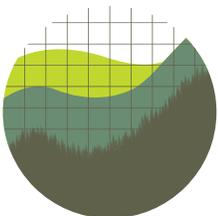


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Coal Royalties

Historical Uses and Justifications



Institute for
Policy Integrity

NEW YORK UNIVERSITY SCHOOL OF LAW

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Executive Summary

On January 15, 2016, the Department of the Interior (Interior) announced that it would begin a comprehensive review to identify and evaluate potential reforms to the federal coal program. This review will be conducted as a Programmatic Environmental Impact Statement (Programmatic EIS) that will analyze issues including “how, when, and where to lease; how to account for the environmental and public health impacts of federal coal production; and how to ensure American taxpayers are earning a fair return for the use of their public resources.”¹ This report explores the argument for increasing federal coal royalty rates by considering the historical meaning of royalties, the economic justifications for royalties, the legislative history of the implementation of a federal royalty, and some of the considerations that private landowners have relied upon in setting royalties. The report also considers justifications for royalties in other contexts, such as intellectual property.

While royalties typically have a revenue or profit sharing component, a common thread in our research that may be especially relevant to Interior is that royalties have historically been used as a policy lever, to help set national, state, or private priorities for how land, resources, or property should be used. For example, royalties have been set at specific rates in order to: encourage resource production; encourage westward expansion; maintain the incentive to create new inventions; and deter socially undesirable behavior, to name just a few. In line with this finding, this report concludes that it would be reasonable for Interior to adjust coal royalty rates to account for negative externalities that are not otherwise addressed by regulation.



Jacobs Ranch Mine complex. Photo © Doc Searls

The report begins with a review of the common law origins of royalties for mineral resource extraction. Royalties were paid to the sovereign or to other private landowners in order to share the value of the resource and for the privilege of mining on the property. Next, in Part II we discuss the economic justifications for royalties, including as the owner's share of differential returns on mines given their superior productivity (economic rent); as payments to the owner for minerals removed (user cost); and as the sum of the former plus compensation for negative externalities from the extraction or use of minerals.

In Part III we review the legislative history of mineral resource extraction law and policy in the United States. Leasing policies and royalty rates have consistently been used as policy levers to advance the national interest and to compensate the public for the removal of mineral resources. Beginning in the 20th century, legislative history also reveals growing attention to the relationship between fossil fuel royalty rates and externalities, as shown through state revenue sharing arrangements, the Land and Water Conservation Fund, and recent calls for hardrock mining reform.

In Part IV we briefly examine how private royalty rates and mineral resource leases are influenced by diverse factors, including expected economic rent, characteristics of the resource, competition for the lease, and externalities that may affect the leaseholder, such as noise and pollution. Finally, in Part V we examine how royalties are set and applied in contexts outside of natural resources, including intellectual property. In both the patent and copyright fields, royalty determinations are influenced by the specific characteristics of the property at issue; moreover, federal law and policy in these fields has sought to reconcile competing interests and provide proper incentives to intellectual property holders and property users.

Overall, the historical and economic justifications for royalties would support Interior exercising its existing statutory discretion to raise coal royalty rates to account for factors such as negative externalities, including those resulting from carbon and methane emissions, in order to align the federal coal program with other national priorities, such as meeting climate change goals and commitments.

I. Royalties at Common Law

English common law origins of the word royalty and concepts of ownership played a role in the formation of U.S. common law.² As early as 1400 the term “royalty” was used by the British Crown to describe any “right or privilege retained by the crown.”³ It became associated with mineral rights in particular by 1580, when the British Crown retained title to all land and the right to take any gold or silver discovered on land conveyed.⁴ By 1829, the term royalty specifically meant a right retained by a landowner under a lease in return for the privilege of working a mine.⁵

Although a royalty may be viewed as a type of rent, at common law it was viewed more as the actual portion of minerals due the crown at the mine in return for the privilege of extraction.⁶ For “royal mines” the royalty was paid to the sovereign, whereas for other mines it was paid to the landowner for “the privilege of working the property.”⁷

As the common law developed, the King of England maintained exclusive ownership over all silver and gold discovered (called the “regalian right”). In contrast, royalties taken on other minerals functioned as a “rent or tax” or were sold fee simple, depending on local customs.⁸ For example, in the tin mines of Cornwall, the right to work was given to all “free tinners” so long as a portion of all minerals extracted were transferred back to the owner, usually about 1/15th of the product. Mining of lead mines of Derbyshire was made contingent on returning 1/13th of the minerals extracted to the crown or the land’s lessee.

Outside of England, the early concept of a “royal fifth” (quinto real or quinto del rey in Spanish and Portuguese) reserved to the monarch 20 percent of all precious metals and other commodities extracted by mining, acquired by his or her subjects as war loot, or found as treasure. The “royal fifth” was instituted in Medieval Muslim states, Christian Iberian kingdoms (including Spain and Portugal) and their overseas colonial empires during the age of exploration.⁹ In 1783, King Charles III of Spain dictated the Mining Ordinances for New Spain whereby a “fifth part” of the value of all minerals produced from mines located in New Spain (much of present-day Central and South America) was reserved to the crown.¹⁰

Early mineral royalties in the United States typically consisted of 1/8th of production (or 12.5 percent), a figure likely taken from the early Pennsylvania salt industry.¹¹ The 1/8th figure was so common in the 1920s and 1930s that Texas courts took judicial notice of it in mineral leasing litigation.¹² That said, there is evidence of early use of higher royalties such as 1/6th of production.¹³ In Part III we discuss the legislative history of mineral resource royalties in the United States, which sheds more light on the factors that lawmakers and the public considered when setting minimum royalty rates. First, we explore the economic justifications for natural resource royalties.

II. Economic Justifications

In general, economists have justified mineral royalty payments as the owner's share of differential returns on certain mines given their superior productivity (economic rent) or as payments to the owner for minerals removed (user cost). Increasingly, economists have considered the relevance of negative externalities from the extraction or use of minerals in the calculation of socially optimal royalty rates. This Part describes this economic literature.

Royalty as Economic Rent

The concept of economic rent has been used as a justification for royalty payments.¹⁴ Economic rent (also referred to as the Ricardian rent) is a payment to the owner of a factor of production that exceeds the amount necessary to keep the factor in its current employment.¹⁵ David Ricardo first explored the idea of an agricultural land rent equal to the advantage of using a tract of land in its most productive use relative to the advantage of using the marginal tract (or, the best rent-free tract) for the same purpose.¹⁶ In other words, land rent is the payment to the owners of especially fertile land in return for the production advantage (or cost savings) associated with using that land.

Just as agricultural land varies in its fertility, mineral mines vary in their production costs due to deposit quality and proximity to markets, and for this reason, some mines may earn economic rent. For example, a coal mine on land with superior coal deposits (say, thicker deposit seams located closer to the surface) will be able to produce coal at lower cost than will a mine on land with inferior coal deposits (such as narrow deposit seams located at great depth).¹⁷ Similarly, a mine located near an industrial or shipping center will have lower production costs than a mine located farther away and subject to higher transportation charges.¹⁸ The owners of superior mines earning economic rent will be able to charge higher royalties. These royalties tend to be seen as equitable, enabling the mineral owner to share in the economic rent arising from the mineral's superior quality.¹⁹ Unlike other forms of taxation, royalties imposed on economic rent also would, in principle, not distort behavior.²⁰ Of course, if the private costs of production do not fully account for the social costs of production and no corrective policy measures are taken, then the resulting level of production would not be socially optimal. In such a case, even if royalties capture more than the economic rent and thereby reduce production, the "distortion" in behavior would actually result in a production level closer to the socially optimal level.²¹

There is evidence that U.S. royalties might have historically been directed, at least in part, at capturing economic rents.²² John Orchard, in his analysis of the history of mineral rents, argued that in the United States, royalties were "partly compensation for the mineral removed and partly surplus or economic rent arising through superiority of some mines over others."²³ He quoted the secretary of the American Institute of Mining Engineers explaining the U.S. royalty rates in 1889 as follows: "With us the royalty always settles itself according to special advantages. The lowest royalty is the royalty that must be paid, or else the landowner would not care to let the mine be worked. On top of that, you have all those higher royalties coming in to represent special natural advantages."²⁴ He also quoted a Birmingham mining engineer as stating in 1919 that "strictly speaking, royalties are partly rent or income, and partly capitalization of assets."²⁵

Orchard also examined early royalty rates and found that they tended to be higher when economic rents were likely to be higher—that is, when the costs of extraction were low due to the coal's "accessibility, quantity, thickness, depth, value, and other conditions that affect the cost of its extraction."²⁶ For example, Kentucky in 1910 had a royalty of 8 cents per ton on coal from 3 to 4 feet thick seams, 10 cents on coal from 4 to 5 feet thick seams, and 12 cents on coal from 5

to 6 feet thick seams.²⁷ Orchard also noted that the U.S. Geological Survey, in its 1910 classification and valuation of government coal lands, placed a significantly higher value on lands less than 15 miles from a completed railroad.²⁸ These U.S. practices, according to Orchard, were consistent with practices in other European countries at the time.²⁹

The concern about the “special advantages” of certain mines was also evident in the testimony before Congress prior to the adoption of Federal Coal Leasing Amendments Act of 1976. The concern apparently motivated the lower royalty rate on coal produced from underground mines, which were thought to be more costly to operate. Legislative history is discussed more thoroughly in the next Part.

The discussion of economic rent typically does not involve discussion of externalities. But it is easy to imagine that a “special advantage” of a mine might include its low environmental externalities. Such a mine should be able to earn economic rent that the public, in turn, can capture through the royalty rate. Mines that generate high environmental externalities might earn no economic rent or become unprofitable to operate at all. In such a case, the mineral owner may prefer for the mineral to stay undeveloped, a concept discussed in the next Section.

Royalty as User Cost (or Compensation for Liquidated Wealth)

Unlike the agricultural land on which Ricardo based his theory of economic rent, coal is a nonrenewable resource. Its supply is exhausted in the long run, at which point economic rent becomes zero. Because of the unique characteristics of nonrenewable resources, some economists have distinguished between royalties on nonrenewable resources and rents, influenced by the work of Harold Hotelling.³⁰ In 1931, partly in response to the conservation movement, Hotelling developed a model of the optimal rate of extraction of a nonrenewable resource over time.³¹ According to Hotelling, profit-maximizing competitive firms will extract a mineral resource until the market price of the resource equals the production costs of the last unit plus a cost equal to the net present value of the forgone future profits had the resource remained in the ground (in other words, the cost of not being able to use the resource in the future). This latter cost is now referred to as the Hotelling rent or user cost.



Abandoned Mine Lands in Pitkin County, CO. Photo © U.S. Geological Survey

Economist Alfred Marshall explained that, conceptually, a royalty is akin to the user cost because it compensates the owner of the mineral for the reduced opportunity to produce the mineral in the future.³² A tax on the user cost, unlike a tax on economic rent, would distort firm behavior because it would incentivize a firm to leave mineral resources in the ground for the future.³³ Hotelling’s model implies that the optimal royalty schedule must induce the mining firm to exhaust the mine in such a way that marginal net benefits grow over time at the rate of discount.³⁴

Under this framework, the government would be justified in collecting a high royalty if the stock of the mineral were limited even if there were no economic rents.³⁵ On the flip side, if the stock of the mineral were large relative to anticipated demand, the royalty would be lower.³⁶ Arguing in favor of this aspect of a royalty, Orchard explains that the owner of a currently unprofitable coal deposit, one that does not earn economic rent, would not allow any mining without compensation, as he would “gain[] nothing” and “lose[] an asset that may bring in an income for himself or his heirs with a change in market conditions.”³⁷ The owner would demand payment equal to the marginal or minimum royalty necessary to compensate the owner for his loss even in the absence of economic rent.³⁸

Despite its intuitive appeal, however, there is little evidence that user costs were a significant component of historical royalty rates for coal in the United States. This is largely because the supply of coal has not been perceived to be scarce, implying user costs close to zero,³⁹ though economic theory predicts an increasing royalty rate over time as the resource becomes scarce.

Nonetheless, the concept of user costs has historically been relevant as a justification for royalty rates in the United States. U.S. mining operators and policymakers were aware of the user cost when determining and evaluating possible royalty rates. Both American mining operators quoted by Orchard referred to user costs—or, in their words, the part of the royalty “that must be paid, or else the landowner would not care to let the mine be worked,” or the part that essentially represented the “capitalization of assets.”⁴⁰ And, in congressional hearings on the Federal Coal Leasing Amendments Act of 1976, there was concern that “it may not be desirable to encourage underground mining [via a lower royalty rate] until technology has evolved which will allow a higher percentage of recovery be underground mining,” which is really a concern about future less costly mine productivity forgone by present mining.⁴¹ Such a concern, in turn, can be analogized to concern about costly externalities caused by coal production. The landowner receives a royalty payment from coal production, but the landowner’s total benefit is reduced by the environmental damage to his land from the production. Such a landowner may prefer to wait to extract the coal when technology evolves that makes coal production less environmentally costly. When the government is the land and mineral owner, such concerns about the net social costs of production become even more relevant, as discussed in the next Section.

Royalties and Externalities

The concepts of economic rent and user cost roughly suggest that maximum net benefits would accrue to the public when the government directs royalties at capturing all economic rent and at compensating the public for the user cost. But when resource extraction produces environmental and other costs to social welfare, unless corrective measures are taken, the level and rate of exploitation of the resources will be higher than socially optimal.⁴² The concepts of economic rent and user cost do not directly address what the government should do in the face of such externalities. Nonetheless, economics provides a framework for thinking through this complex issue.

As the White House Council for Economic Advisors recently explained, ensuring the optimal extraction of mineral resources on public land is akin to solving a principal-agent problem: the government (the principal) directs a coal firm

(the agent) to efficiently extract the coal and return economic profits to the government.⁴³ When the government is the mineral owner, its objective should be to develop the resource in such a way as to generate maximum net benefits to the public.⁴⁴ In the best-case scenario, the government would itself efficiently extract the coal using the lowest-cost approaches at the optimal rate, taking into account both direct and external costs of production, and keep economic rents and user costs for taxpayers. To address negative externalities, the government as operator may have chosen to forego development of the resource—or chosen to extract less coal. But in reality, the government does not extract the resources for itself and instead relies on the coal firm to do so.⁴⁵

Thus, a royalty payment, by also targeting the residual negative externalities not addressed by other policies (such as direct regulation limiting greenhouse gas emissions from coal mines), would in theory allow to the public to enjoy maximum net benefits from extraction by forcing the coal firm to internalize negative externalities and align its incentives with those of the government.⁴⁶ This justification for a royalty is implicit in Orchard’s characterization of the minimum royalty as the landowner’s compensation for otherwise uncompensated environmental externalities of mining such as “the marring of the beauty of the locality with an ugly mine mouth, a black coal tipple, or a dump heap.”⁴⁷ The association of royalty payments with payments for residual environmental costs is also implicit in the fact that about half of the federal government’s revenues from royalty payments are returned to the states where mining occurs.⁴⁸ The implication of this revenue-sharing policy is discussed in more detail in the next Part.

The idea that the royalty can help align producer incentives with those of the government and potentially address externalities is not new. For example, the existence of positive externalities such as “the stimulation of an infant industry and the development of mineral resources” was used as a “principal rationale” for imposing no royalties on the discovery and extraction of certain minerals in 1872.⁴⁹ Historically, the fact that “[o]il and gas operations have minimal effect on surface use compared to coal operations which are usually highly disruptive to the surface” has been offered as a relevant difference between oil-and-gas extraction and coal that justifies different royalty rates.⁵⁰ The legislative history for Federal Coal Leasing Amendments Act of 1976 also indicates that U.S. policymakers were aware that “[o]ne manner by which [more costly] underground mining can be encouraged is by the use of a lower royalty rate on coal mined by underground methods.”⁵¹ More recently, Radford Schantz, Jr., a member of a 1993 task force assembled by Interior for the economic analysis of royalty proposals, recalled that compensation for environmental impacts in particular was a justification offered for a royalty at the time.⁵² In fact, according to him, an initial proposal for dealing with pollution from abandoned mines involved using revenue from royalty payments, “underscoring the environmental aspect of the royalty.”⁵³ There is also evidence outside of the United States of governments using royalties to motivate changes in firm behavior. For example, in 1987 New Zealand introduced royalty payments to help reduce geothermal extraction from the Rotorua geothermal field.⁵⁴

Regarding the environmental justification in particular, however, economists often emphasize that, from the point of view of economic efficiency, direct economic instruments (such as a specific price or quantity condition on pollutants from mining activities) may be better suited to control environmental externalities, as these instruments could be directed at specific environmental problems and pollutants.⁵⁵ Much of this concern is motivated by the idea that many environmental externalities produce site-specific damages,⁵⁶ though notably, this concern is absent in the context of externalities from global pollutants like carbon and methane. In any event, it is undeniable that the financial and environmental purposes underlying royalty payments “are not really separate” because, as Schantz explains, “[w]hen correctly measured, the wealth embodied in in-ground minerals is an indicator of their social utility value” and “[a]s such, it ought to be net of the social costs of mining, including the value of environmental impacts.”⁵⁷

Thus, Schantz gives this justification an economic treatment when modeling the government's supply of a royalty.⁵⁸ In his model, the government landowner weighs the value of income from the sale against the value of what it gives away.⁵⁹ The government determines this latter value by evaluating: (1) opportunity cost, defined as the value of alternative uses of the land; (2) user cost; and (3) residual environmental impacts not mitigated by other laws or regulations.⁶⁰ These considerations form the minimum royalty that the government would accept at each site (comparable to Orchard's statement of the minimum royalty). The demand for leasing land for exploration and eventual mining, in turn, is determined by the prospector's assessment of the expected value of exploration at the site. Assuming competitive bidding for each site, the optimal royalty that emerges is equal to the supply price for the site (the opportunity cost, user cost, and environmental cost) plus, if applicable, a premium for economic rents at certain sites generated by competition among prospectors.⁶¹ At the marginal site, this premium would be zero, and the royalty would equal the supply price.⁶²

Economists have modeled the effect of various forms of royalty and taxes in bringing production closer to the socially optimum level and rate, but many of the effects are ultimately dependent on the type of assessment scheme chosen for the royalty.⁶³ In general, however, royalties take the form of *ad valorem* taxes, that is, taxes on the amount or value or the resource.⁶⁴ Although an analysis of the optimal form of a royalty is beyond the scope of this report, we note that there is a robust literature in economics about setting an optimal *ad valorem* tax in the context of externalities.⁶⁵ For example, economist Evan F. Koenig has argued that *ad valorem* taxes combined with specific taxes are a viable policy option that may outperform other regulation in appropriately accounting for externalities given uncertainty under certain conditions.⁶⁶

III. Legislative History

Legislative history concerning coal and other mineral resource extraction and leasing demonstrates that leasing policies and royalty rates have consistently been used as policy levers to encourage development when deemed necessary for the advancement of the national interest and to compensate the public for the removal and value of mineral resources. Congress has repeatedly made policy judgments with respect to the value of mineral resources; the desirability of promoting the development of a particular type of resource; and, beginning in the 20th century, the best way to allocate revenue from resource extraction to the public and communities affected by resource development. In addition, Congress has vested the Secretary of the Interior with broad authority to set royalty rates and manage the federal coal program in order to best serve the national interest.

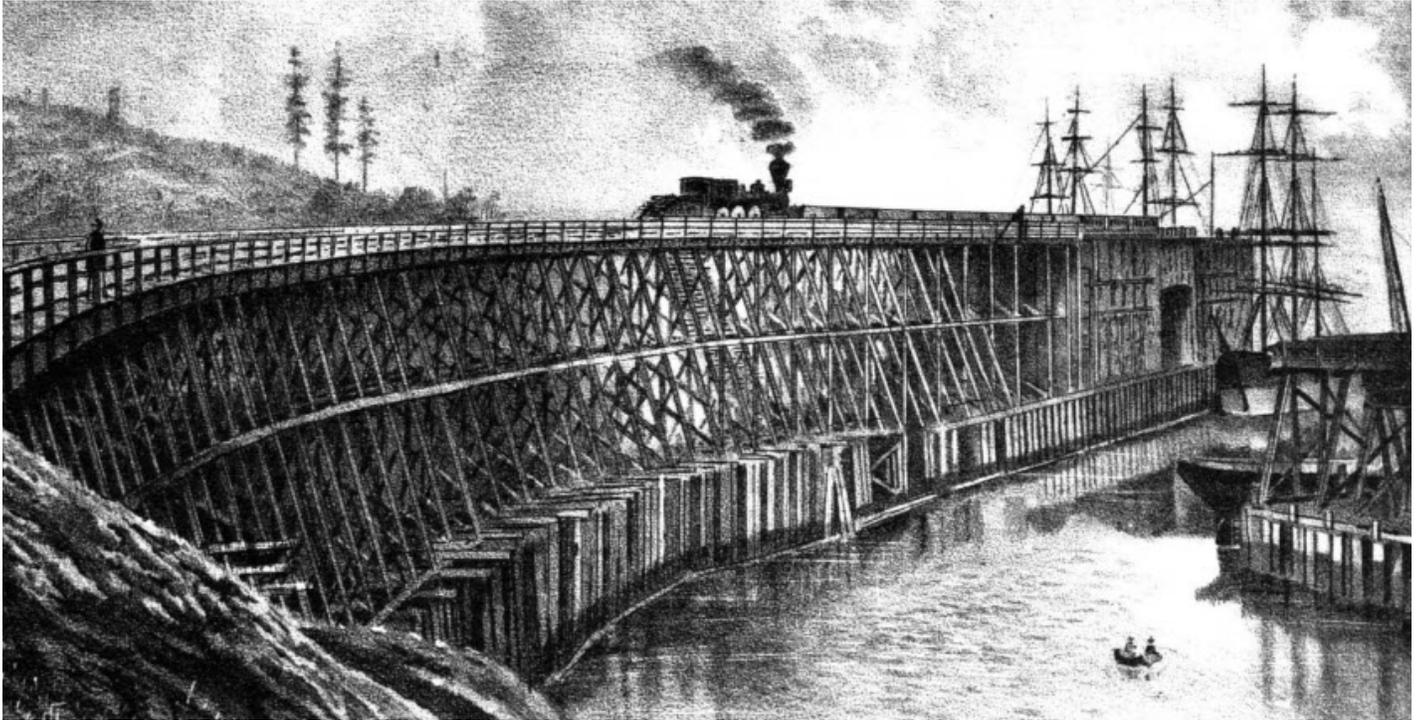
One of the earliest records of the United States' contemplation of mineral rights appears in the provisions for the sale of land by the government in the Northwest Territory in the Land Ordinance of May 20, 1787, which provided that "there shall be reserved . . . one-third part of all gold, silver, lead, and copper mines, to be sold, or otherwise disposed of as Congress shall hereafter direct."⁶⁷ The provision was, however, not adopted by the Constitutional Convention.

As the settlement of the United States expanded westward, the general policy of public land management was to convey lands to private ownership as quickly as possible, to encourage settlement, farming, and mining.⁶⁸ The gold rush of 1848 prompted the consideration of mineral resource legislation by Congress in 1849 and 1850, but Congress failed to take any action to control western mineral resources.⁶⁹

Starting in the second half of the 19th century, Congress began to treat coal differently from other minerals, as its value as an energy source became clear. In 1864 and again in 1873, Congress enacted Coal Lands Acts authorizing private purchase in fee simple⁷⁰ of lands classified by Interior as valuable for coal; those statutes set a maximum limit of 160 acres on individual entry and minimum prices of \$10 to \$20 per acre.⁷¹ Congress enacted the General Mining Law of 1872 to address other minerals; that statute authorized the sale of public lands in fee simple to mining claimants at rates of \$2.50 to \$5.00 per acre.⁷² The Coal Lands Acts and General Mining Act of 1872 helped open the West by allowing individuals to obtain exclusive rights to mine billions of dollars worth of gold, silver, coal, and other hardrock minerals from federal lands without having to pay a federal royalty.⁷³

At the turn of the 20th century, concerns arose about the price, supply, and control of coal, and Congress began to discuss ways to retain federal control of mineral resources.⁷⁴ Congress passed the Coal Lands Act of 1909,⁷⁵ which authorized the issuance of patents to "[a]ny person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal," upon proof of compliance with those land laws.⁷⁶ The Act, however, mandated that the patent "shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same."⁷⁷ Thus, the statute aimed to reconcile the twin goals of the federal government to settle the West and to retain federal ownership of valuable mineral resources.

Legislative history leading up to the passage of the Mineral Leasing Act of 1920 reveals the desire among members of Congress to retain public ownership of mineral resources.⁷⁸ Royalty rates were described as a way to "assure the Government an adequate return from lessees,"⁷⁹ and represented the way in which "the community shares in the element of value."⁸⁰



Tacoma Coal Bunkers. Courtesy of Washington State Library

Some representatives from states with federal land within their borders expressed concern that “the communities in which these great resources lie would not obtain any considerable part of the cream of the values taken from them in the way of royalty.”⁸¹ This concern has persisted today, in calls for a greater portion of royalties to be returned to states in which minerals lie or to coastal states near offshore mineral tracts. (See discussion later in this Section.) Other members of Congress were apprehensive about the broad grant of authority to Interior in the draft bill that would become the Mineral Leasing Act, stating that “the Secretary of the Interior is given practically unlimited authority as to the granting and the terms and conditions of leases. One will search the bill in vain to find any provision in it which insures to anyone under any circumstances the unquestioned right to make a lease.”⁸²

The Mineral Leasing Act of 1920 provides for the disposition of reserved minerals, including coal, oil, and natural gas, on federal lands subject to enumerated lease terms and payments. The Act sets a minimum royalty rate for “the privileges of mining or extracting the coal in the lands covered by the lease” payable to the United States of “not less than 5 cents per ton of two thousand pounds.”⁸³ The Mineral Leasing Act also states that the Secretary of the Interior can include coal, oil, or natural gas lease terms that she or he deems necessary “to insure the sale of the production of such leased lands to the United States and to the public at reasonable prices, for the protection of the interests of the United States, for the prevention of monopoly, and for the safeguarding of the public welfare.”⁸⁴ Royalties during this period were described as a way to “protect the Government in a declining market,” and were based on cents per ton (and varied with the quality of coal and associated difficulties of mining it); however, this method changed to “a percentage of value royalty” in the late 1960s.⁸⁵

In 1970, the congressionally established bipartisan Public Land Law Review Commission recommended that all federal lands be retained in federal ownership unless disposal to private parties would achieve a greater benefit and provide equitable compensation if the use is interrupted. In establishing guidelines for public land management, the Commission stated, “[t]he end result, of course, is to achieve the maximum benefit for the general public”⁸⁶ In addition to emphasizing federal control, Congressional testimony leading up to the passage of the Federal Land Policy

and Management Act in 1976 reveals support for revenue-sharing provisions that would direct a portion of the revenue from fossil fuel production to the states where the production occurs in order to “help county government[s] cope with energy development impact problems.”⁸⁷

The Federal Land Policy and Management Act requires that the United States “receive fair market value of the use of the public lands and their resources unless otherwise provided for by statute.”⁸⁸ The Federal Coal Leasing Amendments Act of 1976 likewise specifies that no bid may be accepted which is less than “the fair market value, as determined by the Secretary, of the coal subject to the lease.”⁸⁹ The term “fair market value” is not defined in either statute. In 1982—the last time that Interior convened a working group to comprehensively review its fair market value procedures—the task force determined that “fair market value” was not merely the value of the resource discovered or produced, but the value of “the right” to explore and, if there is a discovery, to develop and produce the energy resource.⁹⁰ Indeed, the Federal Land Policy and Management Act refers to the value of using the lands, and not solely to the value of the resources.

The final version of the Federal Coal Leasing Amendments Act of 1976 states: “A lease shall require payment of a royalty in such amounts as the Secretary shall determine of not less than 12½ per centum of the value of coal as defined by regulations, except the Secretary may determine a lesser amount in the case of coal recovered by underground mining operations.”⁹¹ According to one hearing statement, “[t]he overall objective [of the royalty] is to get a fair market value for the Federal resources back into the Federal Treasury.”⁹²

In 1982, Interior set the royalty rate for underground coal mining at not less than 8 percent of the value of the coal removed from the lease; in 1990 it changed the rate to a flat 8 percent.⁹³ The main reason provided in the legislative history for giving Interior discretion to treat royalty rates for surface mining and underground mining differently was the perceived additional cost and difficulty of underground mining and the lower sale price of deep-mined coal.⁹⁴ According to the hearings, “[y]ou could certainly logically expect to have much less [sic] amounts bid in a competitive sale for deep coal if you had the same royalty for surface coal and deep coal.”⁹⁵

Central to the question of how royalties interact with externalities, the legislative history of the Federal Coal Leasing Amendments Act of 1976 also reflects a concern that states be paid a greater share of federal coal royalties to account for social and environmental externalities. In considering the bill, which would direct an additional 12.5 percent of royalty revenues to states with federal leases within their borders (in addition to the 37.5 percent they already received at that time) the Committee on Interior and Insular Affairs stated, “The current restrictions on the manner in which monies return to the States from the sale of Federal leases within their borders are onerous. When an area is newly opened to large scale mining, local governmental entities must assume the responsibility of providing public services needed for new communities, including schools, roads, hospitals, sewers, police protection, and other public facilities, as well as adequate local planning for the development of the community.”⁹⁶ The legislative history also reflects concern as to “the waste of valuable resources, and the creation of severe environmental impacts.”⁹⁷

The Federal Coal Leasing Amendments Act increased the state share of revenue from federal coal royalties, provided that the state share of revenue be used by “giving priority to those subdivisions of the State socially or economically impacted by development of minerals leased under this Act, for (i) planning, (ii) construction and maintenance of public facilities, and (iii) provision of public service . . .”⁹⁸ Thus, the Act directly links receipt of production revenues to compensation for the social and environmental costs of mineral production.

Furthermore, coastal states and their congressional representatives have repeatedly advocated for a greater share of offshore oil and natural gas revenue, due to significant impacts on coastal infrastructure and the environment.⁹⁹ According to coastal producing states, these revenues are needed to mitigate environmental impacts and to maintain the necessary support structure for the offshore oil and gas industry.¹⁰⁰ In addition, the Gulf of Mexico Energy Security Act of 2006 directs coastal states to use their share of royalty payments from offshore drilling for “the purposes of coastal protection, including conservation, coastal restoration, hurricane protection, and infrastructure directly affected by coastal wetland losses,” and “[m]itigation of damage to fish, wildlife, or natural resources,” among other delineated uses.¹⁰¹ Moreover, the federal Land and Water Conservation Fund, since its establishment in 1965, has used federal oil and gas revenues to build and maintain public parks and protect open space and trails across the country.¹⁰²

Of course, to the extent that states receive a greater proportion of the royalty as compensation for social, environmental, or economic impacts, less is left for the federal government unless the royalty rate is increased. There is no defensible reason for the federal government to receive a lower proportion of the royalty simply because some externalities are borne by the states. Instead, Interior should increase the royalty rate in order to shift more of the externality costs onto coal producers and arrive at a more socially optimal royalty rate.

Congressional efforts to modernize hardrock mining law also directly link royalties to compensation for negative externalities. No royalties are currently paid for hardrock mining on federal lands. The Hardrock Mining and Reclamation Act of 2007 would have imposed a royalty of 4 percent of gross revenues on existing mining from unpatented mining claims and placed an 8 percent royalty on new mining operations.¹⁰³ Seventy percent of the royalty money would have gone to a cleanup fund for past abandoned mining operations, and 30 percent to affected communities.¹⁰⁴ The Hardrock Mining and Reclamation Act of 2009 would have provided that the Secretary of the Interior establish a royalty rate of between 8 and 15 percent of the value of mineral production from any new mines on federal mineral lands, with royalties and reclamation taxes used to reclaim abandoned hardrock mines.¹⁰⁵

Finally, the royalty rate for both surface and underground coal is lower than the royalty rate collected for other taxpayer-owned natural resources, such as offshore oil and gas, which generate royalties of 18.75 percent.¹⁰⁶ Interior raised the offshore oil and gas royalty rate in 2007 due to a number of factors, including increased oil and gas prices, technological improvements that made exploration and production more efficient, and the competitive market for leases.¹⁰⁷ Former Interior Secretary Ken Salazar said increasing the offshore rate was necessary to ensure that “the American taxpayer is getting a fair return for the oil and gas that the American people own”; he also pointed to higher state onshore rates for oil and gas as a possible justification to raise the onshore federal rate for oil and gas.¹⁰⁸

In short, legislative history concerning coal and other mineral resource extraction demonstrates that leasing policies and royalty rates have consistently been used as policy levers to encourage development of particular minerals; to retain federal ownership of lands and resources; and to ensure adequate compensation to the public for the removal of mineral resources, in light of changing technology, environmental impacts, and market conditions. More broadly, Congress has sought to use royalty rates to advance the national interest, and has vested the Department of the Interior with discretion to manage the federal coal program in order to best serve the public interest.

IV. Private Royalties

While less relevant to Interior, as a social decisionmaker acting on behalf of the U.S. public, private royalty rates and mineral resource leases are influenced by diverse factors, including expected economic rent, characteristics of the resource, competition for the lease, and externalities that may affect the leaseholder, such as noise and pollution.

Negotiation of the Royalty Rate

The royalty rate for coal, oil, and gas production on private lands is variable, and depends on a number of different factors, including the expected rate of return for the extracted resource, the number of other producers offering leases in the area, and the number of other nearby mineral owners currently negotiating with a producer.¹⁰⁹

The exact value of a royalty rate can be negotiated between parties, and the result depends highly on the negotiation power and skills of each party. The negotiation power, in turn, depends on how many acres of resource the mineral owner owns, how close the land is to “proven production,” and how many other companies are competing for the specific lease.¹¹⁰ As expected, the owner of “a large tract next to a newly discovered field with numerous oil companies vying for the lease” would possess a significant amount of negotiation power¹¹¹ and could negotiate a high royalty rate for the lease. In the shale development context, however, there are also concerns that the oil and gas industry unfairly dominates negotiations.¹¹² In support of this view, economists Christopher Timmins and Ashley Vissing have found that demographic factors are also associated with negotiation power, with high-income mineral owners able to negotiate higher royalty rates.¹¹³

The way the resource is appraised can also influence the royalty rate, depending on whether it uses “market price” or “proceeds” or whether it includes an option to take royalties “in kind.”¹¹⁴ The percentage of the royalty rate, being driven by market forces, is dependent on “what others in the area are willing to lease.”¹¹⁵ Oil and coal leases tend to use “market price,” gas leases use “proceeds,” and mineral owners may receive their share “in kind.”¹¹⁶ Sometimes, producers are able to deduct post-production expenses from the total royalty amount due to the mineral owner.¹¹⁷

In negotiating private leases, the parties often take into account pollution, surface disruptions, and other impacts. For example, mineral owners, in addition to negotiating the royalty rate, can negotiate lease clauses such as environmental clauses that encourage the use of safeguards to prevent contamination of soil and water and noise clauses that require the use of mufflers with loud equipment.¹¹⁸ And in cases when mineral rights and surface rights are held separately (a split-estate), the surface owner can negotiate compensation for protection from “unreasonable encroachment and damage” to the surface.¹¹⁹ One 1979 commentator urged that “[l]andowner-lessors should provide for escalating royalty payments according to the type of mining method used” to account for different waste production.¹²⁰

Private royalty rates have also evolved with advances in technology that have made extraction more efficient, such as hydraulic fracturing. About 30 years ago, a typical oil and gas royalty rate for a private landowner was 12.5 percent; today, largely due to the growth of shale development, this negotiable rate has increased to an average of approximately 16 to

25 percent.¹²¹ In the shale gas context, the new higher average royalty rate varies from state to state. By 2010, in West Virginia, the average royalty rate was between 16 to 18 percent;¹²² in Pennsylvania, it was between 17 and 18 percent;¹²³ in Wyoming, it ranged from 12.5 to 20 percent;¹²⁴ and in Texas, it ranged from 18 to 28 percent, with an average of 25 percent.¹²⁵

Statutory Minimums for Private Royalties

Some states have enacted laws that guarantee a minimum royalty rate to private landowners, usually set at 12.5 percent, and regulate how companies calculate royalty payments.¹²⁶ West Virginia, for example, has a 12.5 percent minimum royalty rate guaranteed by statute.¹²⁷ Pennsylvania has had such a minimum royalty guaranteed by the “Guarantee of Minimum Royalties Act of 1979 for oil-and-gas development,”¹²⁸ though there have been recent proposals to change the way that royalties are calculated to ensure that the landowner receives the 12.5 percent minimum.¹²⁹ North Carolina also has a minimum royalty payment statute, which requires any lease or “any other conveyance of any kind separating rights to oil or gas from the freehold estate of surface property” to have a minimum royalty payment of 12.5 percent, which cannot be reduced by pre- or post-production costs.¹³⁰ Finally, Wyoming, Nevada, and Michigan all regulate post-production cost deductions. Wyoming passed the Royalty Payment Act of 1982, which prevents the “costs of production” from being deducted from a landowner’s royalty.¹³¹ Nevada “excludes the costs of production from the landowner’s royalty,” which includes post-production costs.¹³² Michigan only “allows a gas driller to deduct only two types of post-production costs: processing costs that enhance the value of the gas and transportation costs incurred after the point of entry into an independent pipeline system.”¹³³

V. Royalties in Other Contexts

Royalty rates play a critical role in multiple industries beyond mineral resource extraction. Within the intellectual property context, royalty rates are often used to compensate patent owners for the use of their patent, commonly orchestrated through licenses. To determine damages for patent infringement, courts assess several factors, including the value of the property the infringer has appropriated as well as the value he or she has gained from its use, to determine a “reasonable royalty” that forms the basis of damages owed to the patent holder. Royalties are also used in other contexts, such as the music industry, in order to balance competing interests between copyright holders and users.

Federal law and policy in these fields has sought to provide proper incentives to intellectual property holders and property users and reconcile competing interests. This is analogous to how royalty rates have evolved in the natural resources context, and is consistent with the recent calls to reform coal royalty rates in order to strike a more proper balance between coal development on the one hand, and conservation and mitigation of environmental damages on the other.

Royalties in Patent Law and the Determination of “Reasonable Royalties” for Patent Infringement Damages

In the intellectual property context, royalty payments can be viewed as a profit-sharing mechanism. Patent holders have relatively broad authority to license a patent “for any royalty, or upon any condition” so long as that royalty or condition is reasonable.¹³⁴ In addition to being set reasonably, royalties must “be reasonably related to the licensee’s use of the patented invention.”¹³⁵ The setting of licensing royalties has not been without controversy. On the one hand, in *Brulotte v. Thys Co.*, the Supreme Court has held that “[a] patent empowers the owner to exact royalties as high as he can negotiate with the leverage of that monopoly.”¹³⁶ But on the other hand, courts have concluded that some royalty rates are too high. For example, in the late 1960s, the Seventh Circuit held that a royalty rate of 24 percent was “exorbitant and oppressive”



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in the context of the case—though the decision was later reversed and the rate ultimately upheld on a second appeal to the court.¹³⁷ Today, licensing royalty rates vary by patent and by industry. Below is a summary table demonstrating the range of royalty rates found in licensing agreements in various industries in the intellectual property context.¹³⁸

Industry	Average	Median	Max	Min
Chemicals	4.8%	4.5%	25.0%	1.0%
Internet	13.5%	10.0%	80.0%	0.3%
Telecom	5.5%	4.9%	50.0%	0.4%
Consumer Goods	6.0%	5.0%	40.0%	0.1%
Media	12.7%	8.0%	70.0%	0.1%
Food processing	3.9%	3.0%	30.0%	0.3%
Medical/health	5.8%	5.0%	50.0%	0.1%
Pharmaceuticals/biotech	7.7%	5.0%	90.0%	0.0%
Energy	5.3%	4.6%	75.0%	0.1%
Machines/tools	5.3%	4.5%	25.0%	0.5%
Automotive	4.8%	4.0%	20.0%	0.5%
Electrical	4.4%	4.1%	20.0%	0.5%
Semiconductors	5.1%	4.0%	30.0%	0.0%
Computers	5.3%	4.0%	25.0%	0.2%
Software	11.6%	6.8%	77.0%	0.0%

In addition, average licensing royalty rates may be increasing over time. For example, researchers have assessed changes in royalty rates in the medical device, pharmaceutical and chemical industries and noted upward trends in the licensing royalties in these sectors from the late 1980s to mid-2000s: average royalty rates increased from 3.86 to 5.68 percent in the medical device industry and from 5.21 to 8.52 percent in the pharmaceutical industry.¹³⁹

Royalty rates are also used in the intellectual property context to determine damages owed when an infringer uses a patent without license.¹⁴⁰ Damages may be determined, among other things, through expert testimony for “determination of damages or of what royalty would be reasonable under the circumstances.”¹⁴¹ This “reasonable royalty” doctrine emerged in the early 20th century. Preliminary versions of the Patent Act, which was first passed in 1770, defined damages for infringement with little guidance.¹⁴² In its 1915 decision in *Dowagiac Manufacturing Co. v. Minnesota Moline Plow Co.*, the U.S. Supreme Court sanctioned “a reasonable royalty” as an appropriate measure of infringement damages.¹⁴³ The Patent Act of 1922 first codified this “reasonability” concept by referring to the infringer’s liability as based on “a reasonable sum as profits or general damages.”¹⁴⁴ By 1946, the patent statute explicitly stated that “a reasonable royalty” was available to determine damages.¹⁴⁵ The current language directs courts to award “damages adequate to compensate for the infringement, but in no event less than a reasonable royalty.”¹⁴⁶

Determining a “reasonable royalty” and overall damages, however, is not a simple task. The Federal Circuit, in addressing this issue, has ruled that “a reasonable royalty is the minimum permissible measure of damages for patent infringement,” or a floor, not ceiling for damages.¹⁴⁷ Courts have also emphasized the purpose of reasonable royalty-based damages in the patent infringement context, noting that “[t]he purpose of compensatory damages is not to punish the infringer

but to make the patentee whole.”¹⁴⁸ It used to be the case that, in calculating patent damages, courts used a “25 percent rule of thumb,” which set the royalty equal to 25 percent of the infringer’s profit from sales of the products embodying the licensed technology.¹⁴⁹ But in *Uniloc USA, Inc. v. Microsoft Corp.*, the Federal Circuit held that the 25 percent “rule of thumb” was “arbitrary,” “unreliable,” and a “fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation.”¹⁵⁰

What remains is a list of fifteen factors, first outlined in *Georgia Pacific Corp. v. U.S. Plywood Corp.*, that courts consider to determine the reasonable royalty rate under the circumstances.¹⁵¹ As the *Georgia-Pacific* factors demonstrate, the calculation of reasonable royalties is a complex and holistic analysis dependent on many factors relevant to the nature and characteristics of the property and patent at issue. The *Georgia Pacific* factors include: (1) whether the license is restricted or non-restricted with respect to whom the manufactured product may be sold; (2) the duration of the patent and the term of the license; (3) the established profitability of the product made under the patent and its current popularity; (4) the utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results; and (5) the effect of selling the patented specialty in promoting sales of other products of the licensee, and the value of the invention to the licensor as a generator of sales of his non-patented items. Many of these factors have analogues in the natural resources context, as the duration and terms of coal lease; whether the coal can be sold to any purchaser; the value and demand for the coal; and the environmental characteristics of the coal or coal tract (i.e., sulfur or other air pollutant content; anticipated remediation) all may influence the value of a coal lease.

The *Georgia-Pacific* reasonable royalty factors have been criticized as leading to uncertain, variable outcomes in patent litigation.¹⁵² Still, the reasonable royalty concept embodies several broad principles about royalty determination and reveals the flexibility of quantifying royalties in intellectual property law. The patent context demonstrates that royalty determinations in this field tend to be flexible and determined by specific aspects of the property being used, while accounting for the value of the property at issue.

Royalties in the Music Industry

Royalties are used extensively across the American music industry. The U.S. Constitution empowers Congress “[t]o promote the Progress of Science and useful Arts,” by providing artists and inventors with copyright and patent protection.¹⁵³ This authority has led Congress to pass several copyright statutes throughout history.¹⁵⁴ The first major act, the Copyright Act of 1909 was established to achieve the “ultimate goal . . . [of] enhanc[ing] public welfare.”¹⁵⁵ In an early music copyright litigation dispute, *Herbert v. Shanley Co.*, the Supreme Court ruled that when a for-profit business plays a songwriter’s musical work, the performance constitutes a public performance of the copyright holder’s work for profit, and, accordingly, the business owner must compensate the copyright holder for the performance.¹⁵⁶ Here too, we see an early articulation by the Court of the necessity of compensating the value-creator, or owner, for his or her property’s use.

In general, mechanical licenses to reproduce music are set at a “statutory rate” by the Copyright Arbitration Panel, under the Copyright Act.¹⁵⁷ Each musical license contains two types of copyright—a “musical work” copyright and a “sound recording” copyright.¹⁵⁸ “The owner of a musical work[, generally the songwriter,] possesses exclusive rights under the Copyright Act, including the right to authorize others to exploit [other] exclusive rights.”¹⁵⁹ Musical copyright owners can also license the rights to publicly perform their work, and these rights are often licensed either through a flat fee or through a royalty-type percentage of profits made.¹⁶⁰ The rights surrounding a sound recording copyright, usually possessed by a record label, include the exclusive right to “make and distribute copies or phonorecords” (e.g., CDs and DVDs) of the work.¹⁶¹ Currently, for distribution of “permanent downloads or physical phonorecords of a musical

work,” the royalty rate is 9.1 cents per copy distributed.¹⁶² In the online music-streaming context, the rate is generally 10.5 to 12 percent of the online service’s revenue from the streaming of that work.¹⁶³ Royalty rates for mechanical music licensing have increased over time. The Copyright Act of 1909 first set compulsory mechanical licensing rates at only 2 cents per reproduction.¹⁶⁴

Royalty rates have also been used, and suggested for use, in varying remedial contexts in the music industry. For example, in the rise of home audio recording in the late 20th century, Stuart Talley proposed that Congress “increase royalties on blank tapes” in order to discourage home recording while compensating the original artists, whom home recording affects.¹⁶⁵ As in the patent context, reasonable royalties in the music context are determined through several factors. Under the Copyright Act of 1976, Copyright Royalty Judges (CRJs, officers appointed by the Librarian of Congress to collect royalties), must determine reasonable royalty rates that balance four goals: “(1) to ‘maximize the availability of creative works,’ (2) to provide a ‘fair’ return to both the copyright owner and the copyright user, (3) to ‘reflect the relative roles’ of the owner and user as to ‘creative contribution, technological contribution, capital investment,’ and the like; and (4) to minimize any disruptive impact on industry structure.”¹⁶⁶ Thus, the royalty determination seeks to balance competing interests in order to ensure profitability for both copyright holder and user, while also valuing the creative work of the original artist and industry stability as a whole.

In the context of copyright law, the royalty rate has also been used to account for positive externalities. Specifically, the Copyright Act “codifies the equitable doctrine of fair use by providing a defense for infringing uses which are permissible because their overall value to society outweighs the copyright owner’s interest in enforcing its property boundaries.”¹⁶⁷ In evaluating the defense of fair use, courts balance four factors: “(1) the purpose and character of the use (for example, commercial v. non-profit); (2) the nature of the copyrighted work (factual v. fiction); (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work.”¹⁶⁸ As one legal commentator wrote, “the strongest case for royalty-free fair use is the large number of positive externalities that are created through the use of creative/copyrightable subject matter.”¹⁶⁹ Just as positive externalities can justify lower royalty rates, negative externalities can justify higher royalty rates.

In sum, royalty rates are used in the intellectual property context in a variety of industries. In general, royalty rate determinations incorporate multiple factors, seeking to compensate the property owner or patent holder for the value of his work, while also accounting for value gained by the infringer. Much as Interior is empowered to do in the federal natural resources context—and has recently done, with respect to offshore oil and gas production—royalty rates are determined by considering context-specific factors, such as the nature of the property at issue, positive or negative externalities, and more.

Conclusion

Royalties have several commonly accepted justifications, including sharing in economic rent; compensating the owner for removal of a nonrenewable resource; and compensating the owner for negative externalities. While the externality justification appears much more frequently in recent economic literature and legislative history, royalties have been used as a policy lever to influence behavior and meet national goals for centuries. Historical uses, accepted economic justifications, legislative history, and examples of royalty use by private actors and in other industries all support the determination that it would be reasonable for Interior to increase coal royalty rates to account for externality costs and to better align the federal coal program with national climate change priorities.

Endnotes

- ¹ U.S. DEP'T OF THE INTERIOR, OFFICE OF THE SECRETARY, Press Release: Secretary Jewell Launches Comprehensive Review of Federal Coal Program (Jan. 15, 2016), available at <https://www.doi.gov/pressreleases/secretary-jewell-launches-comprehensive-review-federal-coal-program>.
- ² Robert E. Sullivan, *All About Royalties*, 16 ROCKY MTN. MIN. L. INST. 7 (1971). Commentators emphasize its impact to varying degrees, though Robert Sullivan argues it “was significant.” *Id.*
- ³ Dante L. Zarlengo, *Royalty Concepts and Present Applications to Federal Oil and Gas and Coal Leases*, 19 ROCKY MTN. MIN. L. INST. 1 (1986).
- ⁴ *Id.*; John S. Lowe, *Defining the Royalty Obligation*, 49 SMU L. REV. 223, 258 (1996).
- ⁵ Zarlengo, *supra* note 3.
- ⁶ *Id.* Despite hesitation among scholars to use royalty and rent interchangeably, some mineral leases have used them that way. See Sullivan, *supra* note 2 (citing 2 BOUVIER'S LAW DICTIONARY (Rawle's ed. 1914)).
- ⁷ Zarlengo, *supra* note 3.
- ⁸ Sullivan, *supra* note 2 (citing 1 LINDLEY, MINES §§ 2, 3 (3d ed. 1914); 2 SNYDER ON MINES § 1276 (1902)).
- ⁹ The specification of the 20 percent royalty rate on war loot was institutionalized from the start of the Islamic conquest, with the rate set down in the Quran, in Sura VIII (Al-Anfal), verse 41: “And know that out of all the booty that ye may acquire (in war), a fifth share is assigned to Allah . . .” (Quran 8:41).
- ¹⁰ Charles Thomson, THE ORDINANCES OF THE MINES OF NEW SPAIN: TRANSLATED FROM THE ORIGINAL SPANISH, WITH OBSERVATIONS UPON THE MINES AND MINING ASSOCIATIONS 142, 147 (1825).
- ¹¹ See Laura H. Burney, *Interpreting Mineral and Royalty Deeds: The Legacy of the One-Eighth Royalty and Other Stories*, 33 ST. MARY'S L.J. 1, 3 n.4 (2001) (citing Leslie Moses, *The Evolution and Development of the Oil and Gas Lease*, 2 INST. ON OIL & GAS L. & TAX'N 1, 10 (1951)); see also Noelle C. Letteri, *Resolving the Multi-Fractional Deed Dilemma—Concord Oil Co. v. Pennzoil Exploration & Production Co.*, 30 ST. MARY'S L.J. 615, 653 (1999) (also citing Moses).
- ¹² See, e.g., *Garrett v. Dils Co.*, 299 S.W.2d 904, 907 (Tex. 1957) (“The court takes judicial knowledge of the fact that the usual royalty provided in mineral leases is one-eighth.”); *Leonard v. Prater*, 36 S.W.2d 216 (Tex. Comm'n App. 1931) (“It is a matter of common knowledge that the customary compensation to lessors, paid by lessees, under conditions similar to those existing at the time the original contract was executed, is 1/8 of the gross production as royalty.”).
- ¹³ See, e.g., *Newburg Petroleum Co. v. Weare*, 27 Ohio St. 343, 348 (1875) (discussing a dispute involving a one-sixth royalty).
- ¹⁴ See, e.g., Larry L. Dale, *The Pace of Mineral Depletion in the United States*, 60(3) LAND ECON. 255 (1984); John H. Mutti & William E. Morgan, *Changing Energy Prices and Economic Rents. The Case of Western Coal*, 59 LAND ECON. 164, 164-65 (1983); John E. Orchard, *The Rent of Mineral Lands*, 36(2) QJ. ECON. 290, 290-91 (1922); ROSS GARNAUT & ANTHONY CLUNIES ROSS, *TAXATION OF MINERAL RENTS 1*, 17-36 (Clarendon Press Oxford 1983).
- ¹⁵ DAVID RICARDO, *ON THE PRINCIPLES OF POLITICAL ECONOMY AND TAXATION* (London 1817), available at <http://www.econlib.org/library/Ricardo/ricP1a.html> (Chapter 2).
- ¹⁶ *Id.*
- ¹⁷ See Orchard, *supra* note 14, at 298-99. In the short run, all profitable mines arguably earn economic rents because they will operate as long as they recover their variable costs.
- ¹⁸ *Id.*
- ¹⁹ See GARNAUT & CLUNIES ROSS, *supra* note 14, at 22.
- ²⁰ Even assuming that there are no externalities and that the royalty perfectly captures economic rent, it is possible that, in the long run, the royalty will distort behavior because it will reduce incentives for discovering high-quality mineral deposits.
- ²¹ EXECUTIVE OFFICE OF THE PRESIDENT, *THE ECONOMICS OF COAL LEASING ON FEDERAL LANDS: ENSURING A FAIR RETURN TO TAXPAYERS*, White House, Council of Economic Advisors, at 11-12 (June 2016) [hereinafter CEA REPORT].

- ²² Whether a royalty actually captures economic rent is a separate matter. Such a royalty would be specific to each site, based on ex ante predictions of economic rent given the site's attributes and associated production costs, which may itself diverge from ex post realized costs. See Radford Schantz, Jr. *Purpose and Effects of a Royalty on Public Land Minerals*, 20(1) *RESOURCES POLICY* 35, 37 (1994). Generally speaking, a federal royalty could not perfectly capture such rent. See, e.g., P.S. DASGUPTA & G.M HEAL, *ECONOMIC THEORY AND EXHAUSTIBLE RESOURCES* 362 (1980) ("The subject is particularly murky, since the structure of optimum taxes often depends sensitively on the constraints the government faces in wielding the various controls available to it."); JAMES OTTO ET AL., *MINING ROYALTIES: A GLOBAL STUDY OF THEIR IMPACT ON INVESTORS, GOVERNMENT, AND CIVIL SOCIETY* 30 (World Bank 2006).
- ²³ Orchard, *supra* note 14, at 307-08. Notably, Orchard and the American mining operators that he quotes also refer to user costs, a concept discussed *infra* in the next Section, as partly justifying the royalty rate.
- ²⁴ *Id.* at 296 (quoting Rossiter W. Raymond, an American mining engineer, then secretary of the American Institute of Mining Engineers, in his testimony before the British Royal Commission on Mining Royalties appointed in 1889).
- ²⁵ *Id.* (quoting T. H. Bailey, a Birmingham mining engineer, testifying before a 1919 British coal commission).
- ²⁶ *Id.* at 298.
- ²⁷ *Id.* at 299-300.
- ²⁸ *Id.* at 299.
- ²⁹ *Id.* at 302-03. Most illustrative is the French practice in 1890 of setting variable royalty rates that ranged from 1/6th of yield for coal mined from the shallowest and thickest seams to 1/80th of the yield for coal mined from the deepest and thinnest seams. See *id.*
- ³⁰ This issue has attracted significant debate in economics. Some economists argue that royalties for nonrenewable resources are not rents, see, e.g., ALFRED MARSHALL, *PRINCIPLES OF ECONOMICS*, Book V, Chapter X, 254 (8th ed. 1920), available at <http://eet.pixel-online.org/files/etranslation/original/Marshall,%20Principles%20of%20Economics.pdf>, while others argue that the concept of rent is relevant, see e.g., Lewis Cecil Gray, *Rent Under the Assumption of Exhaustibility*, 28(3) *Q.J. ECON.* 466, 467-70 (1914). Still others conclude that royalties include both economic rent and user cost. See Orchard, *supra* note 14, at 290-97; see also Ben Fine, *Landed Property and the Distinction between Royalty and Rent*, 58(3) *LAND ECON.* 338, 343-45 (1982) (arguing that the question itself is irrelevant from a general equilibrium context).
- ³¹ Harold Hotelling, *The Economics of Exhaustible Resources*, 39(2) *J. POL. ECON.* 137-175 (1931).
- ³² MARSHALL, *supra* note 30.
- ³³ See, e.g., Dale, *supra* note 14.
- ³⁴ See Hotelling, *supra* note 31, at 165-69; Gerard Gaudet et al., *Optimal Resource Royalties with Unknown and Temporally Independent Extraction Cost Structures*, 36(3) *INT'L ECON. REV.* 715 (1995); Dale, *supra* note 14, at 255-56; DASGUPTA & HEAL, *supra* note 22.
- ³⁵ See Mutti & Morgan, *supra* note 14.
- ³⁶ *Id.*
- ³⁷ Orchard, *supra* note 14, at 295.
- ³⁸ *Id.* at 296.
- ³⁹ See OTTO ET AL., *supra* note 22, at 29; Mutti & Morgan, *supra* note 14 ("The federal government is receiving substantially higher royalty rates on new leases, but the higher current rates do not reflect a Marshallian royalty because the stock of western coal is virtually unlimited.").
- ⁴⁰ *Id.*
- ⁴¹ *Federal Coal Leasing Amendments Act of 1975: Hearing on S. 391 Before the Subcomm. On Minerals, Materials and Fuels of the S. Comm. On Interior and Insular Affairs*, 94 Cong. 504 app. (1975) [hereinafter *Hearing on S. 391*]; see also Orchard, *supra* note 14, at 295-96.
- ⁴² See William D. Schulze, *Optimal Use of Non-Renewable Resources: The Theory of Extraction*, 1 *J. ENVTL. ECON. & MGMT.* 53 (1974); Timothy R. Muzondo, *Mineral Taxation, Market Failure, and the Environment*, 40(1) *IMF STAFF PAPERS* 152, 160-62 (1993).
- ⁴³ CEA REPORT, *supra* note 21, at 2, 10; see also Gaudet et al., *supra* note 34, at 716 (characterizing the situation as a principal-agent problem in which the government seeks to capture all economic rents).
- ⁴⁴ See CEA REPORT, *supra* note 21, at 10; see also GARNAUT & CLUNIES ROSS, *supra* note 14, at 3-4 (noting that maximizing government revenue can coincide with maximizing social welfare when, among other things, "externalities are

compensated”); Schantz, *supra* note 22, at 36 (“When the government/landowner sells mineral rights, the rent ought to cover expected opportunity and environmental costs arising from anticipated mining activities.”); Orchard, *supra* note 14, at 313; OTTO ET AL., *supra* note 22, at 29-30.

⁴⁵ See CEA REPORT, *supra* note 21, at 10.

⁴⁶ See Muzondo, *supra* note 42, at 162 (“These results [after accounting for negative externalities in Hotelling’s model] suggest that in mining, where environmental taxes are rarely imposed, but specific taxes are popular with governments, such taxes have a redeeming feature: they can be considered proxies for current environmental externalities.”); Schantz, *supra* note 22, at 36.

⁴⁷ Orchard, *supra* note 14, at 295-96. In addition, this justification is implicit in the concern that “it may not be desirable to encourage underground mining [via a lower royalty rate] until technology has evolved which will allow a higher percentage of recovery be underground mining,” see *Hearing on S. 391*, *supra* note 41—that is, a concern that society may benefit more if the resource is left in the ground and potentially mined at lower social cost in the future.

⁴⁸ See, e.g., ROBERT H. NELSON, THE MAKING OF FEDERAL COAL POLICY 1, 225 (arguing, in 1981, that the royalty rate is excessive partly because states can, and do, get compensated for the “public costs of coal mining” through direct taxes).

⁴⁹ See Salvatore Lazzari, The Federal Royalty and Tax Treatment of the Hardrock Mineral Industry: An Economic Analysis, Congressional Research Service Reports – Taxation (June 13, 2008). Other commentators have noted that, practically speaking, the government would have been unable to enforce and collect a royalty in some regions, even if it did set one at that time.

⁵⁰ *Royalty Concepts and Present Applications to Federal Oil and Gas and Coal Leases*, 19D ROCKY MTN. MIN. L. INST. 1 (1986). The fact that offshore oil-and-gas royalty rates are now significantly higher than minimum onshore coal royalty rates (18.75 percent for offshore drilling in the Gulf of Mexico versus 12.5 percent for surface-mined coal and 8 percent for underground coal) further underscores the need to re-evaluate coal royalty rates.

⁵¹ See *Hearing on S. 391*, *supra* note 41.

⁵² See Schantz, *supra* note 22, at 36.

⁵³ *Id.*

⁵⁴ See B. J. Scott & A.D. Cody, *Response of the Rotorua Geothermal System to Exploitation and Varying Management Regimes*, 29 GEOTHERMICS (2000). The royalty was effective, eventually resulting in signs of recovery for the reservoir. See *id.*; B.W. O’Shaughnessy, *Use of Economic Instruments in Management of Rotorua Geothermal Field, New Zealand*, 29 Geothermics (2000).

⁵⁵ See, e.g., Mutti & Morgan, *supra* note 14, at 167 (“Stated differently, assuming impact costs vary among locations, it is desirable from an efficiency perspective to adopt policies that discriminate according to site-specific impact costs rather than financing impact through severance taxes that are imposed at a uniform rate.”); Schantz, *supra* note 22, at 36.

⁵⁶ Mutti & Morgan, *supra* note 14; Schantz, *supra* note 22, at 36.

⁵⁷ Schantz, *supra* note 22, at 36.

⁵⁸ *Id.* at 39; see also Orchard, *supra* note 14, at 295-96 (suggesting the minimal royalty compensates the landowner in part for otherwise uncompensated externalities of mining such as “the marring of the beauty of the locality with an ugly mine mouth, a black coal tipple, or a dump heap”).

⁵⁹ Schantz, *supra* note 22, at 39.

⁶⁰ *Id.*

⁶¹ *Id.* at 40.

⁶² *Id.*

⁶³ See, e.g., Muzondo, *supra* note 42, at 164-65 (summary table); I. Falk, *Dynamical Ecologic Taxes: Public Control for Interrelated Renewable Resources*, 13 RESOURCE & ENERGY (1991) (evaluating various policies to deal with pollution in the context of interrelated renewable resources).

⁶⁴ See GARNAUT & CLUNIES ROSS, *supra* note 14, at 92-94.

⁶⁵ See, e.g., Evan F. Koenig, *Indirect Methods for Regulating Externalities under Uncertainty*, 100(2) QJ. ECON. 479 (1985); Jukka Pirttila, *Specific versus ad valorem Taxation and Externalities*, 76(2) J. ECON. 177 (2002).

⁶⁶ Koenig, *supra* note 65, at 491-92.

⁶⁷ JOHN C. LACY, *HISTORICAL OVERVIEW OF THE MINING LAW: THE MINER’S LAW BECOMES LAW, IN THE MINING LAW OF 1872: A LEGAL AND HISTORICAL ANALYSIS* 13, 16 (1989).

- ⁶⁸ Shelby D. Green, *Reclaiming the Public Domain by Repeal of the Mining Law of 1872*, 6 HOFSTRA PROP. L.J. 85, 152 (1993) (citing LACY, *supra* note 67, at 16-17).
- ⁶⁹ *Id.* at n. 21.
- ⁷⁰ Fee simple refers to permanent and absolute ownership of property, with freedom to dispose of it at will.
- ⁷¹ See Act of July 1, 1864, ch. 205, § 1, 13 Stat. 343; Act of March 3, 1873, ch. 279, § 1, 17 Stat. 607.
- ⁷² See 30 U.S.C. §§ 26, 29, 30, 37.
- ⁷³ U.S. GOV'T ACCOUNTABILITY OFFICE, *HARDROCK MINING: INFORMATION ON STATE ROYALTIES AND THE NUMBER OF ABANDONED MINE SITES AND HAZARDS* (July 14, 2009), available at <http://www.gao.gov/assets/130/123013.pdf>.
- ⁷⁴ See *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Comm. on Pub. Lands*, *4 59th Cong. 11-13 (1907) (testimony of Edgar E. Clark, Interstate Commerce Commissioner).
- ⁷⁵ Act of March 3, 1909, ch. 270, 35 Stat. 844 (codified at 30 U.S.C. § 81).
- ⁷⁶ 30 U.S.C. § 81.
- ⁷⁷ *Id.*
- ⁷⁸ Senator Walsh highlighted issues with the prior fee simple system and the goal of retaining federal control over federal lands, stating, "Some possible criticism might be made, as it seems to me, of an act which would contemplate the complete alienation of the land, by which they were to pass entirely out of the ownership and control of the Government of the United States, that by reason of legislation of that character they might possibly get into the hands of some great interest—the oil lands, for instance, getting into the hands of Standard Oil Co." James D. Harris, *The Linowes Commission – Where Are We 25 Years Later?*, 1 ROCKY MTN. MIN. L. INST. 3 (2007) (quoting 43 Cong. Rec. 4251 (1919)).
- ⁷⁹ 51 Cong. Rec. H14,944 (Sept. 10, 1914) (statement by Mr. Thomson of Illinois).
- ⁸⁰ *Id.* at 14,955.
- ⁸¹ *Id.* at 14,951.
- ⁸² *Id.* at 14,954.
- ⁸³ Mineral Lands Leasing Act of February 25, 1920, Sec. 7.
- ⁸⁴ 30 U.S.C. § 187.
- ⁸⁵ *Federal Coal Leasing: Hearing on S. 3528 Before the Subcomm. on Mines and Mining of the H. Comm. on Interior and Insular Affairs*, 93 Cong. 60 (1974), HRG-1974-IIA-0082 (statement of Jack O. Horton, Assistant Secretary, Land and Water Resources, Department of the Interior) (hereinafter *Hearing on S. 3528*), ("The coal market, as you know, from the twenties down to the mid-sixties was a declining market relative to inflation and, of course, coal was ever cheaper. And it was during this period of time for the benefit of the government to do what the law and regulations permit and that is to recommend coal royalties on the basis of cents per ton. This figure was varied with the quality of the coal and with the difficulties of mining the coal, because this royalty, once in a lease, protected the Government in a declining market. When the market ceased declining in the late sixties, we reversed our type of recommendation, and currently all recommendations to the Bureau of Land Management are a percentage of value royalty with not less than so many cents per ton. And again, it is tailored to the mining conditions and the quality of the coal.").
- ⁸⁶ PUBLIC LAND LAW REVIEW COMMISSION, *ONE THIRD OF THE NATION'S LAND: A REPORT TO THE PRESIDENT AND TO THE CONGRESS* 1, 38 (1970).
- ⁸⁷ *Bills to Provide for the Management, Protection, and Development of the National Resource Lands, and for Other Purposes: Hearing on S. 1507 and S. 1292 Before the Subcomm. on Env't. and Land Res. of the S. Comm. on Interior and Insular Affairs*, 94th Cong. 1 (1975), HRG-1975-IIA-0120 (statement of James Evans, Legislative Rep., National Association of Counties).
- ⁸⁸ 43 U.S.C. § 1701(a)(9).
- ⁸⁹ Federal Coal Leasing Amendments Act of 1975, Pub. L. No. 94-377, 90 Stat. 1083, 1087 (1976), codified as amended at 30 U.S.C. § 181 et seq.
- ⁹⁰ U.S. GOV'T ACCOUNTABILITY OFFICE, *NO. GAO-14-140, COAL LEASING: BLM COULD ENHANCE APPRAISAL PROCESS, MORE EXPLICITLY CONSIDER COAL EXPORTS, AND PROVIDE MORE PUBLIC INFORMATION* 3 (Dec. 2013), available at <http://www.gao.gov/assets/660/659801.pdf>.
- ⁹¹ Federal Coal Leasing Amendments Act of 1976, Sec. 7(a).
- ⁹² See *Hearing on S. 3528*, *supra* note 85, at 63.
- ⁹³ 43 CFR 3473.3-2(a)(2); see 47 Fed. Reg. 33114-01 (July 30, 1982); 55 Fed. Reg. 2653-01 (Jan. 26, 1990).
- ⁹⁴ See, e.g., *Hearing on S. 3528*, *supra* note 85; *Hearing on S. 391*, *supra* note 41.

- ⁹⁵ *Hearing on S. 3528, supra* note 85, at 62; *see also* also COMPTROLLER GENERAL, IMPROVEMENTS NEEDED IN ADMINISTRATION OF FEDERAL COAL-LEASING PROGRAM 1100 (1972) (“[H]e also might produce much less if he had per ton a higher royalty payment, so he might produce only the richest coal and not go into the less rich coal because of the higher royalty figure.”).
- ⁹⁶ H.R. Rep. 94-681, 38, 1976 U.S.C.C.A.N. 1943, 1975 WL 12515 (Leg. Hist.).
- ⁹⁷ *Id.* at 20.
- ⁹⁸ 30 U.S.C. § 191(a).
- ⁹⁹ *See* CONGRESSIONAL RESEARCH SERVICE, NO. R40645, U. S. OFFSHORE OIL AND GAS RESOURCES: PROSPECTS AND PROCESSES 19 (April 26, 2010), *available at* <http://fpc.state.gov/documents/organization/142736.pdf>; *see also* Senate Hearing 113-122, Revenue Sharing Hearing before the Committee on Energy and Natural Resources, United States Senate, 113th Congress, 1st Session to Consider S. 1273, The Fair Act of 2013 (July 2013), *available at* <http://www.gpo.gov/fdsys/pkg/CHRG-113shrg85874/html/CHRG-113shrg85874.htm> (stating, *inter alia*, “Revenue sharing is vital for these [coastal] areas to adequately respond to all sorts of impacts associated with enormous influxes of people and equipment;” “States and communities will have less incentive to support this development if they’re expected to shoulder risks and absorb impacts with no opportunity for revenue sharing” “[t]here are also cumulative impacts of offshore energy development such as habitat degradation and coastal erosion that are typically not mitigated at the project level, and it is important for states to address these impacts. Therefore, a significant portion of a state’s revenue share should be directed to addressing those unmitigated cumulative impacts, including through coastal protection and restoration and investments in natural infrastructure such as forested wetlands, marshes, oyster reefs, barrier islands, and dune systems.”).
- ¹⁰⁰ *Id.*
- ¹⁰¹ *See* 30 C.F.R. § 219.410(d)(1)(A)-(C).
- ¹⁰² *See* 30 C.F.R. § 219.410(d)(1)(A)-(C).
- ¹⁰³ H.R. 2262 (110th Cong.), Hardrock Mining and Reclamation Act of 2007.
- ¹⁰⁴ *Id.*
- ¹⁰⁵ H.R. 699 (111th Cong.), Hardrock Mining and Reclamation Act of 2009.
- ¹⁰⁶ 43 U.S.C. § 1337.
- ¹⁰⁷ U.S. GOVERNMENT ACCOUNTABILITY OFFICE, NO. GAO-14-50, OIL AND GAS RESOURCES: ACTIONS NEEDED FOR INTERIOR TO BETTER ENSURE A FAIR RETURN 13–14 (Dec. 2013), *available at* <http://www.gao.gov/assets/660/659515.pdf>.
- ¹⁰⁸ Hon. Ken Salazar, Secretary of the Interior, “Interior, Environment, and Related Agencies Appropriations for 2013,” Testimony before the House Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies (Feb. 16, 2012), pp. 46–47, *available at* <https://www.gpo.gov/fdsys/pkg/CHRG-112hhr74739/pdf/CHRG-112hhr74739.pdf> (stating, “The underlying principle is we are mandated by statute, mandated by fairness to make sure the American taxpayer is getting a fair return for the assets the American people own.”).
- ¹⁰⁹ COLORADO OIL & GAS ASSOC., THE BASICS: MINERAL RIGHTS, ROYALTIES & SURFACE USE AGREEMENTS (2013), http://www.coga.org/wp-content/uploads/2015/09/3-Basics_MineralRights.pdf.
- ¹¹⁰ REAL ESTATE CENTER, TEX. A&M UNIV, HINTS ON NEGOTIATING AN OIL & GAS LEASE 3 (2015) [hereinafter *Hints*], <https://assets.recenter.tamu.edu/documents/articles/229.pdf>.
- ¹¹¹ *Id.*
- ¹¹² Jeffrey R. Ray, *Shale Gas: Evolving Global Issues for the Environment, Regulation, and Energy Security*, 2 LSU J. OF ENERGY L. & RESOURCES 88 (2013).
- ¹¹³ Christopher Timmins & Ashley Vissing, *Shale Gas Leases: Is Bargaining Efficient and What Are the Implications for Homeowners if it is Not?* 30 (Dept. of Econ., Duke Univ., Working Paper, 2014), *available at* http://public.econ.duke.edu/~timmins/Timmins_Vissing_11_15.pdf.
- ¹¹⁴ Richard A. Grisel, *Look Before You Lease: A Lawyer’s Guide to Oil & Gas Leasing* 7-8 (2013), *available at* <https://works.bepress.com/energylaw/6/>.
- ¹¹⁵ Douglas Atnipp, *Bonus Vs. Royalty: Oil and Gas Landowners’ Dilemma*, LAW360 (June 27, 2013), <http://www.law360.com/articles/452317/bonus-vs-royalty-oil-and-gas-landowners-dilemma>.
- ¹¹⁶ *Hints, supra* note 110, at 15 (“For oil, the conversion is based on ‘market price’ or possibly ‘market value.’ This means the highest posted field price for like grade and gravity of oil in the field where the production occurs. For gas, the conver-

sion is based on ‘proceeds’ or the actual revenue derived from the sale. As such, the resulting price may not necessarily equal its actual market price or market value. Finally, mineral owners may receive physical delivery of his or her share ‘in kind.’ This method presents an alternative when the sale of production is based on long-term contracts. By inserting an option to take either as proceeds or ‘in kind,’ the mineral owner can get the best of both worlds. When the market price rises above the long-term contract price, the mineral owner can take his or her share ‘in kind’ and seek his or her marketing outlet. When the market price falls below the contract price, the lessor can revert back to proceeds.”); see also CEA REPORT, *supra* note 21, at 16 (stating that “private coal from Appalachian and interior States rang[es] from \$30 per ton to as high as \$100 per ton (in Virginia), while Federal PRB coal still remains close to \$10 per ton”).

¹¹⁷ Atnipp, *supra* note 115 (“Expenses incurred through the production stages (e.g., drilling costs, capacity costs, etc.) are borne solely by the lessee. Expenses subsequent to production (i.e., post-production costs) can be either shared or borne solely by the lessee depending on the terms of the O&G lease.”).

¹¹⁸ Timmins & Vissing, *supra* note 113, at 72.

¹¹⁹ ANTHONY ANDREWS, UNCONVENTIONAL GAS SHALES: DEVELOPMENT, TECHNOLOGY, AND POLICY ISSUES 27 (2010).

¹²⁰ Laurence W. Hancock, Note, *Preventive Law and the Negotiating and Drafting of Coal Leases after the Surface Mining Control and Reclamation Act of 1977*, 81 W. VA. L. REV. 733, 746-47 (1979); see also Ray, *supra* note 112, at 79.

¹²¹ Atnipp, *supra* note 115; see also Andrew Boslett, Todd Guilfoos & Corey Lang, *Valuation of the External Costs of Unconventional Oil and Gas Development: The Critical Importance of Mineral Rights Ownership 2* (Working Paper, 2016), available at https://works.bepress.com/corey_lang/22/; Hints, *supra* note 110, at 14-15.

¹²² ANDREWS, *supra* note 119, at 28-29.

¹²³ *Id.* at 28.

¹²⁴ SOUTHEASTERN WYO. MINERAL DEV. COAL., LANDOWNER GUIDELINES FOR NEGOTIATING A MINERAL LEASE OR SURFACE USE AGREEMENT 4 (2011), available at <http://region8water.colostate.edu/PDFs/Oilgaslandownerguidelines.pdf>.

¹²⁵ ANDREWS, *supra* note 119, at 29; Timmins & Vissing, *supra* note 113, at 2; see also Priscila Mosqueda, *The Holdouts: Three Families Who Took a Pass on the Fracking Boom – And What it Cost Them*, TEX. OBSERVER (Feb. 16, 2015) (describing a couple that was offered a 25 percent royalty rate by one company in Texas to start drilling a horizontal well under their property).

¹²⁶ Timothy Fitzgerald, *Mineral Rights, Leasing, and Royalties: Primer on Oil & Gas for Montana Landowners* (2015), available at <http://www.montana.edu/oilgasleasing/handouts/Webinarfebruary2015.pdf>.

¹²⁷ Sean Cassidy, *Division of Royalties – Who Gets What?*, 30(12) ENERGY & MIN. L. INST. 377 (2009). West Virginia also has a “Coalbed Methane Wells and Units” statute, which states that “[t]he royalty interest in a well shall include the right to receive one-eighth of the gross proceeds resulting from the sale of methane at the wellhead and such interest shall exist in the coalbed methane owners.” “Coalbed Methane Wells and Units,” W. Va. Code, § 22-21-17 (2009).

¹²⁸ Guarantee of Minimum Royalties, 58 PA. CONS. STAT. § 33 (1979); 58 PA. STAT. ANN. § 33 (2012); see also Cassidy, *supra* note 127.

¹²⁹ See Alex Wolf, *Pa. House Panel Approves Natural Gas Royalty Payment Bill*, LAW360 (June 27, 2016) (describing HB 1391, guaranteed a minimum royalty payment at 12.5 percent, even after post-production costs are included); Marie Cusick, *House Panel Approves Bill to Limit Gas Royalty Deductions*, NPR StateImpact (Mar. 17, 2014) (describing HB 1684, which was “aimed at preventing gas companies from shortchanging landowners on royalty money.”).

¹³⁰ S.L. 2012-143 § 4.(d), N.C. Gen. Stat. § 113-423(c) (2012).

¹³¹ Robert J. Burnett, *HB 1391: Putting Teeth Back in Pennsylvania’s Minimum Royalty Statute*, HOUSTONHARBAUGH, available at <http://www.hh-law.com/hb-1391-limits-post-production-cost-deductions/>.

¹³² *Id.*

¹³³ *Id.*

¹³⁴ Evelyn M. Sommer, *Patent License Restrictions*, 59 CONN. B.J. 236, 246 (1985).

¹³⁵ *Id.* (citing *Zenith Radio Corp. v. Hazeltine Research, Inc.*, 395 U.S. 100 (1969)).

¹³⁶ 379 U.S. 29, 33 (1964).

¹³⁷ Sommer, *supra* note 134, at 246-47 (quoting Photocopy Equipment Co. v. Rovico, Inc., 359 F.2d 745 (7th Cir. 1966), *on remand* 257 F.Supp. 192 (N.D. Ill. 1966), *aff'd*, 384 F.2d 813 (7th Cir. 1967), *cert. denied*, 390 U.S. 945 (1968)).

¹³⁸ This table is taken from Roy J. Epstein & Paul Malherbe, *Reasonable Royalty Patent Infringement Damages After Uniloc*, 39(1) AIPLA Q.J. 3, 4 (2011), who relied on information published by RoyaltySource, a widely used royalty database, *see Industry Royalty Rate Data Summary*, LICENSING ECON. REV. 6 (2007). The royalty database, however, only includes licensing information that parties reported in publicly available sources, such as Securities and Exchange Commission filings. *See Epstein & Malherbe, supra*, at 18.

¹³⁹ Michelle Porter et al., *Industry Norms and Reasonable Royalty Rate Determination*, 43 LES NOUVELLES 47, 50-51 (2008). The study does not conduct a time series analysis for royalty rates in the chemical industry because of the small sample size of chemical industry royalty rates. *See id.*

¹⁴⁰ 66 A.L.R. Fed. 186 (originally published in 1984).

¹⁴¹ 35 U.S.C. § 284.

¹⁴² 66 A.L.R. Fed. 186.

¹⁴³ 235 U.S. 641, 649 (1915); *see* Christopher B. Seaman, *Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages*, 2010 B.Y.U. L. REV. 1661, 1669 (2010).

¹⁴⁴ *See Seaman, supra* note 143, at 1670-71; 66 A.L.R. Fed. 186.

¹⁴⁵ *See Seaman, supra* note 143, at 1671.

¹⁴⁶ 35 U.S.C. § 284 (in effect since 1952); *see Seaman, supra* note 143, at 1671-72..

¹⁴⁷ *Deere & Co. v. Int'l Harvester Co.*, 710 F.2d 1551, 1558 (Fed. Cir. 1983).

¹⁴⁸ *See, e.g., Lucent Techs., Inc. v. Gateway Inc.*, 589 F.3d 1301, 1324 (Fed. Cir. 2009) (quoting *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1223 (Fed. Cir. 1995)).

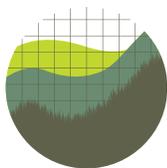
¹⁴⁹ *See Seaman, supra* note 143, at 1695-96; *see also Epstein & Malherbe, supra* note 138.

¹⁵⁰ *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1313 (Fed. Cir. 2011).

¹⁵¹ 318 F. Supp. 1116 (S.D.N.Y. 1970), modified by 446 F.2d 295 (2d Cir. 1971). *Georgia-Pacific* identified the following fifteen factors: (1) the royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty; (2) the rates paid by the li-

ensee for the use of other patents comparable to the patent in suit; (3) the nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold; (4) the licensor's established policy and marketing program to maintain his patent monopoly by not licensing to others to use the invention by granting licenses under special conditions designed to preserve that monopoly; (5) the commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter; (6) the effect of selling the patented specialty in promoting sales of other products of the licensee; that existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sale; (7) the duration of the patent and the term of the license; (8) the established profitability of the product made under the patent; its commercial success; and its current popularity; (9) the utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results; (10) the nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention; (11) the extent to which the infringer has made use of the invention; and any evidence probative of the value of that use; (12) the portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions; (13) the portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer; (14) the opinion testimony of qualified experts; and (15) the amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which would have been acceptable by a prudent patentee who was willing to grant a license. *See, e.g., Ben Johnson, Public Standards and Patent Damages*, 14 MARSHALL REV. INTELL. PROP. L. 199, 213-14 (2015). The *Uniloc* court sanctioned the continued use of factors 1, 2, and 12 in the determination of a reasonable royalty rate “tied to the relevant facts and circumstances of the particular case at issue.” *Uniloc*, 632 F.3d at 1317-18.

- ¹⁵² Peter Dawson, *Royalty Rate Determination*, 8 J. BUS. VALUATION & ECON. LOSS ANALYSIS 133, 135 (2013).
- ¹⁵³ Vanessa Van Cleaf, *A Broken Record: The Digital Millennium Copyright Act's Statutory Royalty Rate-Setting Process Does Not Work for Internet Radio*, 40 STETSON L. REV. 341, 347 (2010).
- ¹⁵⁴ *Id.*
- ¹⁵⁵ *Id.*
- ¹⁵⁶ 242 U.S. 591, 594-95 (1917).
- ¹⁵⁷ E. Scott Johnson, *Long and Winding Road: Music Royalties*, MD. B.J. 33-34 (2004).
- ¹⁵⁸ U.S. COPYRIGHT OFFICE, COPYRIGHT AND THE MUSIC MARKETPLACE 16 (2015).
- ¹⁵⁹ *Id.* at 25.
- ¹⁶⁰ *Id.* at 33.
- ¹⁶¹ *Id.* at 43.
- ¹⁶² *Id.* at 30.
- ¹⁶³ *Id.*
- ¹⁶⁴ *Id.* at 26.
- ¹⁶⁵ Stuart Talley, *Performance Rights in Sound Recordings: Is There Justification in the Age of Digital Broadcasting?* 28 BEVERLY HILLS B. ASS'N J. 79, 101 (1994).
- ¹⁶⁶ Thomas G. Field, Jr. *Reciprocal Influences of Changes in the Perceived Status of Intellectual Property Officials*, 41 AIPLA QJ. 593, 607-08 (2013)(quoting 17 U.S.C. § 801(b)(1)(A)-(D)).
- ¹⁶⁷ Simone A. Rose, *On Purple Pills, Stem Cells, and Other Market Failures: A Case for A Limited Compulsory Licensing Scheme for Patent Property*, 48 HOW. L.J. 579, 610-11 (2005).
- ¹⁶⁸ *Id.*
- ¹⁶⁹ *Id.*



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