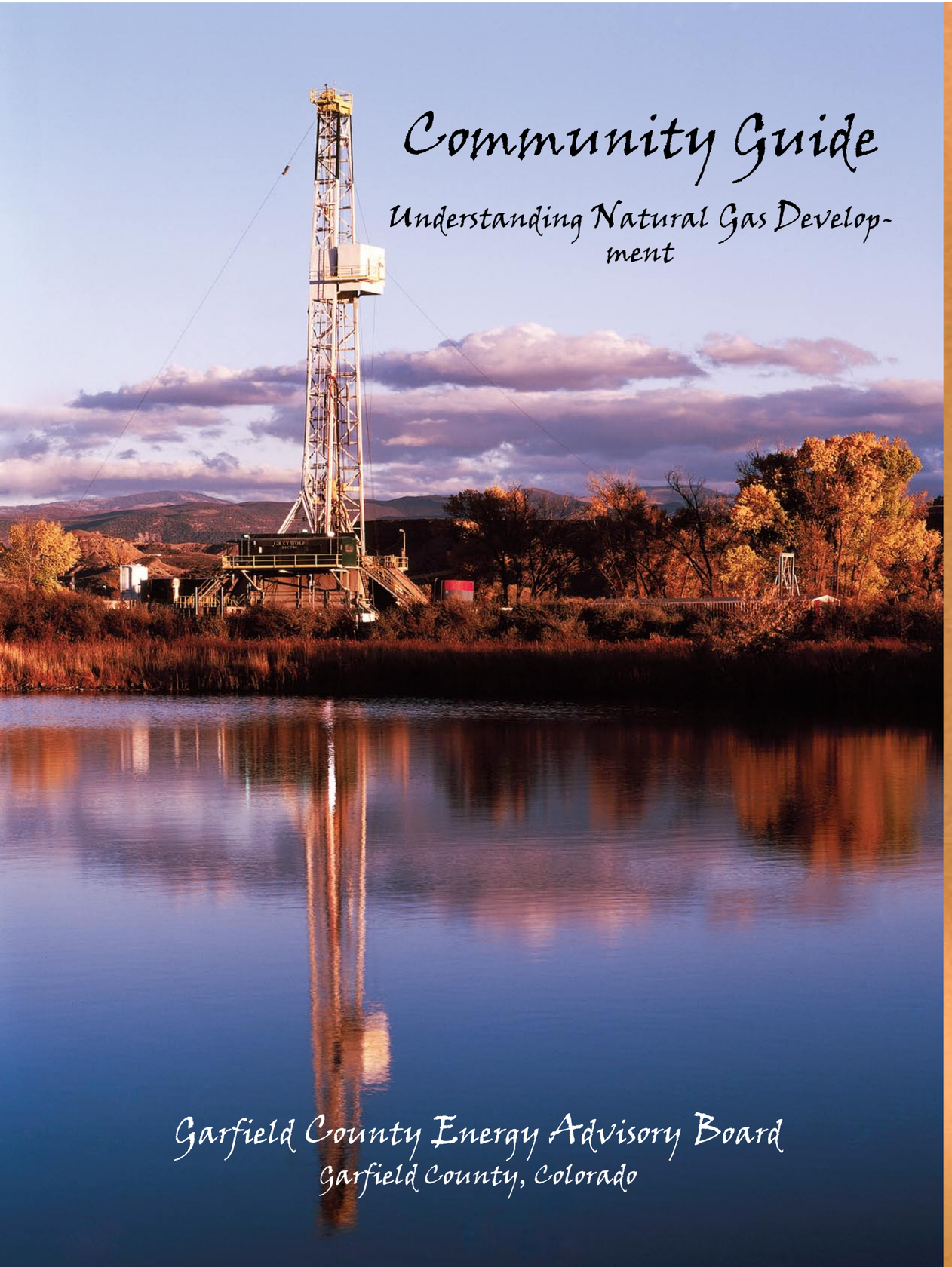


Community Guide

Understanding Natural Gas Development

Garfield County Energy Advisory Board

Garfield County, Colorado

What is the Energy Advisory Board?

The Garfield County Board of County Commissioners formed the Garfield County Energy Advisory Board (EAB) in 2004. Its mission is to provide a forum for the oil and gas industry, the public, impacted landowners and local government to prevent or to minimize conflict associated with oil and gas development through positive and proactive communication and actions that encourage responsible and balanced development of these resources within Garfield County.

The EAB is composed of members representing a broad spectrum of interests related to the natural gas industry including:

- Garfield County; City of Rifle; Town of Silt; Town of Parachute; Town of New Castle;
- School District 16; RE-2 School District;
- Battlement Mesa Oil & Gas Committee;
- Grand Valley Citizens' Alliance (GVCA);
- Citizen Representatives from each of the following nine geographic areas:

  - Roan Creek
  - Parachute/Battlement Mesa
  - Taughenbaugh & Morrisana Mesas
  - Rulison
  - Grass Mesa
  - Mamm Creek & Hunter Mesa
  - Divide Creek & Dry Hollow
  - Silt Mesa & Peach Valley
  - Una Bridge, Wallace Creek & Spring Creek

Industry Operator Representatives include:

- Antero Resources
- Berry Petroleum
- Bill Barrett Corporation
- Chevron
- ConocoPhillips
- EnCana
- Laramie Energy
- Maralex Resources
- Marathon Oil
- Noble Energy
- Occidental Petroleum
- PetroGulf
- Petroleum Development Corporation
- PRESCO
- Shell
- Williams Production
- Windsor Energy

The EAB meets the first Thursday of each month in Rifle at 6:00 p.m.. Call the County's Oil and Gas Liaison Office at (970) 625-5691 for location and agenda information. Community attendance and participation are welcome at all meetings.

Dahlgren Photo

Table of Contents

Special Thanks

Garfield County and its Energy Advisory Board would like to thank these people and organizations for their help in producing this booklet:

- Antero Resources for oversight and direction of the project;
- Donna Gray for writing;
- Movin' Forward Consulting for photos, editing and graphic design;
- Greg Dahlgren / Shadowcatchers Photography for the cover and other credited photos;
- EnCana Oil & Gas, USA for photos (Ed Kosmicki) and Web resources;
- Colorado Oil & Gas Conservation Commission staff and Energy Advisory Board members for their review of the material presented and desire to increase the community's knowledge.

Printed August 2007

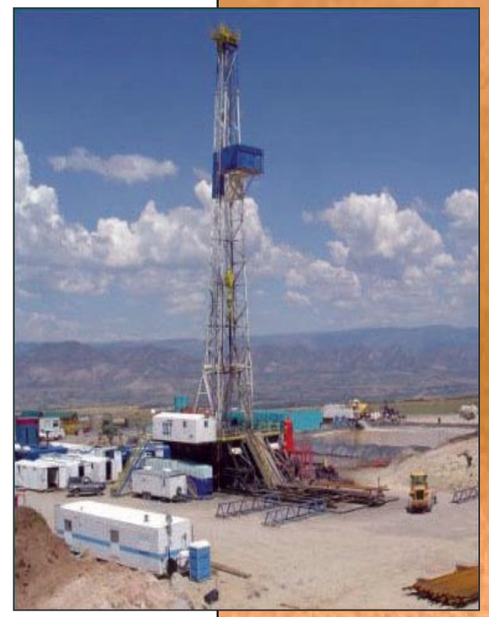
Drilling & Completion

The Intermountain West, specifically the states of Colorado, Wyoming, Utah, Montana and New Mexico, contains more natural gas than any other region in the contiguous 48 states. It holds 41 percent of the estimated proven and potential gas reserves in the nation and produces around 20 percent of our natural gas supply (*What Every Westerner Should Know About Energy,* Center for the American West - University of Colorado at Boulder).

Within the Intermountain West, the gas-rich Piceance Basin extends through northwestern Colorado and includes parts of Garfield, Mesa and Rio Blanco counties. It is characterized by "tight sands" formations – where the shales and sandstones trap small, lense-shaped reservoirs of natural gas. With the recent rapid development of gas resources in western Colorado, the state is now the fifth largest producer (2007) in the country, and Garfield County is one of the fastest growing areas in the state for gas production, with over 4,000 active wells valued at $2.2 billion (2006).

Advancing technology has played an important role in the development of Piceance Basin natural gas. Because the gas is trapped in small lenses rather than large reservoirs, it was not economical to produce until the late 1990s when a technology was developed that fractures the underground geology, releasing multiple pockets of gas. Other technological improvements, like directional drilling, make it possible to drill multiple wells from a single pad. The use of new technologies and the rising price of natural gas are two factors driving rapid natural gas development across the west.

In Garfield County, most wells are between 5,600 and 10,000 feet deep, and well pads average in size from two to eight acres during the drilling process, typically with four or more wells per pad. Continuing advances in technology will soon make it possible to drill as many as 32 wells from a single pad, resulting in only one pad every 320 acres. In the Piceance Basin, where drilling takes place on forest lands and private ranches, this is an important improvement that will reduce impacts.



Drilling Rig

The Drilling Process

The largest part of the drilling rig is the derrick. It is a vertical tower that extends above the hole and supports the cables or drilling lines that drive the bit and the pulleys as they run the heavy steel drill pipe, called a drill string, into the well bore. The pipe is made up of 30-foot

Drilling Pipe

sections that are threaded together as they go into the hole. The average derrick used in the Piceance Basin is 145-160 feet high. Under the rig floor and directly over the bore hole is the blowout preventer, a piece of heavy equipment that seals the well bore to prevent uncontrolled gas releases.

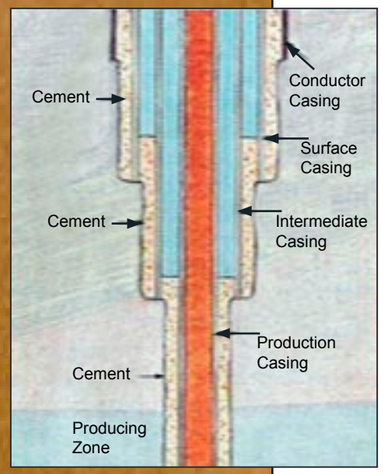

Dahlgren Photo


Drill Bits

The first step in constructing a gas well is called "spudding." Initially, a well is spudded or drilled to a depth of 40-80 feet. Steel conductor pipe is then cemented into the hole from top to bottom. This strong pipe acts as a structural casing to prevent the ground from washing out around the bore as drilling mud and water are pumped into the well bore during drilling.

Once the conductor pipe is in place, drilling continues in what is called the surface hole, to a depth of about 900 feet. Drilling mud, usually bentonite clay suspended in water, runs through the drill bit to cool and lubricate the bit as it drives through the rock. The weight of the mud also controls well pressure by preventing uncontrolled releases of gas or naturally-occurring water. It also circulates cuttings to the surface – the fragments of rock produced by the bit as it moves through the rock.

When the surface hole is completed, surface casing is run into the bore and cemented into place from top to bottom on the outside of the casing, as required by state regulations. This seals the space between the casing and the bore hole, thus isolating shallow surface formations and water zones from gas production. The surface casing depth varies, depending on the depth of the well and the location of water bearing zones.



Drilling then continues until the total depth of the bore is achieved. At this point, logging tools – electronic and neutron measuring instruments – are run down the hole to determine where the gas is located. Once that determination has been made, production casing goes into the hole and is cemented into place. Production casing is not cemented the entire depth of the bore, only a percentage of the well's depth at top and bottom.

After the cement has been allowed to cure, technology that measures the cement's integrity is used to create a cement bond log. This process ensures that the cement has no voids and verifies that the correct placement and depth of cement has been achieved to prevent migration of gas and fluids to the surface or into water-bearing zones. Because of the naturally fractured geology

Garfield County EAB Community Guide


Drilling Fluids Waste Pit

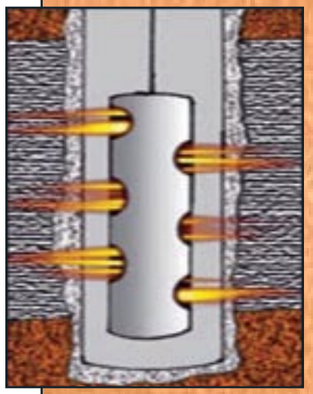
in western Garfield County, state regulators require operators here to cement the well bore to 500 feet above the top of the gas producing zone as an extra measure of protection.

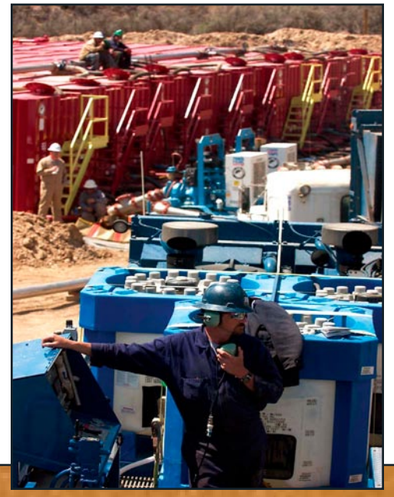
The majority of operators in the Piceance Basin use what are called reserve or waste pits during the drilling process. These are large surface pits on the well pad that are used to store the drilling mud, waste water and other drilling fluids during the drilling process. Separate, smaller pits may be used to hold the drill cuttings, primarily sandstone and shale. The pits are also used to flare gas, when necessary, during drilling and completion operations.

In some areas, particularly near residences, steel tanks can be used instead of reserve pits to reduce the pad size and prevent drilling wastes from potentially contaminating the surface soils or ground water. These tanks and associated equipment are called a closed- loop drilling system. When drilling is completed, reserve pits, if used, should be reclaimed, although regulations allow some wastes to be buried on site unless removal is stipulated by the landowner in a surface use agreement.

Well Completion

One to three weeks after the drill rig leaves the well pad, completion activities begin. A perforation tool is run via an electric wireline into the well bore to the depth of the gas-bearing zone. The tool detonates high energy jet charges that perforate the steel casing, the cement sheath and penetrate a few inches into the rock. These perforations in the casing will allow the gas to flow into the well bore.


Perforating the Casing


Fracing Operation

After perforating is completed, a technology called hydraulic or slick water fracturing, or "fracing" (pronounced fracking), is used to break apart the sandstone formations that trap the gas. The Williams Fork Formation will not produce economic quantities of gas unless the geologic formation is broken apart to release the gas from the rock.

During fracing, water, dilute chemicals and a proppant - typically sand - are pumped under high pressure through the perforations in the well casing to break apart the sandstone where the gas is trapped. The volume of water and sand varies from well to well, however, an

average well in Garfield County uses around 2 million gallons of water and 1 million pounds of sand that are pumped into the bore in 4 to 8 stages. The water used is usually a mix of treated waste water that was produced during drilling and recycled frac water from other wells.


Fracing Operation

Sometimes, prior to fracing, a dilute concentration of acid is pumped into the perforations to remove the cement immediately around the perforations so that the fracing fluid can better reach the gas-bearing rock. Other chemicals typically used in fracing include: a friction reducer to make the water slicker, allowing it to be pumped at lower pressure; a surfactant or soap-like additive that helps the water flow back to the surface rather than soaking into the sandstone; and a bactericide to prevent the introduction of live bacteria from the surface.


Dahlgren Photo

Installing the Well Head

The Williams Fork Formation has over 1,500 feet of potential gas reservoir to draw from, so multiple fracs or stimulations are needed to intercept as much gas as possible. The sand particles in the fracing fluid hold open the fractures created by the fluid after the fluid is pumped back out of the bore.

Fracing begins at the lowest levels of the gas bearing zone and moves up the bore. Once a zone is fraced, a temporary bridge plug is installed directly above the zone to seal it until fracing of all zones is completed. When all fracing is finished, a smaller workover rig is used to remove the bridge plugs and set the production tubing into the well.

The well is then flow-tested and the wellhead is installed. The wellhead equipment includes the tubing head and the Christmas tree. The tubing head seals the inside of the casing and prevents gas and fluids from leaking into the atmosphere. The Christmas tree sits on top of the casing and tubing heads and is comprised of valves that control the flow of hydrocarbons out of the well. Valves on the wellhead are built to withstand 5,000 - 10,000 pounds per square inch of pressure.


Well Head (Christmas Tree)

Processing & Transporting the Gas

After the well has been drilled and completed, it goes into production. That is to say, gas begins flowing out of the well, through equipment that separates the gas from associated liquids and into a system of pipelines that carry it to market.

The gas that consumers use is primarily methane. When gas from the tight sands formations of the Piceance Basin comes out of the ground, it typically contains a variety of other components, such as ethane, propane, carbon dioxide, nitrogen and heavier hydrocarbon compounds. Some of those components must be removed from the gas before it can be sold, which is called processing. It begins at the well pad where separators or dehydration units remove the heavier hydrocarbon compounds - called condensate - as well as removing any water that came out of the ground with the gas. The condensate and produced water go into holding tanks on the well pad that must be emptied periodically by tanker trucks. Produced water is often reused in the drilling process, while the condensates can be refined and sold.


Dehydration Units

From the dehydrator, the gas flows into gathering lines – small diameter, low pressure pipelines that carry the gas from the field to the processing plant. At the plant, separators cool the gas so the heavier, semi-liquid condensates separate from the lighter gas. Additional water is also removed so that the gas will meet specific quality specifications before being sold.


Dahlgren Photo

Condensate Tanks

After the gas has been conditioned at the processing plant, it enters a transportation or interstate transmission pipeline that carries it to markets across the country where it is sold. The Piceance Basin has several major transportation pipelines. As with other commodities, the market price of natural gas is determined by supply and demand and varies depending upon the point of sale.


Compressor Station

Transportation pipelines are usually between 24 and 36 inches in diameter and carry the gas under high pressure. At given intervals along the gathering and transportation pipelineline system, the gas passes through compressor stations that keep the pipelines pressurized and flowing.

Reclamation

The Colorado Oil and Gas Conservation Commission (COGCC), regulates the reclamation of drilling sites. Their rules require that the surface of the land be restored as closely as possible to its original condition. Under COGCC rules, there are two types of reclamation. Interim reclamation takes place when drilling of all wells on the pad is completed. Final reclamation takes place when a well is no longer producing, and it is plugged and abandoned.

Active Drilling Operation

Interim Reclamation of a Drilling Site

The purpose of interim reclamation is to restore lands that were disturbed by drilling operations, but which are not needed during the production phase. Interim reclamation on crop land must begin no later than three months after drilling is completed and on non-crop land no later than 12 months. Interim reclamation includes proper removal and disposal of drilling wastes, filling of pits and holes and replacement of topsoil that was disturbed when the pad was constructed.

The operator is required to replace all soils and re-contour the land as closely as possible to its original condition. Steps must be taken to prevent weeds and erosion, and on crop land, the lost crop must be re-established. If the crop is not re-established, the owner is compensated for the loss. On non-crop land, the operator must re-seed the disturbed area with plant species similar to the neighboring plant community.

Reseeding Crop Land

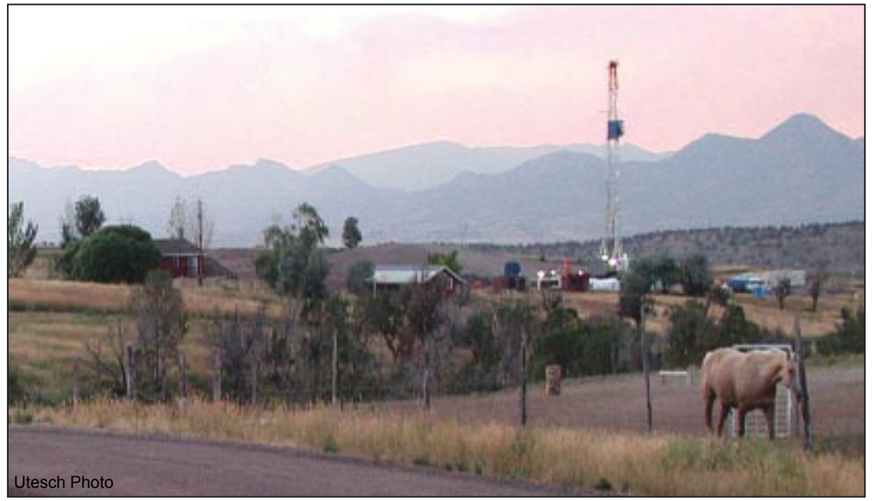
Final reclamation takes place when the well is no longer producing. This must occur on crop land no later than three months after the well is plugged and abandoned and no later than 12 months on non-crop land. Final reclamation includes: removal of all production equipment and debris; removal or treatment of production waste and contamination from spills; backfilling of all production pits by replacing soils; closure of all access roads to the well; grading and contouring of well pads and associated facilities to their original condition; and restoration and revegetation of pads and access roads.

Garfield County EAB Community Guide

The well site must be inspected by COGCC staff to be sure no weeds are present and vegetation is sufficient to control erosion prior to bond release. If an operator does not perform the reclamation or if it is not done properly, the bond is forfeited.

Legal Issues

Like all western states, Colorado recognizes that the surface of the land and the resources that lie beneath can be owned separately, and specific property rights apply to what are called the surface and mineral estates. This is referred to as split estate.



Utesch Photo

Split Estate, Rural Residential Land South of Silt, Colorado

Separate ownership of the surface and mineral estates developed from two circumstances. Historically, when the federal government made western lands available for settlement, it kept some or all of the mineral rights. In addition, as land changed ownership over the years, sellers sometimes retained part or all of their mineral rights, making it possible for multiple parties, including the federal government, to own a portion of the mineral rights under a property. Until 2002, this information was not required to be disclosed in a real estate transaction. Legislation passed in Colorado in 2001 now requires split estate issues to be disclosed at the time of sale.

Colorado law recognizes that access from the surface to underground resources is necessary for development. By law, a developer of the mineral estate may use as much of the surface as is reasonably necessary to explore for and develop the resource. It is important for surface and mineral owners to work together in order to allow both estate owners the rights to their property, as accorded by law.

Regulating the Industry

State Regulations

The Colorado Oil and Gas Conservation Commission (COGCC) is a division of the Colorado Department of Natural Resources. Its board is appointed by the governor and confirmed by the Senate. It is the state agency that regulates oil and gas development on private, state, and in some cases, federal lands.

The COGCC issues permits for the drilling and operation of oil and gas wells, creates the rules that apply to all phases of development – including surface activities, spacing of wells, drilling and the treatment and disposal of exploration and production waste. The agency also employs field inspectors who are responsible for enforcing its rules and regulations, conducting field inspections and handling complaints.

Dahlgren Photo

Checking Condensate Tank Levels

Rig Near Home, Silt, CO

Surface Use Agreements

A surface use agreement or SUA is a legally binding contract that sets out stipulations for how oil and gas development will proceed on private land. The stipulations can include: specific locations of well pads; roads and pipelines; the size of pads; limits on the timing of operations; compensation for damages to the land, livestock and crops; and specific aspects of reclamation. SUAs can also require water quality and quantity testing prior to, during and after drilling operations.

The COGCC requires oil and gas operators to notify the surface owner of their intention to drill. Oil and gas operators are required to consult with the surface owner about the location of well pads, access roads, pipelines and associated facilities. If an agreement is not reached, and if the operator has made a good faith effort to negotiate, the operator can post a bond and proceed with development.

It is recommended that landowners work with an attorney or other professional to negotiate a surface use agreement (SUA). There are a wide variety of surface impacts that can be addressed in an SUA, and landowners may not be aware of all of their rights.

Garfield County EAB Community Guide

Well Spacing

The COGCC is also responsible for determining well pad spacing on the surface and downhole spacing beneath the surface. These determinations are based, in part, on estimates from operators on what spacing is needed to maximize gas recovery.

In the Piceance Basin, the COGCC has set the surface spacing at no more than one drilling pad per 40 acres. However, operators in western Garfield County have demonstrated through testing that in some areas, a downhole density of 10-20 acres per well is needed to recover the greatest amount of gas from the tight sands formations. With only one pad allowed per 40 acres, the additional wells are drilled directionally from a single pad.

There are some exceptions to these parameters in Garfield County, primarily on private land, where the landowner and operator have agreed to reduced surface and downhole spacing. Although the landowner and operator are in agreement, approval by the COGCC is always required.

40 Acre Spacing South of Silt, Colorado

Financial Assurance Bonds

The COGCC requires a bond of $5,000 per well on irrigated land and $2,000 per well on non-irrigated land to guarantee the site will be properly reclaimed at the end of the well's life. Operators have the option of posting a statewide surface damage bond of $25,000 rather than paying the per-well bond. If a well site is not properly reclaimed, a surface owner may request foreclosure of the bond from the COGCC, which is used to reimburse the landowner for damages. The COGCC has also created an Environmental Response Fund to address cases where reclamation is not sufficient.

In addition, the COGCC requires oil and gas operators to post financial bonds for gas storage and processing facilities, exploration and production waste management and seismic activities.

Processing Plant

Federal Regulations

Federal regulations apply to federally owned minerals and federal lands. Most oil and gas development on federal lands occurs on Bureau of Land Management or U.S. Forest Service lands. Both agencies prepare land use plans that consider what areas should be open for development, the environmental impacts of such development and the mitigation that will be necessary. The BLM prepares a Reasonable Foreseeable Development (RFD) scenario to project long-term oil and gas development and production in a specific area over a given period of time.


Dahlgren Photo

Monitoring Equipment

The BLM oversees mineral development activities on both BLM and Forest Service land. As part of this process, it holds competitive auctions for oil and gas leases quarterly. The leases are issued for a term of 10 years. Before drilling can begin, the leaseholder must apply for a drilling permit, called an Application for Permit to Drill or APD. It requires a surface use plan and a plan for operation and reclamation. Before the APD is issued, the leaseholder must also post a performance bond. Leaseholders of federal oil and gas minerals pay a royalty of 12.5% to the federal government based on the amount or value of the gas removed from the lease.

On private land, where the federal government owns the mineral rights, oil and gas developers must send the landowner a Notice of Intention to Drill. A 60-day exploration period begins 30 days after the notice is given. Before drilling the well, the operator must negotiate in good faith with the landowner to reach an agreement about the proposed operations.

If an agreement is not reached, the operator may post two bonds. The surface use bond covers damage to crops, permanent improvements and the land's grazing value and must be greater than $1,000. The second reclamation bond covers plugging the wells at the end of their productive life and restoring the land to its original condition. Standard bonds are $10,000 per lease, $25,000 for all leases in a state and $150,000 for leases nationwide.

Once the drilling permits are issued, the surface owner has 30 days in which to comment. The BLM may or may not take those comments into consideration. Also, within 15 days of receiving a completed drilling application, the BLM must conduct an on-site inspection with the landowner in attendance. During this inspection, the BLM develops its stipulations for surface use and reclamation.

Unitization

Oil and gas operators can request that the BLM and/or the COGCC place all mineral leases in a specified area into what is called a Unit. There are several different types of Units, including Federal Units and Community Units. Federal Units typically contain a mixture of federal and private land and minerals. Community Units involve private land and minerals.

Within a Unit, all mineral interests are combined and treated as a single lease as long as the Unit is producing gas and/or oil. Within the Unit, all mineral owners are compensated according to their percentage of ownership inside the unit. That is to say, all mineral leaseholders receive a share of the royalty resulting from production. Unitization also eliminates internal property boundaries and spacing requirements in order to permit the most efficient and cost effective means of developing the resource. Without Unitization, operators are not allowed to drill across property lines where the minerals have not been leased to that operator.

Unitization has also been called "forced pooling," because Colorado law allows oil and gas operators to force mineral rights owners within the Unit's boundaries to become part of the Unit or lease pool if a designated majority of the other mineral lease owners have agreed to participate.

Environmental Considerations

While natural gas is the cleanest burning fossil fuel, the extraction process impacts the land and the people who live near oil and gas development. Natural gas extraction, among other types of resource development, can impact air and water quality. Emissions from the internal combustion engines of drill rigs, vehicles, compressor stations and other mechanized equipment affect regional air quality, and isolated incidents of water contamination have occurred but are not prevalent throughout the region.

While no direct links have been scientifically established between natural gas development and specific human health problems, a number of studies are being undertaken to determine what, if any, risks exist.


Dust from Truck Traffic

Air Quality

Air quality has become an important issue for residents of the Grand Valley in the last few years. There are a variety of contributors to these potential problems, including interstate traffic, dust from traffic on rural roads, smoke from fires, and a variety of industrial activities, including gravel pits, construction and natural gas development.

Garfield County is concerned about its air quality and in 2005, undertook an air quality study to identify pollution sources that occur and can be addressed locally. Ozone and dust (PM10), which can contribute to asthma, are two local sources of haze and air pollution about which the natural gas industry is concerned.

Many oil and gas companies have taken steps to reduce the presence of dust, odors and hydrocarbons resulting from their operations. This is a complex and ongoing effort throughout the county. Actions being taken include watering of dirt roads, sweeping of paved roads to remove mud and dust, adding bactericide to waste pits to reduce odors, eliminating waste water pits when practical, and burning hydrocarbon vapors at production facilities.

The results of the County's air quality study will also provide important information to help target and address specific problems. The study is intended to identify: 1) air pollutants in the county; 2) concentrations and sources of those pollutants; 3) potential health risks resulting from the pollutants; and 4) the steps needed to mitigate local sources. It is important to note that industry emissions are regulated by Colorado's Air Quality Control Commission.

Water Quality

In addition to infrequent accidents - such as the West Divide Creek Seep incident south of Silt, where cement intended to seal a well bore slipped into a crack, allowing 115 million cubic feet of gas to escape underground - other potential sources of water contamination include leaking or unlined drilling waste pits and condensate tanks. Spillage on well pads and lack of adequate storm water runoff mitigation, intended to reduce erosion and sediment movement into irrigation ditches and rivers can be a problem.

While the Colorado Department of Public Health and Environment's Water Quality Control Division has adopted storm water regulations that apply to natural gas operations. It is recommended that landowners have their water wells tested for both quality and quantity prior to the commencement of drilling. Periodic testing after drilling is completed is also a good idea. Drilling companies are often willing to pay for water testing. Landowners should work closely with the drilling operator in their area to protect water wells, springs and irrigation ditches and address other surface or ground water concerns.

Best Management Practices

With natural gas exploration, drilling and production accelerating across the Intermountain West, a set of standards has emerged that point the way to less impactful development. Best Management Practices are technologies, tools, procedures and practices that result in environmentally sound energy resource development that is also efficient and economically viable for operators.

In 2004, the Western Governor's Association, which includes Colorado, Wyoming, Utah, Montana and New Mexico, adopted a policy to promote voluntary Best Management Practices. When applied consistently and correctly, Best Management Practices or BMPs, can lessen the impacts to ground and surface water quality, air quality, wildlife habitat, soil and vegetation, and reduce noise and dust. They can also improve relations between operators and surface owners.

New technologies have been at the forefront of BMPs. Directional drilling, for instance, has reduced overall impacts by increasing the number of wells that can be drilled from a single pad. Directional drilling, use of combustion units and pit-less or closed fluid systems, where tanks hold drilling wastes and other drilling fluids rather than storing waste in open pits, are examples of reduced human and environmental impacts.

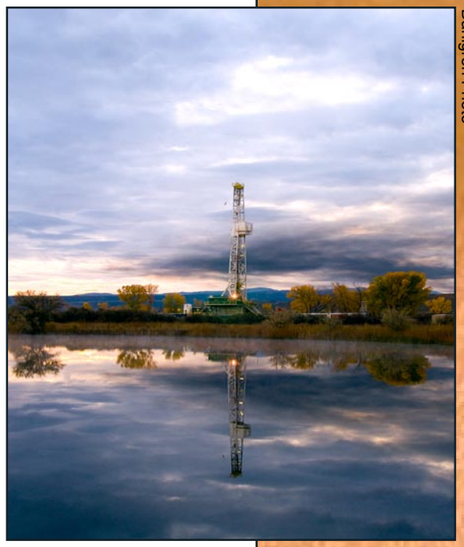
The Rifle, Silt, New Castle Community Development Plan (RSNC-CDP)

Since natural gas development began to increase dramatically a few years ago in Garfield County, concern has grown about how to manage the growth of that industry while preserving economic diversity and the quality of life that is so highly valued here.

Garfield County EAB Community Guide

The Grand Valley Citizens' Alliance, a grassroots community organization, undertook a new approach to addressing a variety of community and environmental problems associated with natural gas drilling. GVCA organized community members who defined their areas of concern and then negotiated with Antero Resources Corporation to develop a plan that applies to the geographic area between Rifle and New Castle between I-70 and the Grand Hogback.

The premise of this ground-breaking work was to form a partnership between industry and the community that manages drilling activities to reduce its impact on residents. Plan leaders began discussions with Antero in March 2005, and by December that year, the final plan was endorsed by the community, Antero, and the municipalities of Rifle, Silt and New Castle. In addition, Senator Ken Salazar hailed the plan as a new way for communities and industry to do business and reduce conflict.



Dahlgren Photo

The plan is based on a wide variety of BMPs, including the emerging concept of clustered development – the concentration of wells an their associated roads and pipelines onto a single large pad. Clustered development reduces the number of well pads, thereby reducing the loss of agricultural land and wildlife habitat. Using 160-acre surface spacing as a guide, the plan recognizes that this level of industrial development is not appropriate in residential situations unless the pad can be placed well away from homes.

Other BMPs included in the RSNC-CDP are:

- sharing drilling plans and changes to those plans with the community
- consulting with landowners on the location of pipelines
- placing multiple pipelines in one trench
- transporting drilling fluids when possible by pipeline rather than by truck
- use of closed-fluid drilling systems
- use of liners for waste and complete removal of waste if pits need to be used
- erosion control that meets state storm water regulations
- noxious weed control planning
- use of flow-back units to reduce odors and the need for flaring
- combustion devices to reduce VOCs and odors
- berms around pads to reduce noise, light and visual impacts to residences
- enclosed compressor stations to minimize noise
- 500 foot setbacks from homes when possible
- water quality testing of all domestic water wells within 1/2 mile of a pad

- water quantity testing upon a landowner's request
- quarterly testing of all domestic water wells within 100 feet of the pad for the first three years of production and annually for the productive life of the well
- random testing of irrigation water for contaminates
- graveled pads to reduce mud and dust
- use of non-toxic fracing fluids

Dahlgren Photo

Other industry operators are now working to replicate the RSNC-CDP in defined geographic areas in Western Garfield County in an effort to improve community relations. While many of the best management practices identified in the plan were already in use by some operators, these types of plans are creating a voluntary and improved standard for operation that benefits everyone.

Resources List

Printed Materials

1. *Your Land, Your Rights* (A landowner guide to understanding split estate issues.) Western Colorado Congress (970) 249-1978 or (970) 256-7650
2. *Oil and Gas At Your Door – A Landowner's Guide to Oil and Gas Development* - The Oil and Gas Accountability Project (970) 259-3353
3. *Our Drinking Water At Risk* - Oil and Gas Accountability Project, Durango (970) 259-3353
4. *What Every Westerner Should Know About Energy* – Center for the American West/University of Colorado at Boulder (303) 492-1671
5. *Filling the Gaps:* Improving Oil and Gas Reclamation and Reduce Taxpayer Liability – Western Organization of Resource Councils available on the Web at: www.worc.org
6. *Law and Order in the Oil and Gas Fields: A Review of Inspection and Enforcement Programs in Five Western States* – Western Organization of Resource Councils. Available on the Web at: www.worc.org
7. *Coal Bed Methane Best Management Practices Handbook* – Western Governor's Association (303) 623-9378
8. *Methane Madness: A Natural Gas Primer* – The Community Office of Resource Efficiency (970) 544-9808
9. *Oil and Gas Well Notification, Consultation and Reclamation Rules: Information for Oil and Gas Operators, Surface Owners and Surface Tenants* – State of Colorado Oil and Gas Conservation Commission (970) 285-9000 or (303) 894-2100
10. *Typical Questions From The Public About Oil and Gas Development in Colorado,* Colorado Oil & Gas Conservation Commission (970) 285-9000 or (303) 894-2100

Web Sites

1. Garfield County: www.Garfield-county.com
2. Oil and Gas Accountability Project: www.ogap.org
3. Western Organization of Resource Councils: www.worc.org
4. Western Colorado Congress: www.wccongress.org
5. Western Slope Energy Solutions: www.wescolo.com
6. Community Office of Resource Efficiency: www.core.org

Garfield County EAB Community Guide

7. Colorado Oil and Gas Conservation Commission: www.oil-gas.state.co.us
8. Western Governor's Association: www.westgov.org
9. Center for the American West, University of Colorado at Boulder. Available on the Web at: www.centerwest.org
10. US Environmental Protection Agency: www.epa.gov/air/urbanair/ozone/what.html

Organizations and Individuals

1. Garfield County Oil and Gas Liaison: (970) 625-5691 or (970) 309-5441
2. Colorado Oil and Gas Conservation Commission Garfield County Office: (970) 285-9000 or (970) 250-2440
3. Garfield County Energy Advisory Board: (970) 625-5691
4. The Grand Valley Citizens' Alliance: (970) 379-3252
5. The Oil and Gas Accountability Project: (970) 259-3353
6. Western Organization of Resource Councils: (406) 256-9672
7. Western Colorado Congress Grand Junction Office: (970) 256-7650
8. Bureau of Land Management Glenwood Springs Field Office: (970) 947-2800
9. Colorado Division of Water Resources: (970) 945-5665
10. Colorado Region VIII Environmental Protection Agency: (800) 227-8917
11. Colorado Oil & Gas Conservation Commission complaints: (800) 235-1101

Video/DVD Resources

1. Drilling and Completion of a Piceance Basin Well – EnCana Oil & Gas, USA
2. Who We Are: Drilling and Well Completion, Gas Gathering, North Parachute Ranch Environmental Studies - EnCana Oil & Gas (USA)
3. A Land Out of Time - Maroon Creek Productions, Aspen, CO