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Article Case

Split Estate and Wyoming's Orphaned Well Crisis: The Case of Coalbed Methane Reclamation in the Powder River Basin, Wyoming

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Abstract

This case presents the stakeholder conflicts that emerge during the development and subsequent reclamation of abandoned natural gas wells in Wyoming where split estate, or the separation of surface land and mineral rights from one another, occurs. From 1998 to 2008, the Powder River Basin of northeastern Wyoming experienced an energy boom as a result of technological innovation that enabled the extraction of coalbed methane (CBM). The boom resulted in over 16,000 wells being drilled in this 20,000 square-mile region in a single decade. As of May 2017, 4,149 natural gas wells now sit orphaned in Wyoming as a result of industry bankruptcy and abandonment. The current orphaned wells crisis was partially enabled by the patchwork of surface and mineral ownership in Wyoming that is a result of a legal condition referred to as split estate. As the CBM boom unfolded in this landscape and then began to wane, challenges emerged most notably surrounding stalled reclamation activities. This case illuminates these challenges highlighting two instances when split estate contributed to issues between landowners and industry operators which escalated to litigation.

KEY MESSAGE

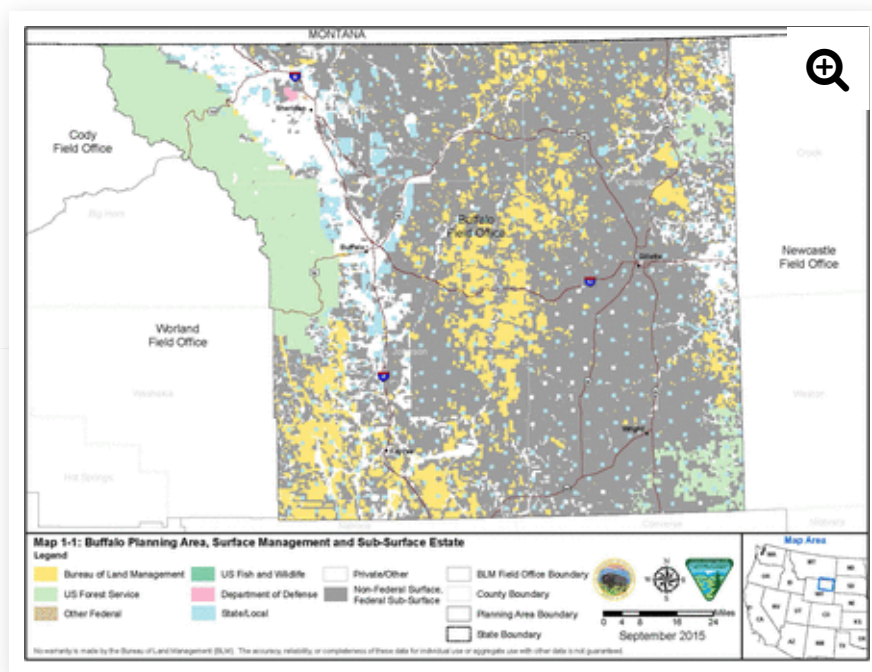
Readers of this case will become familiar with (1) the legal concept of split estate and some of its

implications in the context of energy development; (2) the historic pieces of federal legislation that enabled the legal phenomenon of split estate; (3) reclamation activities associated with coalbed methane development in the Powder River Basin, Wyoming; and (4) legal cases that resulted from disagreements between surface landowners and holders of mineral rights (industry operators) in the Powder River Basin, Wyoming.

INTRODUCTION

The US West has long been host to a variety of extractive industries. The mainstay of many local Western economies, the extractive industry relies on access to subsurface minerals for production. Across the West, minerals are owned by a variety of entities including the Federal Government, the host State Government, and private individuals. Coupled with the patchwork of public- and private-owned surface land, the mosaic of surface land and underlying mineral ownership is increasingly complex. Therefore, it is germane to ask, how have we arrived at such a complicated land and mineral ownership regime in the US West and what are the present-day implication of such a regime in the context of energy development?

To answer this research question, a case study of the Powder River Basin (PRB), Wyoming, has been presented (see supplemental slides for background information and visuals about the PRB). The PRB is a worthy case study site for three key reasons: (1) the pattern of surface and mineral ownership is extraordinarily complex (Figure 1); (2) as a region in the US West, the area was impacted by a variety of legislative measures that were consequential to the current mosaic of surface and mineral ownership; and (3) the completion of reclamation activities following a recent coalbed methane (CBM) boom has been complicated by split estate ownership. It is worth investigating how we have arrived at the current ownership pattern because it has present-day implications for landowners in the region.

**FIGURE 1**

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Land and mineral ownership pattern in three Powder River Basin counties. *Note:* Split estate lands in grey (Source: Bureau of Land Management, Buffalo Field Office ARMP, 2015).

CASE EXAMINATION

General Definitions of Core Concepts: The Origins of Split Estate

The Homestead Act of 1862 was one of the most revolutionary modes of public land distribution in American history. Signed into law by President Abraham Lincoln, the Homestead Act of 1862 allowed American citizens, who were head of household and at least 21 years old, to apply for a 160-acre homestead at their local land office. The conditions of the Act required the citizen to reside on the land, build a home, make improvements to the land, and actively farm for five years before being granted possession of the land [1]. The scale and spatial extent of the Homestead Act was vast. Ten percent of US land area was given away under the Homestead Act [1], and in Wyoming, 29% of total land area was distributed as homesteads [2]. Specifically, in the PRB, over 5,966 land patents were granted as a result of the 1862 Homestead Act [3]. Of particular importance is the fact that this Act, upon meeting the conditions after five years, granted ownership of the surface land *and* the underlying minerals to the homesteader. The result was a proliferation of privately-owned minerals and lands as opposed to those owned publically by the Federal Government or the State.

The Stock Raising Homestead Act (SRHA) of 1916 was signed into law by President Woodrow

Wilson which granted homesteads of 640-acres for livestock production. The homesteads contained non-irrigable land unsuitable for cultivation. Therefore, in order to be granted possession of the land after 5 years, the homesteader was required to carry out rangeland improvements amounting to US\$1.25 an acre [4] as opposed to agricultural cultivation [5]. In the semi-arid PRB, the environment was conducive to stock raising and at least 4,787 homesteads were granted under this Act [3]. The SRHA's predecessor, the 1862 Homestead Act, distributed surface land and minerals together (as did the 1909 Enlarged Homestead Act, although the parcels were larger in area). The defining feature of the SRHA was that the subsurface minerals were no longer granted to the homesteader and were instead reserved for the Federal Government. The language of the law specifically states, "Excepting and reserving, however, to the United States all the coal and other minerals in the lands so entered and patented, together with the right to prospect for, mine, and remove the same pursuant to the provisions and limitations of the Act of December 29, 1916 (39 Stat., 862)" [3]. In other words, the SRHA stated that the minerals must be reserved for the Federal Government. This resulted in a legal condition referred to as split estate. Split estate occurs when the surface land and subsurface minerals are owned separately by two different parties [6]. In the case of the SRHA, the surface was owned privately but the minerals were property of the Federal Government.

Traditionally, surface landowners have often been dissatisfied with the "perceived imbalance of power that mineral owners have over surface owners/users" [7, p.417]. In part, this stems from the fact that surface owners are required by law to grant land access to prospectors and federal agents for the purpose of mining and mineral recovery [8]. A provision of the SRHA states:

Any person qualified to locate and enter the coal or other mineral deposits, or having the right to mine and remove the same under the laws of the United States, shall have the right at all times to enter upon the lands entered or patented, as provided. By this subchapter, for the purpose of prospecting for coal or other mineral therein, provided he shall not injure, damage, or destroy the permanent improvements of the entryman or patentee, and shall be liable to and shall compensate the entryman or patentee for all damages to crops on such land by reason of such prospecting.

Despite the provisions that require compensation to the surface owner if degradation was to occur, conflicts between surface landowners and mineral owners happen and occasionally escalate to litigation. The case study of CBM development in the PRB helps to illustrate these concepts.

CASE BACKGROUND: CBM DEVELOPMENT IN THE PRB, WY

The PRB is located in northeast/central Wyoming and extends northward into southeast Montana. Within Wyoming, the PRB encompasses all of Campbell County and parts of Sheridan, Johnson, Converse, Crook, Weston, and Niobrara Counties. The Yellowstone River lies to the north, the Laramie and Casper Mountains make up the Basin's southern boundary, and the Big Horn Mountains are to the west [9] (see supplemental slides for visuals). Covering roughly 20,000 square miles of semi-arid grasslands used primarily for livestock production, the region experienced rapid and intensive CBM development from 1998 to 2008. Approximately 2,500 CBM wells were drilled in the Basin annually through 2008 [10]. After the economic downturn and subsequent decline in the natural gas market, some 4,149 orphaned gas wells remain on farms and ranches in Wyoming [11], along with considerable uncertainty about who will take responsibility for well and land reclamation. According to the Wyoming Oil and Gas Conservation Commission, orphaned refers to, "wells for which the agency is unable to require the responsible party (owner or operator) to plug and abandon them and rehabilitate the surface because the responsible party no longer operates in the state, is bankrupt, or out-of-business" [12]. A State well plugging program does exist, but the rate at which wells become orphaned outpaces the rate at which the state can plug wells. Plugging the well "prevents potential discharge of water, oil or gas from the well bore and ensures these fluids stay within their proper formations" [12]. Moreover, the state only plugs and abandons the well and does no additional surface reclamation.

The post-production, reclamation phase is critical to guarantee that the legacy of CBM production is not destructive to the regional ecosystem and natural environment. Some environmental concerns related to CBM activities are directly related to the process of CBM extraction. According to Nghiem et al., "The extraction of CBM involves the reduction of pore pressure by pumping the water from the deep confined aquifer above and within the coal seams to the surface, allowing the methane gas to desorb from the coal" [13, p.317]. In other words, water needs to be removed from the coal seam to reduce the underground pressure. Once the pressure is reduced, the methane gas is free to escape (see diagram in slides). The depressurization process mobilizes underground water, called produced water, to the surface, which is often salt-rich. Produced water may be reinjected, treated, used in livestock operations, stored in reservoirs, used for irrigation or dust control, or removed from the site. The contents and quality of the produced water dictate how it is managed.

In the US West, water from CBM development is most often discharged into surface reservoirs or reinjected underground [13]. Surface discharge of produced water has prompted some research

regarding potential ecological impacts [9, 14, 15]. First, during peak extraction, each CBM well produces approximately 40.32 million gallons of water pumped to the surface per day [16]. Unsurprisingly, Schneider (2001) found that CBM development was responsible for lowering water levels in aquifers, contamination of surface waters, disruption of surface hydrology, and soil erosion [15]. Horpestad revealed that discharge waters have increased the amount of total dissolved solids in nearby soils that can reduce plant's capacity for nutrient uptake [14]. Lastly, Stearns et al. found that soils exposed to CBM discharge waters have increased sodium content [9]. This allows salt-tolerant species to flourish, "making it easier for them to invade and outcompete native vegetation" [9, p.35]. These ecological impacts are especially concerning considering the reliance on agricultural activities in the Basin.

The reclamation issue is further complicated by surface and subsurface ownership regulations in the area resulting from split estate. The rural nature of the PRB requires the initiation of infrastructure projects during CBM development. To access remote well locations, the construction of roads and utilities, including power lines, subsurface water infrastructure, and compressor stations, is required (Figure 2). During these construction activities, topsoil is removed, vegetation is lost, water and electrical infrastructure is buried 4–6 feet underground, roads are constructed, local hydrology is changed, and reservoirs are built (Figure 3). Theoretically, reclamation is intended to correct these disturbances post-production. Ecological restoration is beneficial for nature and society as projects increase the supply and quality of ecosystem services, improve hydrology, reduce soil erosion, encourage the presence of native species, and aid in carbon sequestration [17].



FIGURE 2[Download figure](#) | [Open in new tab](#) | [Download powerpoint](#)

Un-reclaimed compressor station, Sheridan County, WY (Source: author).

**FIGURE 3**[Download figure](#) | [Open in new tab](#) | [Download powerpoint](#)

CBM produced water reservoir, Sheridan County, WY (Source: author).

Mandatory Access to Subsurface Minerals

The contemporary measure used to help landowners dictate how the surface can be used for access, and hold mineral developers accountable for any land degradation resulting from their activities, is a legal contract called a Surface Use and Damage Agreement (SUDA). Specifications regarding how the development and subsequent reclamation will be carried out are detailed in the SUDA including points of access, infrastructure placement, and restoration of the surface after extraction ends, among others. Traditionally, surface owners were only compensated when there was documented damage to the surface land by the mineral developer. The nature of contemporary energy development, which requires construction of various infrastructures, poses new challenges for surface landowners with mineral development on their property. To help address these emerging issues, the State of Wyoming passed the Split Estates Act on July 1, 2005. This Act requires the mineral owner compensate the surface owner for access and, "loss of production and income, loss of land value and loss of value of improvements caused by oil and gas operations" [8, p.2]. Despite the passage of the Act, there is question as to whether the State laws apply to federally owned minerals. Wyoming legislators insist that, in fact, they do. Although

this legislation may have helped to avoid some disputes between landowners and industry operators, other conflicts did arise that led to litigation (Paxton Resources L.L.C. v. Brannaman 2004; Pennaco Energy, Inc. v. Sorenson 2016).

Examples of Litigation

As mentioned previously, the mosaic of surface and mineral ownership has impact on the citizens of the PRB. Residents live together and not separated from this ownership pattern. These land and mineral divisions inform the activities of the citizens and, on the ground, cannot be ignored. Moreover, some surface owners have been negatively affected by split estate. The legal case of Pennaco Energy, Inc. v. Sorenson illustrates the problems that can arise from split estate and the legal obstacles that must be overcome in search for resolution.

Brett Sorenson, the plaintiff, sued Pennaco Energy, Inc. in late 2015 for unpaid surface damage and use payments and for damages resulting from the failure to repair water wells and reclaim land. Sorenson is a ranch-owner in Arvada, Wyoming, located in the southeast corner of Sheridan County. In the 1990s, Pennaco Energy obtained mineral leases underlying Sorenson's ranch. Pennaco Energy was one of eight mineral holders, including the State of Wyoming, which had rights to subsurface minerals beneath Sorenson's rangeland. This fact alone illustrates the complexity inherent in such a complicated surface and mineral ownership regime. When Pennaco Energy obtained mineral leases underlying Sorenson's land, the two parties entered into a SUDA. Pennaco then drilled 10 CBM wells and constructed 5.67 miles of road and 4.19 miles of pipeline. Pennaco honored the surface use contract until 2010 when the company sold its interest in the leases beneath Sorenson's ranch and the rights in the SUDA to CEP-M which immediately assigned the interests to another company, High Plains Gas. After this transaction, Sorenson stopped receiving all payments and no reclamation was completed [18].

In the following years, Sorenson was motivated to litigate against Pennaco Energy for abandoning its liabilities. The District Court found Pennaco Energy guilty and awarded Sorenson US\$1,055,982.62 for (1) unpaid annual surface payments; (2) costs related to reclamation; and (3) costs to replace a damaged artesian spring. Sorenson was awarded an additional US\$311,478.13 in attorney fees, as well. Pennaco Energy was found culpable because there was no exculpatory clause included in the SUDA. An exculpatory clause is described as follows:

Absent an express clause that terminates its obligations, the original lessee-assignor will continue to be responsible to the lessor for covenants in the lease under the doctrine of privity of contract. Many oil and gas leases contain clauses eliminating contractual liability of this nature, but some do not. Where

they do not, the courts are nearly universal in their finding that the original lessee-assignor retains obligation to the lessor with respect to at least some of the covenants under the lease [18, p.8].

It stands to reason that Sorenson was successful in large part due to the representation he was able to secure. Sorenson's attorneys from Yonkee & Toner, LLP in Sheridan, Wyoming, chose to represent him using a contingent fee contract. Yonkee & Toner, LLP agreed to represent Sorenson but their compensation was contingent on the case being won. Agreements like this take place occasionally but not often, as attorneys must be willing to work within such an arrangement. This brings to light the question of landowner range of choice when they feel industry operators are not upholding their contractual obligations. Litigating is contingent on the landowner having the means to endure such a process, financially, emotionally and otherwise, or securing an attorney willing to work within a contingent fee contract. Other ranchers are likely in similar situations, faced with uncertain land reclamation and limited financial resources to secure an attorney to litigate against industry operators. For this reason, the Sorenson case is much more of the exception than the rule. There are a handful of other exceptions, in the form of legal cases, which make clear the impacts split estate can have on surface landowners.

One such exception is the case of Paxton Resources, L.L.C vs. Dan M. "Buck" Brannaman and Mary C. Brannaman. In November 1999, the Brannaman's and Paxton Resources entered into a SUDA as Paxton had the rights to the minerals underlying their ranch east of Sheridan, Wyoming. At that time, the Brannaman's had no mineral holdings. Four years after the SUDA was drafted, in 2003, the Brannaman's brought a lawsuit against Paxton for damages to their property and lost income. The case was heard in the 4th Judicial District Court of Wyoming. The Brannaman's alleged that Paxton did not adhere to the SUDA. Specifically, Paxton did not properly store CBM materials including pipe, tractors, and 55-gallon drums and that roads and well sites were poorly located which contributed to increased erosion. Mary Brannaman testified that "Coalbed methane crews turned their roads into mud bogs, left trash on the ground, drove across rangeland, mixed topsoil with salt-laden subsoil and let hillsides erode away" [19]. Ultimately, the Brannaman's were awarded US\$810,887 for Paxton's breach of contract and breach of the duty of good faith and fair dealing [20].

CONCLUSION

In conclusion, the complicated mosaic of surface and mineral ownership in the PRB, and throughout the US West, is a product of historical actions that have significant present-day implications. The making of this ownership regime dates back to the first Homestead Act of

1862. Subsequent legislative measures, most notably the SRHA of 1916, also contributed to the region's complex ownership pattern. The result of these legislative measures is the complicated surface and mineral ownership pattern that exists in the region today. Derived from this pattern is the legal condition known as split estate, where the surface land and subsurface minerals are owned by separate parties. Split estate has led to conflicts between surface and mineral owners in the region, some escalating to litigation despite the passage of Wyoming's 2005 Split Estates Act which was designed to provide more protection for surface landowners. By profiling some of these legal cases, together with the historical narrative that explains how the surface and subsurface ownership pattern was created, the effect of land and mineral tenure on the region's residents can be better understood.

CASE STUDY QUESTIONS

1. Split estate produces a number of different ownership scenarios including (1) private surface/private minerals; (2) private surface/state-owned minerals; (3) private surface/federally owned minerals; and (4) federally owned surface/federally owned minerals. Imagine and list the potential challenges inherent in each scenario regarding surface-owner/mineral-owner negotiations (i.e., SUDAs) and reclamation activities.
2. Based on the description provided in the case and the photos on the accompanying slides, sketch a CBM well site. Be sure to include the well infrastructure and access roads, power, water, pipelines, and a compressor station.
3. Why do you think that the federal government altered the rules around granting mineral estate ownership between the passage of the 1862 Homestead Act and the 1916 Stock-raising Homestead Act? Use historical context to bolster your explanation.
4. What may prevent a surface owner from litigating against a negligent operator?

AUTHOR CONTRIBUTIONS

The author is responsible for the conception of the work, the analysis and interpretation, and drafting of the article.

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COMPETING INTERESTS

The author has declared that no competing interests exist.

SUPPORTING INFORMATION

Supplemental Slides

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