TAKING FULL ADVANTAGE OF OIL AND GAS DEVELOPMENT LEASES: LESSONS FOR FARM MANAGERS FROM THE UNITED STATES

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Abstract:

In the United States, property owners have the right to develop the minerals under their property unless that right has been sold, leased, or transferred. Development of minerals in non-traditional geologic formations has created a dramatic expansion in mineral development. Because the mineral exploration and development process can dramatically affect the land and its future use as well as the financial condition of the mineral owner and surface user, owners and surface users need to be aware of the potential impacts and take steps to see that their interests are protected. The primary tool mineral owners have is the lease agreement with a mineral company. This paper outlines considerations with mineral development for farm and ranch managers.

Keywords: *oil and gas development; leasing practices; leases; hydraulic fracturing; community development; agreements*

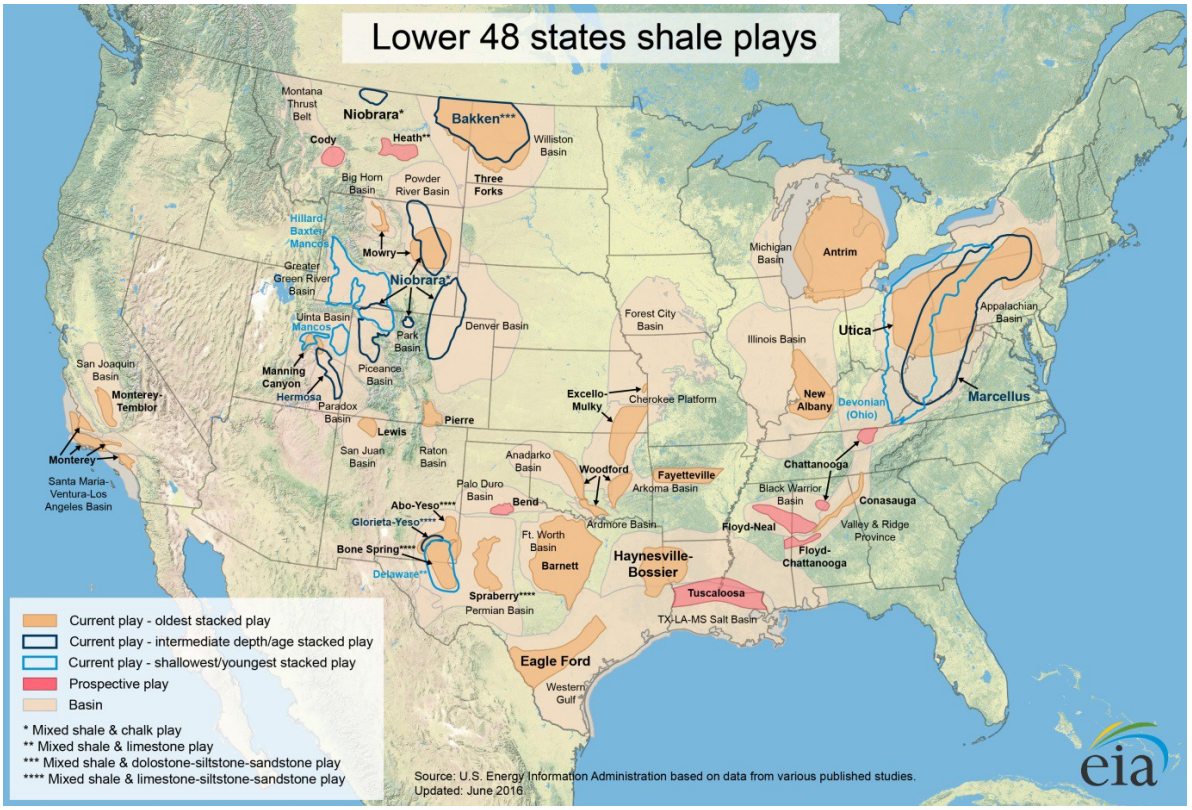
Introduction

Until fairly recently, many oil and gas companies considered gas found in tight, very low permeability geologic formations uneconomical to produce. Advanced drilling and reservoir stimulation methods have now been able to increase oil and gas production from these unconventional shales.

Today oil and gas mineral developers employ techniques such as directional drilling and hydraulic fracturing to significantly improve the production of oil and gas in numerous locations, including the Barnett shale formation in Texas, the Marcellus shale formation in the Appalachian basin and the Haynesville shale formation in Texas and Louisiana, and the Permian Basin (in Texas and New Mexico). Figure 1 illustrates the location of shale mineral resources in the US. These formations are particularly attractive because the drilling and fracturing of long horizontal well laterals yields high initial production volumes and, therefore, strong cash flows. The development is primarily subject to state law and regulation, but federal law regarding water safety also applies.

After a dip in prices to the $50-a-barrel area — halved from just three years ago – US drillers are ending a long period of cutbacks and are filling the market in response to OPEC's recent production cuts. US producers seem to now be effective at producing oil at these prices and have been acquiring land for current and future production.

Figure 1: Map of the shale basins in the contiguous United States.



Source: U.S. Energy Information Administration (EIA)
https://www.eia.gov/maps/maps.htm

Mineral development occurs on land owned by private individuals or companies or the state or federal government. The oil and gas development companies must arrange for the development with the owners of the minerals.

In some cases the mineral rights have been severed from the surface ownership – a split estate. In this situation the mineral owner retains the right to access the land for development. The land owner (in the case of private lands) or the surface user (in the case of public lands) does not need to be compensated for access, but they must contend with the exploration and development process and any ongoing access. A surface use

agreement may be negotiated to recognize issues for management and set compensation for damages. Reclamation activities are regulated by the state.

Each lease is the result of a negotiation between an oil and gas exploration and development company (the operator) and the owner of the mineral rights. It is the mineral owners' responsibility to identify issues of importance and negotiate terms that are in their own best interest. The word negotiation is important because all the terms proposed by either party must be agreed upon. The mineral owner who neglects to examine each term of the agreement does so at his own peril.

Hydraulic fracturing

Hydraulic fracturing, or fracking, is a process that occurs after drilling that involves pumping a mixture (95 percent water, 9.5 percent proppant (something to keep the fissures open, usually sand and tiny ceramic beads), and chemicals (to lubricate the process)) under high pressure into the ground to fracture hard rock and let oil and natural gas seep into a well for collection. Nearly all wells now use this technique. Hydraulic fracturing is often combined with directional, horizontal drilling, which prepares a well for hydraulic fracturing by extending the wellbore laterally through the pay zone. Some hydraulic fracturing is done with carbon dioxide.

Before hydraulic fracturing begins, a well must be drilled. Once an oil and gas company determines where to locate a proposed well, a stake will be set to mark the drill site and an access road and drilling pad for the drilling rig and other equipment will be constructed. Once the drilling is finished, the rig will be removed and the equipment for hydrofracture – trucks with diesel pumps, large bins and a battery of tanks – will be set up.

The size of the pad will depend on the type of well to be drilled, with horizontal wells requiring a larger pad. Vegetation and trees will be cleared, and there will be dust, noise, and exhaust fumes from the work as well as the drilling rig and heavy equipment associated with hauling large machinery, supplies, water and so on, quite apart from the comings and goings of crews working 24 hours a day and the associated supporting traffic. It may take several weeks to several months for drilling to occur, then the hydraulic fracturing operation would begin, which would take several more weeks. If paying quantities of minerals are found in the well, then a pump jack and associated

support equipment like pipes, flares, meters, and tank batteries will be set up and in place for the life of the well. The remaining ground will be reclaimed soon after.

Mineral Lease Core Terms

The two most notable terms in the deal are the royalty fraction and the signing bonus. They are the core of the agreement and will translate into the most money for the mineral owner. Further terms to negotiate will be things associated with protecting the surface and will be put in the addendums to the lease.

Royalty Fraction

In cases in which a private landowner owns the mineral rights on a property, terms of a mineral lease agreement will center on the percentage of the production paid to the mineral owner (the royalty). For every barrel of oil production or 1,000 cubic feet of gas production a percentage of the market value is paid to the mineral owner.

Typical levels are often $3/16^{th}$ (18.75 percent). In competitive areas, $1/5^{th}$ is not uncommon. The table below translates common levels into their corresponding percentage.

Fraction	Percentage
1/8	12.5 percent
5/32	15.625 percent
1/6	16.6 percent
3/16	18.75 percent
1/5	20 percent

The royalty fraction is whatever the mineral holder negotiates. It is likely the single most important term since it will translate into the most money if development is successful.

Signing Bonus

The bonus is the amount of money received within a certain period upon signing a lease. Its purpose is to be a cash incentive to sign a lease. A signed lease does not mean that the company will end up drilling and it certainly does not mean it will find minerals in paying quantities (meaning that there may never be money from production, so the only money the mineral owner may ever receive is the bonus).

The bonus will be specified in the lease agreement, often as a euro (dollar) amount per hectare (acre) of land. The most preferable option is the paid up bonus in which the entire

amount due over the length of the primary lease is paid up front. Without being paid up, a company may decide to do no further exploration or drilling after a couple years, still owing bonus money.

Mineral owners will likely see wide variations in the amount of money offered. A number of factors are at play, including the amount of acreage controlled by the owner, location of the potential mineral deposit (particularly if it is close to known production), and the number of operators seeking the lease, as well as other factors like location of the nearest pipeline (for gas development) and ease of access to property. All of these affect the negotiating position of the mineral owner and thus the terms of the bonus and the royalty fraction.

While the royalty and the signing bonus are the most important terms of the deal, there are many other important terms to be negotiated, including

- **Length of the primary term.** The primary term is the period of time in which the company will investigate the production potential for the property further (via such techniques as seismic surveys) and organize site preparation and a drilling rig if everything looks satisfactory. Lengths of from three to five years are common. Mineral owners would likely prefer to have the company developing the asset and creating a cash flow from production sooner rather than later.
- **Options to extend the lease's primary term.** Once a well is drilled and is producing a product, the secondary term begins and the well becomes held by production. The lease negotiated for the acreage will continue to be in effect for as long as the well is producing in paying quantities (perhaps many years).
- **Shut-in royalties for when a well is not producing.** A well may be drilled, but for some reason is capped and does not produce. It is an active well, so the lease continues: it is shut in. There are no bonuses for renewals and no royalties since there is no production. In this case a minimal fee, say $X per hectare (acre), is paid to the landowner, and the well continues at the shut in rate.
- **The size of the units.** A typical lease will govern all land covered by the lease for the full duration of the lease. Once a well is in place – whether a high or low producer – all the acreage governed by the lease will be held. A development company could negotiate a favorable lease on a large acreage, and then only do minimal development. Thus the lease is held for the company to further develop at

some point far in the future, if at all, leaving the company to develop other properties which may be more promising or which are closer to the end of the primary term of the lease.

- **Pooling with other lands.** The Pugh Clause will generally say that at the end of the primary term, the lease will expire on any part of the land that is not being used by the oil and gas company. Consider that if a lease covered 405 hectares (1,000 acres) and field rules in the area allow for drilling units of 129 hectares (320 acres) in a pooled unit for a producing well, then one well would hold the lease on the entire 405 hectares (1,000 acres). The mineral owner would receive no production royalty from the 129 hectares (320 acres) since they would be held by the lease indefinitely. A Pugh Clause would release the 275 hectares (680 acres) from the lease at the end of the primary term.

Many of these terms will be in the lease document itself. Others items of importance to farm managers can be addressed separately in addendums to the contract that address numerous lesser points.

Terms in the Addendum

An informed mineral owner will have a number of other conditions to agree on beyond the bonus and royalty. These other terms and conditions are attached to the lease in the addendums. Adding an addendum document to the lease allows other issues to be addressed or clarified without having to rewrite the lease. All issues important to current and future surface operations should have clauses addressing them in either the lease or the addendum. Not explicitly resolving important points will create confusion, frustration, delay, and expense.

If surface exploration via seismic survey reveals likely mineral deposits, development would proceed to drilling a well. The associated work would include grading land to create a drilling pad, road construction, digging temporary pits, construction of drilling rigs, utility access, wellhead placement, pipeline and storage tank battery placement, and disposal wells. In many drilling operations, the drilling pad might be 2.4 hectares (five to six acres) for a vertical well or eight hectares (20 acres) with horizontal drilling. Thus exploration and development can entail some extensive and intense disturbance.

An addendum could include clauses that specify what will happen on issues of importance. There are many questions to ask, and it is far better to have agreement on the answers regarding the issues before work proceeds. The negotiating position of the mineral owner declines dramatically once a lease is signed.

- **Ingress/egress to the well site**. Well sites need access, and roads will likely need to be constructed. Who will be responsible for maintaining them? To landowners with cattle and other animals, clauses directing the closing of gates will be important as well as the nature and (re)placement of any cattle guards or fences that may be installed. The agreement should also indicate who is responsible for construction and maintenance of the roads, structures and other utilities and for what period of time.
- **Preservation of topsoil**. In many areas, the topsoil is worth preserving. As a well is drilled, deep pits for sediment ponds and trenches for the movement of fluids are dug. Specify that contractors scrape the topsoil to the side so that it is available to put back on the top of the ground.
- **Loss of resources**. As the well is being drilled, crops may be removed, trees cut, or acreage lost to grazing. Specify who will pay for the losses and how the value for the loss be set. If there is a disagreement, who will settle it?
- **Buried pipelines or power lines.** Power to run the well and pipelines for the distribution of oil and gas will likely be installed – to what depth should they be buried so that tillage does not risk a rupture? Will the lines remain after production ends? A land owner may wish to keep power in order to power a water well, for instance.
- **Protecting cultural resources.** Evidence of early cultures and times as well as prehistoric flora and fauna are widespread in open spaces. Artifacts on the land ranging from dinosaur bones to evidence of settlers and Native American cultures are not protected by The National Historic Preservation Act on private lands. Will the oil and gas developer follow a policy of avoiding all artifacts they come across in their work and leave them intact?
- **Restoration after drilling**. After the drilling rig has been dismantled and the pump constructed and after all the holes and trenches covered and the trash buried, to what condition will the land be restored? Who will be responsible and over

what period of time will the restoration occur? What actions will be taken to prevent erosion in the time immediately following drilling?

- **Restoration at the end of the lease**. Every well has a productive life. What will the countryside look like after the well's life has ended? Who will be responsible for removal of all roads, structures and equipment after well production has ceased or the lease expires? Will the land be returned to original, pre-drilling condition? In rangeland restoration, what species will be used?

Oil and gas development naturally poses risks to the environment through potential leaks, spills, blowouts, explosions, abnormal pressure in formations, fires, and so on. Wellpad and access road sediment runoff, groundwater pollution, and stream contamination are also issues. A mineral owner and surface user should take care to think through the possible situations that may develop as production begins and be sure the responsible party is named in the contract. If no party is named and no method of assessing damages is specified, then the land owner has very little power. If the contract doesn't specify items or people responsible, then the land owner will have to either take what is offered (if anything) or do the work himself.

Water

Hydraulic fracturing operations can use 16,277,270 liters (4,300,000 gallons) of water of water per well over the course of a weeklong fracturing treatment. The water is first injected to create fractures and carry proppant, then much of it returns to the surface for disposal (this water is not acceptable for agricultural use). Because of the amount of water required and produced used in drilling operations, it is important to be clear about the source of the water and compensation, and for the disposal of saltwater or hydraulic fracturing water.

Some of the components used in hydraulic fracturing and drilling are chemicals used as lubricants. There are concerns that these chemicals and the drilling process may put groundwater at risk. Before any drilling occurs, testing of groundwater is advisable to build a baseline of water data. During production, periodic monitoring of groundwater quality should be required, and a lease agreement should explicitly say who is responsible for monitoring. In short, demand water quality testing prior to drilling, during production, and at abandonment.

Community Effects of Development

Farm managers are likely to see the effects of oil and gas (and other mineral) development beyond their direct involvement in leasing arrangements or through the effects of the exploration and development work, but the degree of impact will depend on the nature of the mineral activity. In many areas of the US for instance, oil and gas development is disbursed widely enough that the economic activity generated is a complement to agricultural business. For instance, land owning farmers and ranchers often receive significant cash from signing bonuses as well as royalty payments from production, but they experience minimal disturbance by the development.

Some areas experience quite intense mineral development. For instance, some mineral plays are in small geographic areas, so the disruption of normal life and farm operations is more significant and permanent. Notable areas in the US include the Bakken formation (in the Williston Basin, underlying parts of Montana, North Dakota, and Saskatchewan) and the Jonah Field (in the Green River Basin in Wyoming).

In these locations, a true boom town situation exists in which all aspects of life are affected by mineral development. Effects may include the following.

- **Increased labor costs and reduced labor availability**. An increase in demand for workers in mineral development as well as supporting industries like construction will attract workers away from other, lower-paying jobs. Impacts will include labor turnover and labor shortages leading to declines in productivity. It is likely that mineral development will drive up the cost of all labor. As a side note, job satisfaction of those employed may be high, but they may be dissatisfied with their new community. (Gilmore & Duff).
- **Increased costs of production**. Mineral development will require the development of supporting infrastructure. Prices for all types of resources are likely to be affected, from the price of land to the price of gravel, as well as materials that will have to be shipped in from further away. So employers in a development area will have to deal with numerous supply frustrations. Agriculturalists will face these same supply issues as well as increased prices for land.

- **Lower quality of life.** Growth in mineral development may strain the local service sector's ability to provide housing, health services, schooling, retailing and urban services. Adequate housing may be unavailable (or available at high rates), health services (both physical and mental health) may be inadequate, schools may be overcrowded and unable to serve the needs of the students enrolled, and local businesses may not be able meet the consumer and recreation needs of a growing population. Other problems may include the cost of living rising faster than the national rate and increased crime (burglary and larceny, but perhaps also drugs and prostitution). (Gilmore & Duff).
- **Strains on local government**. Municipal services such as police and fire protection may be at risk. The high costs of expanding water, sewer, and transportation may be beyond the ability of the local government to keep up. In addition, government operations may be affected by reduced manpower. (Gilmore & Duff).
- **Changed wildlife habitat.** Impacts of mineral development will include the direct loss (i.e., surface disturbance) of habitat to well pad, access road, and pipeline construction. Additional indirect habitat losses may occur if increased human activity (*i.e*., traffic, noise) associated with infrastructure cause animals such as deer to be displaced or alter their habitat use patterns.
- **Air quality degradation**. In some locations, impacts on air quality may be observed. Drilling of new wells, routine maintenance, and gas-field equipment release substances that contribute to ozone pollution, including volatile organic compounds and nitrogen oxides. In new wells unwanted gases are burned using open gas flares.

In some situations a boom town is able to transform itself into a sustainable community. But the risk of a dramatic decline in population after the boom is over is always a possibility, leaving creating further undesirable circumstances.

Conclusion

Oil and gas development is now using techniques that make exploration and development of resources more economical. This mineral exploration and development can dramatically affect the land and the future use of it as well as the financial condition of the mineral owner and surface user. Once a mineral owner is approached about leasing

minerals, important points to address in the negotiation of the lease are the terms of royalty rates and signing bonus, and issues of importance such as rents, compensation for damages, disruption of activities on the surface, and reclamation of exploration and development sites.

Once the core elements of the deal are set, it is in a landowner's best interest to make sure that the rights and responsibilities of the parties entering into the agreement are clearly stated and have specific instructions to follow if problems arise. Think through all the possible situations that could be encountered and address issues of importance in the lease and the addendums.

Mineral development can lead to changes in the operation of a farm or ranch during the development process. Further changes may be noted as mineral development expands in the area.

References

Gilmore, J. & Duff, M. (1975) *Boom Town Growth Management: A Case Study of Rock Springs-Green River, Wyoming*. Westview Press. Pp 10 to 15.