sensitive water supplies and public health, county commissioners passed a three-month moratorium in November, 2007¹⁷⁹ and extended that moratorium for a year in February, 2008 to give the commission time to complete amendments to planning documents and codes.¹⁸⁰

In December of 2008, after more than a year of planning, countless public hearings and dozens of revisions, the county passed an ordinance that is one of the most detailed, comprehensive and protective in the country. The ordinance takes multipronged approach, requiring numerous studies, plans, reports and assessments regarding impacts on the environment, fiscal, public facilities and services, water availability, emergency services, traffic and geohydrology before a proposal will be approved. The ordinance imposes fees to cover the costs of the process, and requires a minimum bond of \$50,000. It limits chemical use to approved chemicals; requires closed loop systems, baseline and ongoing surface- and groundwater testing, and fresh water to be used in hydraulic fracturing; and sets standards for noise, light and siting.¹⁸¹

177 Joshua Winata, "Cove postpones drilling permits," 24 August 2008, [Killeen Daily Herald](#)

178 Copperas Cove, Texas, Code of Ordinances, Chapter 14

179 Phaedra Haywood, "Public meeting tonight on new, controversial county ordinance," 5 December 2007, [The New Mexican](#)

180 Santa Fe County, New Mexico, Ordinance No. 2008-19, http://www.santafecounty.org/county_attorney/oilandgas (8 March 2011)

181 Phaedra Haywood, "Panel gives green light to

Recommendations

We recommend that Arkansas legislators and regulators continue to use moratoria as needed to pause oil and gas permitting, exploration and production activities in order to understand, and prevent or minimize impacts of development.

drilling ordinance, County's oil and gas regulations called a 'progressive approach,'" 9 December 2008, [The New Mexican](#)

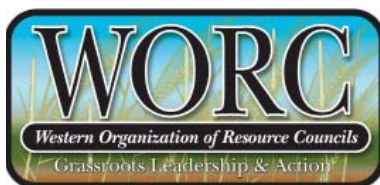
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The Arkansas Public Policy Panel is a statewide 501(c)(3) organization dedicated to achieving social and economic justice by organizing citizen groups around the state, educating and supporting them to be more effective and powerful, and linking them with one another in coalitions and networks. The Panel seeks to bring balance to the public policy process in Arkansas.

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Based in Billings, Montana, **WORC** is a regional network of grassroots community organizations in seven western states that include 10,000 members and 45 local chapters. WORC's mission is to advance the vision of a democratic, sustainable, and just society through community action. WORC is committed to building sustainable environmental and economic communities that balance economic growth with the health of people and stewardship of their land, water, and air resources.



Since the 1970s, WORC has worked for and won model coal mine reclamation and natural resource taxation policies, won farm credit reforms, tackled concentration of economic power in the meatpacking and grain trading industries, and fought for hard rock mining reform and responsible oil and natural gas development.

Back cover photo:

Well site during active drilling to the Marcellus Shale formation in Upshur County, West Virginia, in 2008.

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