The Federal Royalty and Tax Treatment of the Hardrock Mineral Industry: An Economic Analysis

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Summary

Under current law, the hardrock mineral industry pays no royalty to the federal government for the privilege of extracting resources from federal lands. This differs from the federal policy toward the coal and oil/gas industries, the policy of State governments, and the leasing arrangements in the private sector, which often require bonus bids and an ad-valorem royalty on the value of the resulting output. Hardrock mining on acquired federal lands pays a 5% royalty.

The current federal policy toward hardrock minerals is inconsistent with the fundamental market principle that a royalty is a factor payment, part of the rent paid, or the return, to land as both a marketable capital asset and input to production. In general, the free development of federal mining land will result in more public land developed and more minerals produced than is economically efficient. Another implication is that any economic rents, i.e., excess profits to a resource owner above the level required to produce or supply the resource in the long run, would accrue to private rather than public beneficiaries. The free development regime for hardrock minerals on federal lands was created to stimulate economic development of the west and has more recently been sustained to protect the viability of the United States hardrock mineral industry and to prevent negative economic impacts on western communities built around that industry. Introducing a royalty payment system might have an adverse economic effect on hardrock mineral producers but it would also tend to increase output in the rest of the economy and promote a more efficient use of national resources. The hardrock mining industry generally has, over the last four years, been booming, and any adverse industry effects would tend to be mitigated.

The appropriate royalty system, according to economic principles, is the ad-valorem royalty based on the market value of the mineral upon extraction, adjusted for any externality-related taxes. Using “gross income for depletion purposes” is conceptually the same as market value, although it has practical advantages since that is the basis for a producer’s computation of its percentage depletion allowance for tax purposes. Using net smelter return—the basis for most private royalty contracts—is conceptually the same as gross income, although there may be differences due to deductions for costs, and would require a new administrative apparatus. Using the producer’s net profits as the basis would render the royalty an income tax, which would be inconsistent with mainstream economic principles that a royalty is part of a factor payment, and would likely reduce, and at times totally eliminate, royalty payments. The U.S. hardrock minerals industry pays income taxes, including the alternative minimum tax, and, in addition, is assessed a variety of claims and patent fees. In addition, hardrock mining firms qualify for some special tax benefits or subsidies: expensing (i.e., a current deduction) of exploration and development costs; the percentage depletion allowance, at rates ranging from 14% to 22% of gross income; and a deduction for mine closing and reclamation costs. The special mining tax breaks are sufficient to lower the effective marginal tax rate slightly below that for other industries. These tax rates, however, are currently much higher than the historical rates, which were either close to zero or negative.

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Since 1872, hardrock mining on federal lands has been governed by the General Mining Law, which allows virtually free access to open public domain lands for mineral prospecting, staking claims, exploration and development, and extraction without payment of a royalty.[1] And until annual moratoria were imposed by Congress starting in 1994, claimants on hardrock mineral lands could take title to both the mineral rights and the land, after paying to the U.S. Department of Interior (DOI) the required fee or either $2.50 or $5.00 per acre, and after demonstrating diligent development of the mining claim.

Proposals to reform the Mining Law have been made almost from the time it was signed by President Grant, and throughout its 135 year history. Many Presidents—Presidents Roosevelt, Nixon, Carter, and Clinton—have endeavored to reform the law, as have many in Congress. One of the contentious issues has been that the law makes no provision for the payment of a royalty on the production of the hardrock minerals from federal lands. The royalty-free treatment of the hardrock mineral industry is unlike mining arrangements (leases) on private and state lands, mining of the leasable energy minerals (coal, oil, and gas) on federal lands, and even unlike hardrock minerals on *acquired* (as contrasted with public) federal lands, all of which provide for a royalty payment to the landowner.[2]

In recent years, the Congress has repeatedly considered, but not passed, reform of the Mining Law, including, in part, to require the payment of royalties. In 1990, committees held several hearings on proposed Mining Law reform, e.g., on S. 1126, (101st Congress) which among other things would have imposed an 8% ad-valorem royalty. In 1993, President Clinton's comprehensive economic proposal, part of the State of the Union Address, included claims fees and a 12.5% ad-valorem royalty.[3] Several bills were introduced in the 103rd Congress to impose a royalty (H.R. 322, H.R. 1708, S. 257, S. 375, and S. 775) and hearings were held in 1993.[4] S. 775 passed the Senate in May 1993 and was incorporated into H.R. 322 which was approved by the House in November 1993. H.R. 322 went to conference in 1994 but was not approved reportedly because of opposition from Western lawmakers, mainly over the royalty issue.[5] In 1995, there was an unsuccessful attempt to incorporate a royalty as part of the FY1996 budget. In its FY1998 budget proposal, and again in FY2001, the Clinton Administration proposed a 5% "net smelter" royalty but, like previous efforts, this failed.[6]

At this writing, the major reform bill in the House—there is currently no Senate bill—is H.R. 2262, which, among other things, would impose an 8% ad-valorem royalty based on the value of the minerals as defined under the gross income definition of the income tax code (essentially the

[1] 19 Stat. 91, 30 U.S.C. §§ 21-54.

[2] The term "public domain lands" refers to the original endowment of territory (also called the general territory) comprising the United States. Acquired lands are those lands that have been purchased by, or given to, the federal government, including lands obtained through condemnation. The sum of public domain lands and acquired lands comprises federal lands.

[3] Executive Office of the President. *A Vision for Change for America.* House Document 103-49, 103rd Cong, 1st Sess. February 17, 1993. p. 78.

[4] In 1993, the Senate was considering S. 775, which proposed a 2% net profits royalty, and the House was considering H.R. 322 (Representative Rahall), which proposed an 8% net smelter return royalty.

[5] The two major bills were S. 775 and H.R. 322. See CRS Report 93-632, *Reforming the General Mining Law of 1872: A Comparison of S. 775, and H.R. 322*, by (name redacted).

[6] A royalty based on "net smelter return" (either mineral price or profits) attempts to determine or assess the royalty payments—the amounts paid to the landowner—on the value of the mineral after it is separated or smelted from its ores. The term is somewhat misleading and will be discussed in detail in the text.

mining firm's sales revenue) and use the proceeds for the cleanup of abandoned sites. The 8% royalty would apply to new production. Production from existing mining operations would pay a 4% royalty. On October 2, 2007, the Subcommittee on Energy and Minerals of the House Natural Resources Committee held a hearing on this bill. A substitute bill was marked up and approved by the full committee (the House Natural Resources Committee) on October 23.[7] The House approved this committee bill, with minor amendments, on November 1 by a vote of 244 to 166. A summary of the provisions of the House-approved version of H.R. 2262 is described in the Appendix to this report. The comparable bill in the Senate is S. 2750, which also proposes an 8% royalty on new production and a 4% royalty on production from existing leases.[8]

This report analyzes the economic issues underlying proposals to impose a royalty on hardrock (locatable) minerals on public domain lands.[9] It also discusses the federal tax treatment of the hardrock mineral industry. In particular, the report addresses the following questions:

- What exactly is a royalty, and how does a royalty differ from other rental payments or, for that matter, taxes?
- Were a royalty imposed, what would be the best way to structure such a royalty? Should the royalty be an ad-valorem type (i.e., one based on the value or price of the mineral), a fixed unit based royalty (i.e., one based only on mineral output), or a net profits royalty (i.e., one based on the net income or profit of the mining company)?
- If there is to be an ad-valorem royalty based on price or value, at what stage in the mineral producing process should value (or price) be measured? Should it be based on gross income (value of the mineral at the mine) or net smelter return (the value at the smelter less certain deductions)? When does a mining company produce a saleable or marketable product whose value can be measured? What deductions, if any, should be allowed from that price?
- What should the royalty rate be? And how does Congress decide what a fair royalty rate is?
- How does one balance the various considerations, such as efficiency and administrative considerations in deciding whether to impose a royalty?
- What would be the economic effects of introducing a system of royalty payments and other rental payments where one did not exist? Would a royalty harm the domestic and international competitiveness of the U.S. hardrock mining industry?
- Finally, what taxes and fees does the hardrock mineral industry pay, and do they have any bearing on the question of whether to impose, or the magnitude of, a royalty?

[7] The original bill provided for only an 8% royalty; the bill approved by the full committee provides for the two-tiered royalty: 8% on future mining operations and 4% to existing mining operations.

[8] See CRS Report RL33792, *Federal Lands Managed by the Bureau of Land Management (BLM) and the Forest Service (FS): Issues for the 110th Congress*, by (name redacted) et al.

[9] "Locatable minerals" refers to the hardrock minerals subject to the Mining Law of 1872 i.e., "those for which the rights are initiated by the location, recordation, and maintenance of a mining claim." "Leasable minerals" refers to coal, oil/gas, and other energy, chemical, or soft minerals.

The first section of this report provides a brief history of the 1872 Mining Law, including the mineral leasing system and royalty payment requirements for the energy minerals. The second section discusses the economic rationale for the payment of royalties on hardrock minerals. It (1) addresses the question of the appropriate economic basis for payment of royalties to the federal government as landowner, (2) compares royalties based on market value with alternative criteria such as royalties based on gross income from depletion and net smelter return, (3) examines the question of an appropriate royalty rate, and (4) discusses some of the likely economic effects of royalty-free provision of public lands, as well as the effects of introducing a royalty. The fifth and final section examines the federal tax provisions, including the three tax subsidies that affect the hardrock minerals industry, as well as claims and patent fees that the industry pays.

Note that the question of payment of royalties from hardrock mineral production on public lands is part of a much broader debate relating to reform of the Mining Law of 1872, which encompasses many other issues—such as whether public domain lands should be patented—which are not addressed in this report.[10]

History of the General Mining Law of 1872

The General Mining Law of 1872 (17 Stat. 91) can be traced to 16th Century English and Spanish property and mineral rights laws and customs, which, as practiced in Colonial America, formed the basis for the granting of the rights to lands including those containing minerals, including a share of the minerals (a royalty).[11] One of the earliest statutes was the "Royal Code of 1783." This Spanish law became the basis for acquiring mineral rights in Spanish colonies in the Americas, and was used to settle claims disputes. Also, the land charters issued by England to the original thirteen colonies provided generally that 1/5th of the minerals on chartered lands were reserved for the crown.[12] Independence for the American colonies meant that issues of land and mineral ownership between the national government, the states, localities, and even private individuals had to be decided. Several ordinances were enacted—the Ordinance of 1785, the Land Act of 1796, and the Preemption Act of 1841—but these did not address the question of mineral royalties specifically.

The "California gold rush" of 1849 and the silver strike in Nevada of 1860 caused a significant westward population migration for the purposes of prospecting and claiming public domain lands. During this pre-Mining Law period, the issue of land ownership and easy and free access to federal lands was very controversial and fiercely debated. The Congress had approved several temporary leasing or land sales acts for gold, silver, lead, and iron—which were administered by the War Department—but prospectors disregarded them, trespassed onto federal lands, laid their claims anyway, and paid no royalty to the federal government. Also after the Civil War,

[10] For example, under the patenting system, fee title to mineral lands was conveyed to the mineral companies or claimants at a price of either $2.50/acre or $5.00/acre, depending on the type of claim. In response to concerns about this patenting system, since 1994 the Congress has imposed annual moratoria on patenting via the annual Department of Interior appropriation bills.

[11] A mineral is a chemical element or compound that occurs naturally in the Earth's crust. Deposits of minerals that are mined are called ores.

[12] Ely, Northcutt. "Mineral Titles and Concessions." The American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc. *Economics of the Mineral Industries.* Edward R. Robie, Editor. (The Maple Press, 1964.) pp . 81-130.

congressional policy became more openly geared to encouraging westward migration, and the economic development of the West.[13]

These practices and policies became embodied in two statutes that became the precursors to the General Mining Law of 1872: the Lode Law of 1866,[14] which provided free and open access to federal lands with lode deposits for prospecting, claiming, and patenting, and the Placer Act of 1870,[15] which applied the same provisions to placer deposits.[16]

Conveyance and Patenting of Federal Hardrock Mineral Lands

The General Mining Law of 1872, approved by President Ulysses S. Grant on May 10, 1872, was the consolidation of amended versions of both the 1866 Lode Law and the 1870 Placer Act. Under this law, as amended, public lands with hardrock minerals (metals such as gold, silver, copper, lead, etc., and non-metals such as uranium, barite, and fluorspar) are conveyed, rather than leased for a rent and royalty to the federal government as landowner. More specifically, the law permits citizens and businesses to prospect for hardrock minerals on those public lands not withdrawn from mining, and to file a claim, which gives them the right to explore, develop, mine, and sell hardrock minerals from the claim (such as gold, silver, platinum, copper, lead, tin, etc.) without paying a royalty.[17] Further, up until 1994, a claim holder could obtain title—called a patent—to the land and mineral rights upon demonstrating the discovery of economically recoverable minerals. Patenting basically means that the title to the land and mineral rights are conveyed to the claimant—the mineral lands become private property.[18] The claim holder may also claim and patent nonmineral, noncontiguous lands to mill and process the ores. As noted, the General Mining Law was enacted to promote westward migration and the economic development of the West, and the land and mining rushes that followed further accelerated the great Westward settlement and expansion.[19]

Royalties on Leasable Minerals

Originally, the Mining Law applied to all minerals. But over time all but the hardrock or "locatable" minerals were removed from the law's purview.[20] Beginning in 1920, for example, the Mineral Leasing Act of 1920 introduced a leasing system for coal, oil, and gas, and certain other

[13] There were also various homestead acts and land grants (such as for railroads) and other acts which further encouraged westward migration and economic development of the west.

[14] 14 Stat. 86, Revised Statute § 2318, 30 U.S.C. § 21.

[15] 16 Stat. 217, Revised Statue § 2329, 30 U.S.C. 35.

[16] A lode deposit is a vein of valuable mineral that resides in hardrock (or quartz); a placer deposit is an alluvial deposit of a valuable mineral.

[17] Also, for some minerals the federal government earlier sold the lands outright instead of leasing them, and the question of royalties did not arise.

[18] In 1994, in response to concern about the "giveaway" of federal lands, the Congress began to impose annual moratoria, via the Department of Interior Appropriation bills, on the patenting of public mineral lands.

[19] Leshy, John D. *Testimony at the Hearing on HR. 2262, the Hardrock Mining and Reclamation Act of 2007.* Subcommittee on Energy and Mineral Resources, House Committee on Natural Resources. July 26, 2007.

[20] For example, under the Coal Lands Act of 1873, a separate claim/patent system was created for federal coal lands. The law allowed the purchase of public coal land for ten to twenty dollars per acre, depending upon its distance from a railroad, and established guidelines for staking claims for coal mines on federal lands. See U.S. Department of the Interior. *Federal Market Value Policy for Federal Coal Leasing*. Report of the Linowes Commission. February 1984.

minerals.[21] Each lease was negotiated on a case-by-case basis, and provided for both an annual rental per acre and a fixed royalty of so many cents per ton.[22] Where there is competition, the minerals are alienated through a bonus bidding process. Beginning in 1955, the Mineral Materials Act of 1947 instituted a leasing system for the non-hardrock and non-energy minerals—the common and less valuable minerals such as sand and gravel.

For coal, this system of leasing continued until the early 1970s, when the Arab oil embargo and shortages of petroleum reserves focused attention on the vast coal deposits in the western states. Thus, in 1976 the Federal Coal Leasing Amendments Act (P.L. 94-377) was enacted, which among other changes, replaced the fixed royalty with an ad-valorem royalty of 12.5% for surface mines and 8% for underground mines.[23] This kind of royalty payment system is now also used by the federal government in leasing oil and gas properties, which typically are assessed ad-valorem royalties ranging from between 12.5% and 16.67%.[24] As will be discussed below, under an ad-valorem royalty—the most prevalent type of royalty system—the royalty payments are based on the value of the mineral. State governments also typically charge ad-valorem royalties for the extraction of locatable minerals, although some tend to use the fixed royalties. Finally, hardrock mining on acquired federal lands (as opposed to public domain lands) is required to pay a royalty of 5%.

The royalty rates currently in effect on various types of minerals, both leasable and locatable, from federal lands are shown in **Table 1**.

Thus, despite the evolution of the system for paying royalties on coal, oil, and gas, and certain other minerals, the location system for the hardrock minerals industry—involving no royalty payments or any other type of rental payment—has remained essentially unchanged since 1872.[25]

The Economics of Federal Royalties on Public Domain Lands

What is a Royalty?

Part of the problem in deciding whether to assess a royalty on hardrock minerals from federal lands, and how to structure such a royalty, is confusion over just what a royalty is and what it is not. Economics is very clear on this: A royalty is a factor payment, part of the rent paid, or the return, to land as both a marketable capital asset and input to production. It is a payment made by

[21] Coal royalties were not an issue prior to 1920 because with the exception of coal-bearing lands in Alaska, federal coal-bearing lands were sold rather than leased. The Alaska Coal Leasing Act provided for a minimum royalty of 2¢/ton beginning in 1914.

[22] For a discussion of the history and economics of coal leasing policy see CRS Report 83-169, *A History and Economic Analysis of Federal Coal Leasing Policy*, by (name redacted) and (name redacted).

[23] According to a 1974 coal leasing study by the Council on Economic Priorities, the DOI had begun to apply ad-valorem royalties somewhat before 1976. See Council on Economic Priorities *Leased and Lost: A Study of Public and Indian Coal Leasing in the West.* (New York, New York, 1974. p. 27.

[24] The 12.5% royalty has been standard practice in the oil and gas business.

[25] There are exceptions to this general rule, for lands that are not subject to the Mining Act of 1872, such as acquired lands. In these cases, which are not frequent, miners pay ad-valorem rates typically ranging from 4% to 6%.

the renter of the land to the landowner (whether private or public) in a voluntary exchange for the flow of services provided by that land over time. As a factor payment, the royalty is analogous to the wage rate, which is a payment for the services of labor, or the interest rate, which is a payment for the services of capital.

Table 1. Royalty Rates Paid by Mining Companies on Minerals from Federal Lands

Mineral Type or Location	Royalty Rate
Hardrock Minerals on *Acquired* Federal Lands	5.00%
Coal from Underground Mines	8.00%
Coal from Surface Mines	12.00%
Onshore/Offshore Oil and Gas[a]	12.50%
Deepwater Offshore Oil and Gas	16.67%
Geothermal Leases[b]	10-15%
Electricity from Geothermal Leases[c]	1-2.5%

Source: U.S. Department of Interior. Minerals Management Service. *Mineral Revenue Management.* September 2006; and U.S. Department of the Interior. Minerals Management Service. *Mineral Revenues 2000: Report on Receipts from Federal and American Indian Leases.* p. 134.

a. Most federal oil and gas is leased at a 12.5% royalty rate both onshore and offshore; in addition to the above royalties, oil, gas, and coal leases pay rents and a variety of fees.

b. Byproducts from geothermal reservoirs, such as sulfur or zinc, are assessed a royalty of 5%.

c. This is the royalty rate applicable from 2006-2015. The rate applicable after that is between 2% and 5%. The Secretary of the Interior has the discretion to set the actual rate between this range, depending on several criteria, such as revenues.

Mineral producers, as business organizations, require land, as well as labor, capital, energy, and other materials, in order to establish their enterprises and produce goods and services—minerals that provide utility to consumers. And just as mineral producers must pay a wage in exchange for the services of labor, or interest for the service of capital, they generally must pay landowners for the services of land that contains a mineral deposit. The exception to this rule, of course, has been the case of locatable minerals on public (or federal) lands in the United States, on which royalties are not paid.

In the case of mineral lands, rents could be paid in various forms such as a bonus bid, annual rentals, or a royalty, or in various combinations of these depending on the type of mineral, and whether there is a lease or not, and the contractual agreement between a developer of the resources and the landowner. For example, under the Outer Continental Shelf Lands Act of 1953, as amended, the federal government leases lands for oil and gas development in return for a bonus bid, annual rents, and royalties.[26] Lease sales are conducted through a competitive bidding process, and leases are awarded to the highest bidder, who makes an up-front cash payment called a bonus bid in order to secure the lease. Annual rents range from $5 to $9.50 per acre, with lease sizes ranging form 2,500 to nearly 6,000 acres, and royalty rates are, as noted above, either 12.5% or 16.67%.

[26] CRS Report RS22567, *Royalty Relief for U.S. Deepwater Oil and Gas Leases*, by (name redacted).

These mineral rents are an attempt to capture the returns to the land above and beyond the returns paid to labor (wages), capital (interest), entrepreneurship (profits), and other factors, and above any taxes that have to be paid to government. With perfect knowledge and no risks, for example, the rents resulting from mineral lands could be captured by the landowner as up-front payments—as the price of the mineral rights, for example. However, mineral production, like all business, is risky; it is difficult to know in advance of production precisely the quantity and quality of the mineral. There are long lead times between exploration, discovery, and actual production, and it is difficult to project what mineral prices will be upon production and sale. These and other uncertainties make it risky for both the hardrock mineral producer and landowner to predict up front what rents would be earned by mineral lands, and therefore what the mineral producer should pay the landowner. In general, the precise division between royalties or bonus bids and annual rentals depends primarily upon how production risk is shared between landowner and mineral producer. The royalty becomes a way of allowing for mineral land rents to be paid, for the landowner to earn a return on the land, in a way that simultaneously minimizes the risk of either overpayment or underpayment. As a land rental, then, an ad-valorem royalty protects the mineral producer against excessive royalty payments (overestimation of rents) and the government against underestimation of economic rents.

Being a factor payment, then, a royalty is not a tax, which is a compulsory levy on individuals and businesses to finance the cost of government for the common welfare and not a return to a factor of production in exchange for specific services provided. This is an important point, one that might be used, for example, to argue against proposals to impose a royalty based on net profits, which would make the royalty more of an income tax rather than a factor payment.[27] The distinction between a tax and the rental payment also distinguishes between the federal government as a sovereign entity with the power to tax, and as a landowner or proprietor with the right to earn a return on that land for the public.

Economic Implications of Royalty-Free Use of Federal Land

Forgoing royalty and other payments through the location system in effect means that the services of a factor of production are provided free of charge. In this case the services of federal land are provided free to the producer by virtue of the fact that no royalty is ever collected from its use. In economic terms, this is comparable to the free provision of labor or capital equipment. Economic theory suggests that a consequence of providing factor services for free that would otherwise have economic value would be to distort the allocation of resources. This theory holds that if a factor is provided to a firm without charge, too much of that factor would be hired and the output of the firm would exceed the socially desirable amount. Consequently, not enough of a more valuable good is provided.

From another perspective, the federal government is the steward of the public lands which it holds as trustee of American public. The development of public resources should only occur at a fair market value return to the nation, it is argued. An implication of the location system on federal lands is that all economic surplus that may be earned by the industry in the long run is retained by the industry rather than allocated to society at large. These profits are excess or surplus returns to a resource owner above the level required to produce or supply the resource, i.e., above the normal rate of return. In theory, they accrue naturally to the owner of any natural

[27] There are examples of profit sharing, instead of revenue sharing, such as in the movie business. But these reflect the reality that the return to labor (wages) could be paid in different forms.

resource but are not necessary to secure the continued supply of the resource; only a normal long-run return is necessary to ensure such a supply. This is an important rationale for the payment of bonus bids and other rental payments. The theory suggests that any pure economic surplus return from a natural resource should accrue to society.

What Would Be the Structure of an Economically Efficient (and Fair) Royalty?

In general, the economic concept of a royalty as a factor payment implies that the payment should be based on the market value of the producer's output, whether it be hardrock minerals, coal, or oil and gas.[28] For hardrock minerals, however, as a factor payment, the type of royalty that most closely is intended to capture the rents from mineral lands whose future productivity cannot be precisely determined due to risk—variability in output price, unknown quantity and quality of mineral, etc.—is the ad-valorem royalty based on the value or price of the mining firm's output. Under such a royalty, payments are made in installments over the life of the mine, rather than partially up front, and the economic rent is based on the amount of the mineral produced, and the market value or price of the mineral at the mine.[29] Lands producing minerals of higher quality and value, gold for instance, pay a higher royalty amount; those producing lower quality or value minerals, lead for example, pay a lower amount.

It would be inconsistent with the concept of sharing and with the concept of a factor payment in a competitive market for a royalty to be based on other than market value minus the costs of obtaining it. For example, if instead of payments in kind (deer or crops or precious metals) the landowner were to be paid in money, one would expect him to receive the monetary equivalent of the value of the output. Rational landowners would not settle for less than what the deer, crop, or metal is worth because they could always have the deer, crop, or metals taken to market and sold for at least market value. If they wanted less rent, then presumably that would have been negotiated as a smaller share (instead of 1 deer out of 5, it would perhaps be 1 out of 6). Likewise it would not be rational for the renter to pay to the landowner a royalty based on more than market value.

Alternative Bases for Royalty Payments

Although the ad-valorem royalty appears to be economically the most efficient type of royalty, the question becomes to what base specifically should the royalty rate apply? The aggregate value of a commodity being the product of a price (value/unit) and a total output, the questions are: At what point can the value of a mine's output first be determined? Further, since throughout the

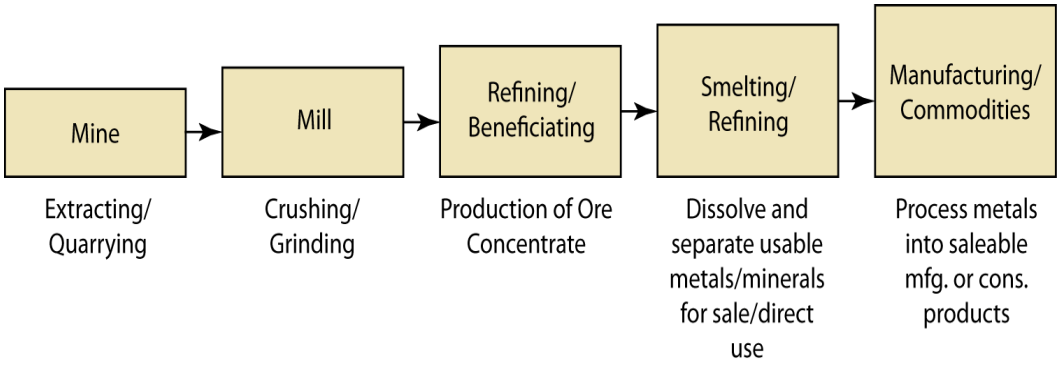
[28] In theory, the demand schedule for factors of production by a producer of an exhaustible resource, such as hardrock minerals, is based on an amount somewhat less than the value of the marginal product, a difference that reflects the sacrifice of future profit due to present production. This causes the extractive firm to produce at an output level consistent with minimum average cost rather than the point where price equals marginal costs. Some economists believe the stock or reserves of hardrock minerals is so large relative to production or supply that the present value of sacrificed future profit due to present production is very small, so that the difference can be disregarded. Regardless of which solution actually applies, it is the market price of the mineral product that governs the demand for land and other factors of production. See Sweeney, James L. "The Economics of Depletable Resources." *Review of Economic Studies.* Vol.44, No. 136. February 1977. pp. 125-141.

[29] As is discussed below, it is not always easy to define what is "at the mine," nor to determine when value is first defined and created in the case of hardrock minerals.

production stage value is added or increased, at what stage does mining value end, and non-mining value begin?

Production of valuable mineral products from raw hardrock minerals (e.g., metals such as iron, copper, aluminum, gold, lead) generally involves various stages: extraction or quarrying of the raw minerals (e. g., iron ore, bauxite, galena, and non-metals such as barite, uranium, diatomite, fluorspar, clay, calcium carbonate, etc., that exist in the hard formations of the earth), delivery to a plant or mill in order to prepare for the initial processing, beneficiating or concentrating to derive an ore concentrate (generally the first valuable product), smelting or refining (i.e., additional processing) of the ore concentrate in order to derive the marketable metal or mineral, and the actual marketing or selling of that metal or mineral.[30] These production stages are shown for the typical case or mineral in **Figure 1**.

Figure 1. The Various Production Phases for the Typical Hardrock Mineral



Within these production stages, from extraction to the first sale to manufacturers, there may be various points at which there is created a valuable output, depending on the type of mineral, and the structure of the industry—there may be several different types of mineral products with value, and it is not always clear what is mining output and what is non-mining output. Does the mine produce the raw mineral ore, the ore concentrate, or the final metal or mineral sold to wholesalers? Further, even if the output of the mine can be determined, there is the problem of what is the value or price of that output. For example, copper is traded in many forms that relate to different stages of processing: at the mine, copper may be sold as ore, concentrate, or precipitate. This question is further complicated when the firm or industry is vertically integrated. In such cases, there may not actually be a sale throughout the mining-production-processing-marketing (sale) stage, and any price or value would have to be constructed, i.e., estimated or derived, from values further upstream when they are first determined or identified.

Percentage Depletion's "Gross Income" Measure of Mineral Value Under the Tax Laws

One measure of the value of mining output is gross income from mining as defined under the income tax laws for purposes of determining the percentage depletion allowance, one of several

[30] The mining portion of the total production involves extraction and milling. Mines extract the raw mineral ore; and mills—which are usually near the mine and are considered part of the mining operation—undertake the initial processing, mainly beneficiating to produce a concentrated ore.

tax preferences or subsidies available to a mining firm.[31] This royalty base has been suggested many times in the current and past royalty debates and is the base proposed in H.R. 2262. The main reason for suggesting this royalty base is that not only is gross income under the tax depletion rules consistent with the economic concept of an ad-valorem royalty, but the legal and regulatory apparatus has been in place since 1932, the year that percentage depletion first became available to the hardrock mining industry.[32] This would tend to reduce the costs of industry compliance and government administration of the royalty system.

Before discussing this royalty base in more detail, it should be explained that the term "gross income" as used for purposes of percentage depletion is somewhat confusing. There are two reasons for this. While the term is intended to measure only sales revenue from mining operations, income in the context of a business generally refers to profits and not sales. Second, the term "gross" may be misleading because it may suggest a larger percentage depletion deduction, and therefore a larger royalty payment than a "net" royalty. But, in fact, whether a gross royalty base is smaller or bigger than a net royalty base depends on the point in the production stage the price is measured, and the deductions allowed. Because value is added as mining production moves from the extraction or quarrying state to the smeltering stage—the market price, if one existed, would increase throughout these stages—a net price (such as net smelter return) further downstream, would generally be greater than a gross price further upstream.

Definition of Gross Income from Mining

Under Internal Revenue Code (IRC) §613, mining companies are allowed a depletion deduction, at varying percentages, based on the gross income from mining. Under IRC §613(c)(1) and (c)(2), the term gross income from mining means sales revenue from the extraction of the ores or minerals from the ground and any treatment processes necessary or incidental to the mining process, specific treatment processes and also generally the costs of transporting the ores or minerals from the point of extraction to the plant or mill in which the treatment processes are applied. More specifically,

- The term "mining" includes not merely the extraction of the ores or minerals from the ground but also the treatment processes considered as mining described in paragraph (4) (and the treatment processes necessary or incidental thereto), and so much of the transportation of ores or minerals (whether or not common carrier) from the point of extraction from the ground to the plant or mills in which such treatment processes are applied thereto as is not in excess of 50 miles unless the Secretary [of the Treasury] finds that the physical and other requirements are such that the ore or mineral must be transported a greater distance to such plants or mills.

[31] As discussed in more detail in the last section, the percentage depletion allowance is a deduction for part of the mining firm's capital costs of doing business.

[32] The idea of using the current tax definition of gross income as the basis for the royalty on locatable minerals appears to have originated with Dr. Sandra L. Blackstone, a mineral lawyer and economist. See Blackstone, Sandra L. *Royalties for Locatable Minerals on Federal Lands: A Proposed Approach.* Statement by Dr. Sandra L. Blackstone, before the Mineral Resources Development and Production Subcommittee of the Senate Committee on Energy and Natural Resources. September 13, 1990.

Subparagraph (4) of IRC §613(c) defines, for the different categories of minerals, the treatment processes that when applied by the mine owner or operator are considered as mining (meaning that the costs of such processes are included in the value or price for purposes of percentage depletion):

- "In the case of iron ore, bauxite, ball and sagger clay, rock asphalt, and ores or minerals which are customarily sold in the form of a crude mineral product—sorting, concentrating, sintering, and substantially equivalent processes to bring to shipping grade and form, and loading for shipment [613(c)(4)(C)];"
- "In the case of lead, zinc, copper, gold, silver, uranium, or fluorspar ores, potash, and ores or minerals which are not customarily sold in the form of the crude mineral product—crushing, grinding, and beneficiation by concentration (gravity, flotation, amalgamation, electrostatic, or magnetic), cyanidation, leaching, crystallization, precipitation (but not including electrolytic deposition, roasting, thermal or electric smelting, or refining), or by substantially equivalent processes or combination of processes used in the separation or extraction of the product or products from the ore or the mineral or minerals from other material from the mine or other natural deposit [IRC §613(c)(4)(D)];"
- In addition, "and so much of the transportation of ores or minerals (whether or not by common carrier) from the point of extraction from the ground to the plants or mills in which such treatment processes are applied thereto as is not in excess of 50 miles unless the Secretary finds that the physical and other requirements are such that the ore or mineral must be transported a greater distance to such plants or mills [IRC §613(c)(2)."

Also under subparagraph (5) of IRC §613(c) the following treatment processes are not considered to be mining processes (and are thus NOT included in gross income):

- "Electrolytic deposition, roasting, calcining, thermal or electric smelting, refining, polishing, fine pulverization, blending with other materials, treatment effecting a chemical change, thermal action, and molding or shaping."

It seems fairly clear from these statutory provisions that gross income from mining is the mining company's revenue from the sale of the first marketable mineral product created as a result of mining and before any non-mining processes (e.g., manufacturing processes such as refining or smeltering) are applied. Generally, for most hardrock minerals extraction produces a raw mineral ore, which of itself has little value and is generally not marketed. For most minerals, after the ore is mined it is sent to a mill or plant to be crushed and ground, and in some cases (lead, for example) is beneficiated to the point that it is saleable as a metal concentrate (e.g., aluminum oxide from bauxite or copper concentrate from copper ore, etc.).[33] At this stage, there is a demand for the mineral ore concentrate as an input into the smelting/refining process for final sale in the wholesale commodities or manufacturing markets (e.g., gold into jewelry, copper for automobiles and piping). Consider gold, for example. Gold refiners are generally the primary market for miners. Raw gold is usually delivered to the refiner where it is purchased from the miner, processed, and refined. At the point of sale to the refiner, funds received are considered gross income to the miner.

[33] Some metals are produced from recycled metals.

After the milling or mining processing stage, the ore concentrate has value due to the value of the mineral to be derived therefrom: copper from copper ore concentrate, aluminum from aluminum oxide, etc. In general, such ore concentrates are either sold to a broker or to a smelter refiner, or they are tolled, which means the ore is not sold, but is rather sent for refining/smelting (and other processing) only—the mining company still owns the ore. If the miner's output is sold in an arm's-length transaction (this would generally occur for certain iron ores sold by independent, i.e., "small" mining companies), then there is a sale of the mineral and that is the actual price used to determine gross income. Thus under IRS regulations, gross income for depletion purposes is defined as "the actual price for which the ore or mineral is sold where the taxpayer sells the ore or mineral as it emerges from the mine before application of any processes other than a mining process or any transportation, or after application of only mining processes, including mining transportation." The price of the ore concentrate would depend on the (wholesale) price of the final metal (including related metals) on commodities markets, and the percentage of the metal in the ore.

If the mining firm is an integrated producer, i.e., it has smelting/refining operations, and also applies non-mining processes to the ore concentrate before the mineral is sold, there may be no sale of either the raw ore, or ore concentrate, and hence no price for the mineral firm's output until the final metal (gold, for example) is sold in the commodities markets or for use in manufacturing. In these cases, percentage depletion is based not on actual gross income but what is called "constructive" gross income, i.e., income derived from or approximated by using representative market prices elsewhere in that particular market. Finally, in cases where there is no representative price from sales of the same ore concentrate (the mining output) in other markets, then gross income from mining is estimated by multiplying gross sales by the ratio of mining to total costs or one of various other methods to estimate the price of the mining output.

As a hypothetical example, assume that the market price of the final cast copper on the commodities exchanges is $3.60/lb, which is $7,937/metric tonne of pure copper.[34] Also assume that one metric ton of copper ore concentrate contains 30% pure copper and no other valuable minerals—the remaining 70% is sulfur, iron, and other impurities that have no value.[35] And finally, to simplify further, assume that mining costs represent 75% of the total costs of producing the final pure copper. Then, under the constructive gross income method, gross income per tonne from mining operations—the average sales revenue per unit from the sale of copper concentrate—would be calculated as follows:

$$\$1,786 = (\$7,937/\text{tonne}) \times (0.30) \times (0.75)$$

If the mining company produced 100,000 tons of copper ore concentrate (equivalent to 30,000 tonnes of pure copper, which would eventually be refined into copper ingots or bars) total gross income from mining in this one year would be $178.6 million. At 8%, the royalty on this would be $14.24 million.

[34] This is the average price in October 2007 on the commodities exchange. See **Table 3** on p. 24.

[35] Copper ores may also contain gold, silver, and other valuable minerals, which would affect the value of the ore concentrate per tonne (or per lb).

Net Smelter Return (NSR) Royalty

Another possible royalty base—one which is used in many private, and most state, royalty contracts—is "net-smelter return."[36]

Net smelter return is a common term used in the mining industry to refer essentially to the net average revenue per unit of the smelted mineral product sold by the miner. It is essentially an estimate of the price the miner receives, or equivalently, the price paid by the smelter, for the ore concentrate produced, based on the price for the pure metal (or mineral) received by the refinery or smelter when it is sold in the commodities market. This estimate is based on the (gross) price received by the smelter/refiner for the marketable metal (e.g., the price on the London Exchange or the Chicago Commodities Exchange), less the costs of smelting/refining and other costs (typically treatment charges, penalties for impurities, and transportation charges from the mill to the smelter). According to Cartright (2007),

> The Net Smelter Return is the amount of money which the smelter or refinery pays the mining operator for the mineral product and is usually based on a spot, or current price of the mineral, with deductions for the costs associated with further processing. In non-metal mines the selling price is usually 'fob mine site' because of the transportation costs involved in delivering the mineral product to the buyer.[37]

In Canadian law, net smelter return is defined in the same way. According to Barten (1993), a net smelter return is

> ... the amount received by the mine or mill owner from the sale of the mineral product to the treatment plant that converts the output of the mill to marketable metal. From the gross proceeds received there may be deductions for costs incurred by the owner after the property leaves the mine property and before sale, such as costs of transportation, insurance, or security, penalties, sampling and assaying, refining and smelting, and marketing. No deductions are made for the operating costs of the mine-mill complex.[38]

Finally, Baldwin (2003) writes:

> A net smelter return will be ... the net value of minerals from the property, where Net Value is Gross Value less certain permitted expenses. Gross value will usually be defined with reference to the spot price of an average weekly or monthly spot price on specified markets for the commodity. The permitted deductions will include all charges by the smelter, such as smelting and refining charge as well as penalties for impurities in the ore, and the cost of transportation to the smelter and insurance. In some cases deductions may also be made for taxes except income taxes and, depending on the nature of the commodity, for marketing

[36] As with the term gross income, net smelter return is somewhat misleading because it does not really refer to a return as in rate of return. In normal business parlance, rate of return refers generally to profits (i.e., gross revenue less all costs, including capital cost), while net smelter return refers to a net price, i.e., a gross mineral price less certain operating and processing costs, but not all costs. Note, however, that while there is a generally accepted standard definition of net smelter return, in fact the precise definition—and the deductions (what gets subtracted) from the gross smelter sales price—is particular to each royalty lease contract.

[37] Cartwright, Michael. R. *Mineral Production Royalties*. Available on http://www.minval.com/royalty_mineral.html. Note: fob denotes "free on board," which means that the price of the mineral does not include the cost of insurance or freight or other delivery charges.

[38] Barton, B.J. *Canadian Law of Mining*. Calgary: Institute of Resources Law, 1993. p. 461.

> costs. If the operator ships to its smelter, charges should not exceed those that would be charged by an arm's length smelter in similar circumstances.[39]

The similarity of these definitions of net smelter return (gross price less non-mining costs) times output to the gross income base under the percentage depletion rules is readily apparent. Each of the above definitions is very specific that smelter and refining charges are to be deducted, just as in the tax definition of gross income.

The following two examples, from contracts or royalty deeds between a landowner (the vendor) and the mining company (the purchaser), illustrate the legal language used in defining a net smelter return:

> As additional consideration for the Vendor entering into this Agreement, the Purchaser acknowledges that the Claims shall be subject to a royalty or charge in the amount of two percent (2%) of net smelter returns payable to the Vendor. For the purpose of this clause "Net Smelter Returns" shall mean the actual proceeds received by the Purchaser from a smelter or other place of sale or treatment in respect of all ore removed by the Purchaser from the Claims as evidenced by its returns or settlement sheets after deducting from the said proceeds all freight or other transportation costs from the Claims, to the smelter or other place of sale or treatment, but without any other deduction whatsoever.[40]

> For the purposes of this Agreement and the payment of the Net Smelter Return, net smelter returns shall mean the actual proceeds received by Warren or any of his respective assignees or successors in interest to the Claims from any mint, smelter, refinery or other purchaser from the sale of concentrates, metals (including bullion) or products from the Claims and sold, after deducting from such proceeds the following charges levied by third parties to the extent that they are not deducted by the purchaser in computing payment: a) assay costs and umpire assay costs charged by any mint, smelter, refinery or other purchaser; b) smelting and refining charges, penalties, and the cost of transportation and handling of such concentrates, metals (including bullion) or products from the Claims to any mint, smelter, refinery or other purchaser; and c) related insurance on such concentrates, metals (including bullion) or products from the Claims.[41]

Thus, continuing with the above hypothetical copper example, the net smelter return would be the price at which cast copper could be sold after the costs of smelting and refining the copper ore are subtracted (so as to deduct any non-mining value). Using the same figures as before, the market price of the final cast copper is $3.60/lb, and thus one metric tonne (2,205 lbs) of pure copper would be valued at $7,938. However, one ton of copper ore concentrate contains only 30% pure copper, so that the value of one tonne of that ore concentrate is 30% of that, or $2,381.[42] To calculate smeltering and refining costs assume that these are 10% or $0.36/lb of the price of the cast copper. Then costs would be $238/tonne of copper concentrate (equal to $0.36 x 0.30 x 2,205) the net smelter return would be:

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[39] Baldwin, Christopher G. *Understanding Royalty Structures.* Paper written for the Conference Board of Canada. 2003. p. 6.

[40] Anglo American Uranium Corporations SEC Filing of Form 20F12G, February 8, 2007. Available from the Securities and Exchange Commission (SEC) website.

[41] Open Energy Corporation's SEC Filing of Form SB-2/A on December 2, 2002. Available from the SEC website.

[42] To simplify the calculations, the figures are all rounded to the nearest whole number. As before, the remaining 70% of the copper ore concentrate comprise sulfur, iron, and other impurities that have no value.

$$\$2,143 = (\$2,381) - (\$0.36) \times (0.30) \times (2,205)$$

Multiplied by the tonnage of ore concentrate shipped to the smelter/refiner, it would equal the actual (or constructive) sales revenue to the mining company of the ore concentrate. If annual sales were 100,000 metric tonnes of copper concentrate, total net smelter return revenues would be $214 million. At 8%, the royalty on this would be $17 million.

Note that in this example, net smelter return is greater than gross income for depletion purposes and would thus yield a greater royalty. This is because final metal prices are high relative to smelting/refining costs. In general, the higher are metals prices relative to costs (in which case mineral producers earn extra or windfall profits) the more net smelter returns diverge from gross income.

Net Profit Royalty

Another royalty base that has been mentioned in the General Mining law debate is net profit. Here the royalty would be a certain percentage of the miner's net after-tax profit or income, which is essentially gross revenue less all costs (operating, capital, and tax costs). For any mining company (indeed for any business) net profit is, of course, less than sales revenue by the costs of doing business, thus resulting in a smaller royalty base from which to calculate royalty payments. Reducing royalty payments to the federal government might be a major reason that it is supported by much of the hardrock mining industry and its supporters. Not only are net profits notoriously variable, difficult to measure, and susceptible to accounting manipulations, but this method could create incentives for mining companies to claim significant deductions from their income such that there would rarely be a profit against which to levy the royalty. Thus depending upon the royalty rate this could lead not only to smaller royalty payments than either a gross income or net smelter return royalty, but perhaps to no royalty at all. Some advocates of the net after-tax profit type of royalty, for example the 1993 bill S. 775, would have measured net profits at the mine mouth, which would generally (depending on the rate) result in even lower royalties. Further, a net profit royalty at the minemouth creates complications in allocating costs between extraction and other mining processing.

Another effect of a net-profit type of royalty on hardrock minerals would be to expose the federal government to the risks of an investor—much like investors in stock are as owners subject to risks—rather than the rewards of the much less risky status of landowner. Such an arrangement would not serve to impose the market-determined factor costs (royalties) on the mining operations. In other words, if net profit were to mean net before-tax profits, then the royalty would essentially operate like an income tax. This would not be consistent with mainstream economic theory that a royalty is not a tax, but a factor payment.

The Fixed Royalty

Yet another royalty base, one which is used less frequently, is the royalty based on a constant rate per unit, say $5/ton, of mineral output (i.e., the ore concentrate). This was the type of royalty instituted under the Mineral Leasing Act of 1920, the law which first introduced a federal leasing system, including a royalty, for coal.[43] As a factor payment, this type of royalty makes little

[43] Prior to this law, royalties on coal were not an issue since the federal government sold, rather than leased, federal coal-bearing lands. This policy was codified by an 1864 statute, and continued as an exception to the locatable minerals (continued...)

economic sense, being equivalent to charging fixed interest payments on capital regardless of the value of the capital loaned. Being assessed on only one variable—output, rather than price and output—it does, however, avoid the usual complexities associated with determining value (price), costs, or even profits.[44]

Comparison With Oil, Gas, Coal, and Geothermal Royalties

For oil, gas, and coal, federal royalties are calculated on the gross proceeds (or gross sales revenues) from the contract sale. For oil and gas this generally occurs close to the wellhead, and so the contract price is used to determine gross proceeds. Typically, for example, oil and gas is sold at a posted price to a pipeline company, and that is the price on which the royalty is based. In situations where oil is not sold in an arm's-length transaction, or is sold without a contract, royalties are based on various types of benchmarks such as comparable sales or even local spot-market oil prices, adjusted for any quality differences and transportation costs. In situations where the oil or gas is transported before it is sold, then transportation charges are generally deducted to determine gross proceeds for royalty purposes.[45]

Royalties on coal extracted from federal lands, at the 8% or 12% royalty rate, are also assessed on the "gross proceeds" from the sale of the coal. This is essentially the price of the coal in a free-market transaction between unaffiliated parties at arm's-length. The price is determined at the point of sale, which for coal is typically at or near the mine-mouth when the coal is weighed and loaded (i.e., at a scale or batch loading facility). Transportation and washing costs, and other costs not deemed to be mining or production costs, are generally deductible. These rules for oil, gas, and coal clarify that value is determined as close to the mine as possible, and that non-mining or extraction costs after a marketable product is created are deductible.[46]

For geothermal resources, the Geothermal Steam Act of 1970 (as amended) instituted a 10%-15% royalty on federal leases based on the value of the steam or any other form of heat or energy produced and sold.[47] However, under amendments made by the Energy Policy Act of 2005 (P.L. 109-58), if the geothermal energy is not sold but is instead used to generate electricity—in most cases it is—the royalty is between 1% and 2.5% and it is based on the gross proceeds from the sale of electricity rather than the value or volume of geothermal energy used in the generation of electricity. In some cases, a deduction against gross proceeds for transmission and wheeling costs is allowed.[48]

(...continued)

policy of the General Mining Law of 1872. See Leshy, John D. *The Mining Law: A Study in Perpetual Motion.* Resources for the Future, Washington, DC. 1987. p. 30.

[44] Additional detail on the various pros and cons of various royalty bases is discussed in: Otto, Andres, Cawood, Doggett, Guj, Stermole, Stermole, and Tilton. *Mining Royalties: A Global Study of Their Impact on Investors, Government, and Civil Society.* The World Bank. 2006. pp. 49-70.

[45] Code of Federal Regulations (C.F.R.). Title 30 Vol.2, Part 206 (Revised 7-1.2007).

[46] Ibid.

[47] U.S. Department of the Interior. Minerals Management Service. *MMS Minerals Revenue Management: General Federal and American Indian Mineral Leasing Terms*. September 2006. p. 4.

[48] Federal Register, Vol. 72. No. 84, May 2, 2007. Department of Interior. Minerals Management Service. *Geothermal Royalty Payments, Direct Use Fees, and Royalty Valuation: Final Rule.* 30CFR, Parts 202, 206, 210, 217, and 218. pp. 24448-24469.

What Would Be the Appropriate Royalty Rate?

With regard to a specific royalty rate, economic theory is less clear beyond the implication that a royalty rate determined in the competitive marketplace is generally the most economically efficient rate—the rate that is most likely to maximize social welfare. In the case of privately owned mineral lands, markets generally exist that determine the royalty type and rate for a wide variety of minerals.

In most types of private royalty arrangements in the early 1990s (the latest data readily available), the most common type of royalty was the ad-valorem royalty at rates ranging from 2-8%, with an average rate of 5%.[49] In the case of publicly owned lands, laws determine the return on the resources, although competitive market rates may be a determining factor in establishing such rates. Most states with mineral resources imposed ad-valorem royalties at rates ranging from 2-10%.[50] For leasable energy minerals on federal lands, the statutory royalty rates range from 5%-16.67%. For oil and gas, the royalty rate is either a 1/8 (12.5%) or 1/6 (16.67%) share of the value of the mineral, depending upon whether the oil or gas is shallow (1/6 share because costs are lower) or deep (a 1/8 share because costs are higher). On some leases, the rate could be higher than 1/6. Also, the royalty could be paid "in-kind" (either a 1/8 or 1/6 share of the output rather than of the price). For coal, the royalty rate is either 12% (surface mines) or 8% (underground mines). Note that the 8% ad-valorem rate proposed in H.R. 2262 is the same as the royalty rate on underground coal mines. Even for hardrock minerals on acquired lands (as opposed to public domain lands, which are governed by the 1872 Mining Law), the Congress has established an ad-valorem royalty rate of 5%.[51] Finally, in international lease transactions, mineral royalties are predominantly of the ad-valorem type with rates ranging typically from 2%-12%, depending on the country, and the mineral type.[52]

External Benefits

There may be conditions under which the government might not want to use the royalty rate established by the market. If there are sufficient positive economic and social effects from the use of public lands for mining, there might be an economic rationale for charging the mineral producer a lower than market rate.[53] Such externality arguments—the stimulation of an infant industry and the development of mineral resources, and the settling of the American West—were apparently a principal rationale for the location system involving no royalties and other rent payments established in 1872. But these arguments may not be valid in today's economy. The hardrock minerals industry is not an infant industry, and there is no longer a need for settling the American West.

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[49] U.S. Department of Interior. *Economic Implications of a Royalty System for Hardrock Minerals.* August 16, 1993.

[50] U.S. General Accounting Office. *Mineral Royalties: Royalty in the Western States and in Major Mineral Producing Countries*. GAO/RCED-93-109. March 1993.

[51] U.S. Department of the Interior. Minerals Management Service. *Mineral Revenues 2000: Report on Receipts from Federal and American Indian Leases.* p. 134.

[52] Otto, Andres, Cawood, Doggett, Guj, Stermole, Stermole, and Tilton. *Mining Royalties: A Global Study of Their Impact on Investors, Government, and Civil Society.* The World Bank. 2006.

[53] To be technically correct, at least from an economic perspective, a lower royalty rate would be justified if the external benefits would derive from consuming the mineral, if they were proportional to price, and if they were invariant with the level of output. In some cases, re-mining a prospect with remediation of damage from earlier mining may be in the public interest.

Arguments are made that the economic stimulus to the industry resulting from royalty-free treatment produces benefits; it is argued that imposition of a federal royalty on hardrock mining would damage most of the American hardrock industry, which, it is argued, suffers from fierce, heavily subsidized foreign competition. Some argue that there is a national security aspect to subsidizing certain hardrock minerals, although there is no presumption that royalty-free treatment is the appropriate way to address these concerns. It is also pointed out that damage to the industry would harm those western communities that are economically dependent upon it.

These arguments are contested on various grounds. Subsidies for hardrock mining clearly produce economic benefits to the industry receiving the subsidy and to the communities dependent upon that industry. But these benefits are not external benefits that the markets are not capable of taking into account; they are not "market failures," which may justify either a tax (in the case of external costs) or subsidies in the case of external benefits. Rather, the benefits are *private* benefits that are taken into account by the normal working of the market system. Further, it can be argued that the private benefits to the hardrock mining industry occur at the expense of private damages to other American industries; the private benefits to mining-dependent regions of the United States may occur at the expense of private costs to other regions of the United States. When resources are scarce, a condition that affects all economic systems and all countries alike, the use of resources in one sector means the loss of the resource in another sector—the subsidy to hardrock mining is not costless. The loss of economic efficiency implies that the private benefits to the hardrock mining industry are smaller than the private costs to other sectors. This suggests that removal of the subsidies would produce a net welfare gain to citizens of the United States.

As to the national security argument, there are minerals that are often referred to as "strategic minerals"—cobalt, columbium, chromium, manganese, platinum, and others.[54] Excessive dependence upon foreign producers of these and other economically vital minerals might pose an economic disruption or national security threat to the United States, although the nature of the relationship between imports, domestic production, and national security is not a simple one. These arguments are similar to those made about the U.S. dependence upon imported oil, and often used to justify subsidies for the domestic oil industry. Some argue that the threat of a domestic supply disruption might be better met with a stockpiling of that mineral.[55] It seems clear also that not all hardrock minerals are of U.S. national security concern. In any event, if a financial subsidy for certain strategic hardrock minerals industries was appropriate, a tax subsidy would probably be more efficient than total forgiveness of royalty payments. (The current tax subsidies for the hardrock mineral industry are discussed in the section "Federal Tax Treatment of the Hardrock Mining Industry," below).

External Costs

There is another side to the externality concept: external costs. It appears that some external effects associated with hardrock mineral production—economic effects not taken into account in the normal business decisionmaking—are net "external costs" rather than net external benefits. The external costs from hardrock mineral production are the degradation of the environment and

[54] See National Research Council. *Minerals, Critical Minerals, and the U.S. Economy.* 2007.

[55] The U.S. oil stockpile is called the Strategic Petroleum Reserve. Under the authority of the Strategic and Critical Materials Stock Piling Act of 1979, as amended, the Department of Defense maintains a stockpile of about 35 strategic and critical materials to supply the military, industrial, and essential civilian needs of the United States for national defense.

the damage to the utility of the land for other potential uses. Without land reclamation, there would presumably be damage to the environment, which is an external cost to society. This is a cost that the typical profit-maximizing hardrock mineral producer does not usually account for in the normal business decisionmaking process. Consequently, since the accountable business costs are lower than the real costs (including external costs) prices are lower than they should be, causing output to be higher than it should be. Under this reasoning, if the presence of external benefits is dismissed and the presence of external costs is considered significant, the appropriate federal policy would be a tax rather than to impose no royalty on the use of the land. This is the economic rationale for the abandoned mineland reclamation fee under SMCRA, the Surface Mining Control and Reclamation Act.[56]

Absence of Competition

Two other conditions might mitigate against the use of the market-determined royalty rate: First if the market for the leasing of mineral lands between landowners and mining companies is not competitive, and second, if the mining industry itself is not competitive. In the first case, if private landowners exercise monopoly power or some other type of market power, then it would be possible to extract from the mining companies higher than competitive royalty rates—monopoly rates. In the second case, if the mining industry is concentrated and exercises market power—control over prices, for example—it might lead to underpayment of royalties—the market-determined royalty rates might actually be too low.

These are complex issues which are difficult to analyze. Much of the land from which hardrock minerals are produced is owned by the federal government, which might be in a position to take advantage of its power to obtain royalty payments above the competitively determined rates. Such payments, combined with the bonus bids, would appropriate for society the economic rents—the abnormal or excess profits (i.e., windfalls)—from the production of scarce natural resources. In reality, of course, the federal government policy is just the reverse: It charges a royalty rate of zero, which is definitely below the market-determined rate. On the other hand, much land is also privately owned or owned by state or local governments or Indian tribes, which suggests that the market-determined royalty rates might be a reliable indicator of competitive rates.

As to the hardrock mineral industry structure, available data suggest that the industry, both in the United States and throughout the world, is somewhat concentrated. Hardrock mining is a highly capital intensive business and large enterprises can operate more efficiently. In the United States, many of the mining firms are large multinational mining conglomerates—five of the top ten claim holders (who hold more than 16% of all claims on western public lands) are foreign corporations. Internationally, the hardrock mining industry is dominated by about 40 companies and the top four account for 35% of total market capitalization.[57] This would suggest that the market-determined royalty rate might actually be too low. On balance, however, it might be the case that the above two opposing forces tend to offset each other and the government would want to use the more appropriate competitive rate, which would be more consistent with economic efficiency, and social welfare, than a zero rate.

[56] P.L. 95-87, Title IV. 30 U.S.C.1231 et. seq. U.S. Library of Congress. CRS Report RL32993, *Abandoned Mine Reclamation Fee on Coal*, by (name redacted).

[57] The largest of these is BHP Billiton, which has operations in the United States. In 2006 this multinational had a market capitalization valued at nearly $120 billion. See PricewaterhouseCoopers. *Mine, Riding the Wave: Review of Global Trends in the Mining Industry, 2007.* Available at its website, http://www.pwc.com.

Should Royalties Rates Differ by Mineral Type?

Economic theory is also unclear whether the same royalty rate should apply to all hardrock minerals or whether the rate should vary by type of mineral in some logical way—according to some acceptable rational criteria. On the one hand, a variable rate is unnecessary because the base is ad-valorem, so the royalty amounts, in absolute dollars, automatically vary in proportion to mineral value: more valuable minerals pay greater absolute royalties per unit. **Table 2** gives an illustration for metals. Note that the royalty in column (4) is based on the gross value of the metal in the commodities markets and does not allow deductions for smeltering costs and

other costs—in other words, the figures do not represent either net smelter returns or gross income from mining, both of which would be less by the amount of such costs. A constant royalty rate also tends to minimize both economic distortions—intra-industry resource allocations among mineral types—as well as administrative costs. On the other hand, private royalty agreements, which are negotiated on a case-by-case basis, have widely varying royalty rates. These can range from 1-10%, and differ by mineral types.

Under one possible structure that has been suggested, the royalty rate itself would be a function of—it would vary positively with—the mineral's price. Column (6) of **Table 2** shows one hypothetical schedule of such rates beginning at 8% for platinum, the most valuable metal, and declining in steps of 1 percentage point to 1% for aluminum. With such a schedule the absolute amount of royalty payments declines even more rapidly as the value of a mineral declines.

Another possibility would be to vary the royalty rates in direct proportion to the percentage depletion rates applicable to gross income from mining as shown in **Table 3**. Such a royalty rate structure would produce a different pattern of absolute royalty payments than either a constant royalty rate or a royalty rate in direct proportion to the minerals value. For example, lead and zinc, which qualify for a 22% depletion rate, would have a higher royalty burden than gold or silver, which are significantly more valuable than either lead or zinc but which qualify for a 15% depletion rate.

Effects on the Mining Industry

Introducing a royalty payment system for locatable minerals could have an adverse economic and financial effect on the producers of these minerals, particularly on marginal producers. Both average and marginal costs would increase, and profits and employment in the hardrock mineral industry would decrease. Hardrock mineral production would be lower as marginal mines closed. This would also adversely affect those parts of the United States that rely on these industries. The payment of royalties combined with higher fees could also alter the competitive balance among mineral producers both domestically and internationally: The competitive disadvantage that royalty-paying mineral producers currently have would be lessened. The hardrock mineral industry generally would be less competitive in relation to other domestic mineral producers and with international mineral producers. Hardrock mineral prices would probably not increase very much because for most minerals, prices are determined in the international market—they cannot be shifted. This would further add somewhat to financial pressures for the marginally profitable mining company.

On the other hand, the hardrock mining industry has been booming over the last four years. One indicator of this is the growth in metals and minerals prices, which have increased overall and

have contributed to industry profitability. **Table 2** shows this increase between 2002 and October 2007 for selected metals. According to the Department of Commerce, relative to its size in the economy, the mining industry group generally was the largest contributor to growth in the Gross Domestic Product price index in 2006, accounting for 6.6% of price growth, more than three times its share of current-dollar GDP.[58] According to PricewaterhouseCoopers, 2006 was another spectacular year for the global mining industry.[59] It also predicted that 2007 should bring with it both record financial results and further consolidation within the industry. Finally, rates of return on capital for the U.S. mining industry have also been higher as compared with many other industries.[60]

Table 2. Illustration of Ad-Valorem Royalty Calculations Based on Recent Minerals Prices

Mineral Type	Price in 2002 ($/lb)	Price on 10-17-2007 ($/lb)	Constant Royalty at 8% ($/lb)	Constant Royalty at 4% ($/lb)	Variable Royalty Rate (% and $/lb)
(1)	(2)	(3)	(4)	(5)	(6)
Platinum	$6,516.00	$17,400.00	$1,392.00	$696.00	8% = $1,392.00
Gold	$3,732.00	$9,000.00	$720.00	$360.00	7% = $630.00
Silver	$55.00	$174.00	$13.92	$6.96	6% = $10.00
Tin	$1.95	$9.70	$0.78	$0.39	5% = $0.49
Copper	$0.75	$3.60	$0.29	$0.14	4% = $0.14
Lead	$0.44	$2.00	$0.16	$0.08	3% = $0.06
Zinc	$0.38	$1.50	$0.12	$0.06	2% = $0.03
Aluminum	$0.64	$1.10	$0.09	$0.04	1% = $0.01

Sources: U.S. Department of the Interior. U.S. Geological Survey. *Mineral Commodity Summaries: 2007;* and the Wall Street Journal, October 17, 2007. p. C8.

Other Economic Implications of Imposing a Royalty

These negative industry and regional effects would be a natural and unavoidable part of the transition from a policy of resource subsidization to a policy of resource neutrality. As the above discussion suggests, however, the policy of introducing a royalty payment system for locatable minerals would be expected to have positive economic effects in other sectors (the non-mining industry) and in the remaining parts of the country. Less land would be mined and fewer U.S. hardrock minerals would be produced and more imported than under a no-royalty system, but more of other, higher-valued commodities would be produced. This would likely contribute to a more economically efficient use of the nation's resources, which would tend to promote the welfare of society—a greater good for a greater number of people.

[58] U.S. Department of Commerce. Bureau of Economic Analysis. *New Release: Gross Domestic Product by Industry, 2006 (advance).* April 24, 2007.

[59] Op. Cit. *Mine, Riding the Wave: Review of Global Trends in the Mining Industry, 2007.* Available at its website, http://www.pwc.com.

[60] U.S. Department of Commerce. Economics and Statistics Administration. U.S. Census Bureau. *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations: 2007.* AFR/07/Q1. June 2007.

Thus, the current policy of free access (i.e., royalty forgiveness) involves a trade-off: Policymakers choose the benefits to the hardrock mineral industry above the benefits that would accrue to another domestic economic sector. A policy of royalty (or other rental) payments would be more neutral; it would let the markets be the arbiter of the relative size of the various economic sectors. And even if the health and competitiveness of the domestic hardrock mineral industry is of sufficient concern to warrant federal subsidies, there may be more economically efficient ways of providing these subsidies than the total forgiveness of a factor payment.

Revenue Effects

The payment of a royalty to the federal government for the services from the mineral land would increase federal revenues, although revenue generation is not the primary rationale for the imposition of a royalty. The Congressional Budget Office has estimated the budgetary effects, revenue and spending, of H.R. 2262. The estimates are replicated in **Table 3**, which shows both revenue effects of the 8% and 4% royalty and from the proposed higher fees.[61]

As noted, H.R. 2262 would establish, beginning after its enactment, a 4% royalty on existing claims, and an 8% royalty on new claims. The 4% royalty on existing claims would generate revenues early, although no royalties would be paid in 2008 due to a provision in H.R. 2262 that would defer royalties during the first 12 months after enactment. Most of the revenues estimated under H.R. 2262 would come from existing claims. The 8% royalty on new claims is unlikely to generate significant revenues during the forecast period (2008-2017) because after a claim is staked, it typically takes at least 10 years for a hardrock mine to begin production. H.R. 2262 would also reauthorize and raise both the claim's location fee and the annual maintenance or holding fee, from $30 to $50 per claim, and from $125 to $150 per claim respectively. The projected revenue effects from the proposed higher fees are shown in **Table 3**.

The revenue estimates are net of federal income taxes—there would be some decline in income tax revenues due to the deductibility of royalty payments and fees against business taxes. Also, note that under federal budget rules fees collected by federal agencies, such as the Department of the Interior, are considered as offsetting budget receipts, or negative spending. Such receipts reduce the agencies' outlays.

Table 3. Revenue Effects of a Royalty on Hardrock Minerals Under H.R. 2262

(dollars in millions)

Type	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008-2017
Royalties	0	70	30	30	30	30	30	30	30	30	310
Fees	10	55	51	47	43	40	37	35	33	31	382
Total	10	125	81	77	73	70	67	65	63	61	692

Source: Congressional Budget Office. H.R. 2262: Hardrock Mining and Reclamation Act of 2007. CBO Cost Estimate. October 29, 2007.

[61] The fees currently charged the hardrock mining industry are discussed later in this report.

Federal Tax Treatment of the Hardrock Mining Industry

The U.S. hardrock minerals industry is subject to the same income tax laws which apply to all other for-profit businesses, paying federal income, payroll, and other federal taxes. The federal corporate income tax applies a 35% rate to most corporate taxable income, defined generally as gross revenue (sales) minus interest, wages, the cost of purchased inputs, and an allowance for depreciation. Reduced tax rates, either 15%, 25%, or 34%, apply to "smaller" corporations, those earning less than $10 million of income.[62] In addition, corporate stockholders pay individual income taxes on their corporate-source capital gains and dividends.

As business entities, hardrock mining companies benefit from many different types of untargeted tax incentives, provisions that are generally available to non-mining businesses, as well as some tax provisions specifically targeted toward mining. Two untargeted or general tax benefits are the §199 manufacturing deduction and accelerated depreciation. Under IRC §199, "manufacturing" businesses are allowed a deduction, as a business expense, for a specified percentage of the qualified production activity's income subject to a limit of 50% of the wages paid that are allocable to the domestic production during the taxable year. The deduction was 3% of income for 2006, is currently 6%, and is scheduled to increase to 9% when fully phased in by 2010.[63] For the domestic mining industry (which includes the oil and gas industry), the deduction applies to any primary product "manufactured, produced, or *extracted* in whole or in significant part in the United States." Note that extraction is considered to be manufacturing for purposes of this deduction, which means that domestic firms in the business of extracting hardrock minerals from underground reservoirs or deposits qualify for the deduction.[64] Effectively, the deduction is equivalent to a reduced marginal tax rate. For example, at the top marginal corporate tax rate of 35%, which typically applies to large corporations such as hardrock mining companies, the current deduction of 6% is equivalent to a marginal corporate income tax rate of 32.9% (35% x 0.94) rather than 35%.[65]

Another untargeted or general tax provision that is important to the hardrock mineral companies is accelerated depreciation—the rules that determine how much a business may deduct for the depreciation of its capital equipment and structures. This deduction is intended to provide a business reasonable allowance for the exhaustion and wear and tear (i.e., depreciation) of business property. It is analogous to the cost depletion allowance for investment in a mineral deposit (as discussed below). The present depreciation treatment is known as the Modified Accelerated Cost Recovery System (IRC §168). Generally, under this system, assets are depreciated for regular tax purposes over a specified recovery period, and by applying one of the

[62] The 15% rate applies to the first $50,000 of profits, 25% to the next $25,000 of profits, and 35% to profits from $75,001 to $10,000,000. Small "non-corporate" mining companies would be taxed as sole-proprietorships.

[63] However, there are proposals to repeal this deduction as part of the Congress's tax reform proposals.

[64] This deduction was enacted under the American Jobs Creation Act of 2004 (P.L. 108-357, also known as the "JOBS" bill). It was originally a substitute for repeal of the export tax benefits under the extra-territorial income tax exclusion, which was ruled to be in violation of trade laws. See CRS Report RL32652, *The 2004 Corporate Tax and FSC/ETI Bill: The American Jobs Creation Act of 2004*, by David L. Brumbaugh.

[65] Corporations are currently taxed at 15% of the first $50,000 of taxable income, 25% of the taxable income from $50,001 to $75,000, 34% of the taxable income from $75,001 to $10 million, and 35% of taxable income above $10 million.

accelerated depreciation methods prescribed for each class of property, including the 200% declining balance method (the double declining balance method) or the 150% declining balance method or formula.

The annual depreciation deductions are determined by applying this formula to the assigned recovery period. The applicable recovery periods are prescribed for each property class. Mining equipment, assets used in the mining, quarrying, milling, and beneficiating of metallic and nonmetallic minerals, are assigned a seven-year recovery period. This system also allows producers to use a depreciation method (as opposed to the recovery period) that maximizes the value of the deduction over time. This is more advantageous than the theoretical treatment, which would call for a depreciation schedule based on the actual economic depreciation—a longer recovery period and a less accelerated formula, which increases the tax value of the deduction (or equivalently, reduces the effective marginal tax rate on the income generated by the equipment). Given that hardrock mineral producers are highly capital intensive and that the equipment used (stripping shovels, drills, bulldozers, drag lines, and haulers) can cost tens of millions of dollars, the accelerated depreciation provision can be relatively important.

Three Special Tax Preferences or Subsidies

In addition, at the federal level there are three special, or targeted, tax preferences available to the mining industry generally, that are also available to hardrock mining firms.

Expensing of Mine Exploration and Development Costs

One important special tax break available to the hardrock mineral industry is expensing of exploration and development expenditures, i.e., the deduction in the year incurred of costs that are essentially capital in nature (IRC §616 and §617).

Before a mine reaches the producing stage, mining companies incur geological and geophysical (or surveying, and reconnaissance investigation) costs, costs for ascertaining the existence and location of a mine, and costs for determining the quantity and quality of the deposit. These include the costs of staking the claim, removal of property line obstructions, limited removal of overburden (the removal of large amounts of overburden would indicate that a deposit may have already been found and the mine may be in a different stage), and limited sluicing. Exploration expenditures include the costs of surveying, test pitting, trenching, drilling, driving of exploration tunnels and adits, and similar types of work. The costs of exploratory drilling to ascertain the extent of commercially marketable ores are treated by the tax law as a mineral exploration cost. Expenditures for exploratory drilling from within a producing mine to ascertain the existence of what appears (on the basis of all the facts and circumstances known at the time of the expenditure) to be a different ore deposit are also considered exploration expenditures. These types of costs are all deductible rather than capitalized.

Expenditures made after the existence of ores or minerals in commercially marketable quantities has been disclosed are considered mine development expenditures, and these also qualify for expensing treatment. These are costs associated with bringing the mine to production. For example, the costs of constructing or sinking a mine shaft, or the costs of driving tunnels and galleries, are development costs, which may be expensed. Activities associated with development are building roads, clearing the land, and other activities to prepare a site for the production stage.

There are several limitations to expensing of mine exploration and development costs. First, expensing applies only to domestic mines; exploration and development cost of foreign properties must be either depleted or amortized over a 10-year period using straight-line amortization. Second, corporate mining companies may only expense 70% of the exploration and development; the remaining 30% must be amortized over five years, i.e., deducted evenly over 60 months (IRC §291 (b)). Third, both exploration and development costs must be recaptured (i.e., taken back) once the mine is opened and production commences (for exploration expenses) or when the mine is sold (for development expenses). Recapture is accomplished by either including the amount expensed as ordinary income or by subtracting it from the percentage depletion allowance. This makes it especially important for mining companies to determine when exploration ends and development begins.

The Percentage Depletion Allowance

Once a mine reaches the producing stage, a producer may deduct a certain percentage of the gross income—as specified by law—as an allowance for depletion. The percentage depletion allowance is a tax deduction against the federal income tax available to a mining firm for the costs of depleting a mineral reserve, which is part of the total production costs deductible to derive net taxable income. The depletion allowance or deduction is intended to give the mineral producer a deduction for the depletion of the investment in the mine, to account for the loss (depreciation) of capital, to reflect the physical and economic depletion of the mineral reserve as the mineral is being extracted (i.e., the wasting of the asset). It is analogous to the allowance for depreciation of equipment and structures and other assets that is available to all businesses. In theory the depletion allowance should be based on the actual investment cost of the mine, and the annual deduction should be based on the actual output of the mine (its actual rate of depletion). This is called cost depletion.

Unlike the annual depreciation deduction, however, which is calculated based on a taxpayer's actual investment cost of the property (equipment and structures), a recovery period corresponding to that property, and an annual rate of deduction over that recovery period, the percentage depletion deduction for a mine is calculated as a percentage of "gross income" (annual sales revenue) irrespective of the actual investment in the mineral reserve (the mine). That is why percentage depletion is a tax subsidy, preference, or tax expenditure. Any depletion deduction in excess of cost depletion is considered by economists to be a tax subsidy or incentive because the present value of the total amount deducted typically exceeds the initial investment. In other words, the total amounts that can be recovered through percentage depletion generally exceed the total investment cost of the property. This is true even with the net-income limitation, which limits the deduction to 50% of the taxable income from the mine (IRC §613 (a)). Using cost depletion, the total cost recovered cannot exceed the actual investment in the property.

Table 4 shows percentage depletion rates for most minerals, including hardrock minerals. As this table shows, the allowance is available to virtually all mineral producers except integrated oil and gas producers, although the highest rates available are for the hardrock minerals. Percentage depletion rates range from 5% for stone and clay to 22% for uranium and beryllium. Most of the hardrock minerals have a depletion rate of 22%, and several have either a 15% or 14% rate.

The percentage depletion allowance is also subject to several limitations. First the amount of deduction is limited to 50% of the net income (essentially, the net profit) from the property. Second, for iron ore (and coal) mined by corporations (as opposed to noncorporate firms) the allowance must be reduced by 20% of the excess of percentage depletion over cost depletion

(IRC §291). This limitation was introduced by the Tax Equity and Fiscal Responsibility Act of 1982 (P.L. 97-248).

In effect this limitation reduces the 22% depletion rate to an effective depletion rate of between 17.6% and 22%, depending upon the amount of cost depletion.[66]

Table 4. Percentage Depletion Rates for Minerals

Any....	If from deposits in United States:	The following metal ores:
22% Depletion Rate		
Sulfur, and uranium	Anorthosite, asbestos, bauxite, block steatite, talc, celestite, chromite, clay, corundum, fluorspar, graphite, ilmenite, kyanite, laterite, mica, nephilite syenite (to the extent that alumina and aluminum compounds are extracted therefrom), olivine, quartz crystals (radio grade), rutile, and zircon	Antimony, beryllium, bismuth, cadmium, cobalt, columbium, lead, lithium, manganese, molybdenum, nickel, platinum, platinum group metals, tantalum, thorium, tin, titanium, tungsten, vanadium, and zinc
15% Depletion Rate		
Oil and gas	Gold, silver, copper, iron ore, and oil shale from deposits located within the United States	
14% Depletion Rate		
All metal mines not in the United States, and all metal mines in the United States, but not qualifying for the 22% rate	Rock asphalt, and vermiculite, granite, limestone, dimension or ornamental stone, and all other minerals not listed in this table	If not mined in the United States, bauxite, fluorspar, most types of ball clay, bentonite, china clay, sagger clay, and clay used or sold for use for purposes dependent on its refractory properties
10% Depletion Rate		
Asbestos not mined in the United States	Brucite, coal, lignite, perlite, sodium chloride, and wollastonite.	
7.5% Depletion Rate		
Clay and shale used or sold for use in the manufacture of sewer pipe or brick	Clay, shale, and slate used or sold for use as sintered or burned lightweight aggregates	
5% Depletion Rate		
Clay used, or sold for use, in the manufacture of drainage and roofing tile, flower pots, and kindred products	Gravel, peat, pumice, sand, scoria, shale and stone (except oil shale and stone described elsewhere in this table)	Bromine, calcium chloride, and magnesium chloride from brine wells

Source: Internal Revenue Code Section 613(b).

[66] If the statutory depletion rate is 22%, and if this were to be reduced by 20%, then the effective depletion rate would be 17.6% (22% minus 22% times 0.2). Because the statutory rate is reduced not by the full 20% but by 20% of the excess of percentage over cost depletion, the effective rate is somewhat higher than 17.6%. The specific effective depletion rate, therefore, depends upon the cost depletion amount.

The Interaction Between the Percentage Depletion Allowance and the Royalty

As noted above, the imposition of a royalty, where none existed before, would increase a mining firm's operating costs and reduce profitability. Further, due to the deductibility of the royalty (as an operating cost of doing business) against the federal income tax, the deduction reduces tax liability and therefore lowers the tax costs—the after-tax cost of the royalty is effectively reduced.

However, there is an important interaction between a royalty and the percentage depletion allowance that limits that effect, i.e., that *increases* the after-tax cost of the royalty somewhat. Under IRC §613, royalty payments (and other rental payments) are deductible from gross income to determine the percentage depletion allowance. This means that if a royalty were to be imposed on hardrock mining from federal lands, it would have the effect of simultaneously reducing the amount of the percentage depletion deduction. Thus, while the imposition of a royalty would increase deductible expenses and reduce the mining company's tax liability, the reduced percentage depletion allowance would reduce tax deductions and would raise a mining firm's tax liability. The net effect on tax liability of these two simultaneous considerations are shown in the following equation, which shows the total increase, after tax burden, for every dollar of royalty paid:

(1) $= r\,(1-t) + r\,t\,d$

(2) $= r - r\,t + r\,t\,d$

(3) $= r - rt\,(1 - d)$

where r = the royalty rate,

t = the marginal corporate (or business) tax rate,

d = the applicable percentage depletion allowance rate.

The first term in (1) shows how the burden of a royalty is reduced by its tax deductibility; and the second term shows how the burden of a royalty is increased by its subtraction from gross income. For example, an 8% royalty without the gross income offset is effectively a 6% royalty at a 25% marginal tax rate; the same royalty however is effectively a 6.44% royalty with a gross income offset if the percentage depletion allowance is 22%. Similarly, a 4% royalty without the gross income offset is effectively a 3% royalty at a 25% marginal tax rate; the same royalty, however, is effectively a 3.15% royalty with a gross income offset if the percentage depletion allowance is 15% (say, for gold).

Equations (2) and (3) are the same as equation (1). Expressed as equation (3), the effective royalty is shown as a gross royalty, the r term, and the offset term - rt (d-1). So in the previous example when the gross royalty is 4%, the revenue offset is a negative 0.85% [0.04 x 0.25 (1 - 0.15) = - 0.85]. This shows that under current tax laws, and given the current percentage depletion rates, the costs of gross income deductibility of the royalty could, in certain cases, offset the benefits from royalty tax deductibility—which, for these cases, is effectively equivalent to not allowing tax deductibility.[67]

[67] These calculations ignore the effects of the 50% taxable income limit on the percentage depletion allowance.

Deduction for Mine Closing and Reclamation Costs

The Deficit Reduction Act of 1984 (P.L. 98-369) included a provision that gives preferential tax treatment to the mining industry in the area of mine closing and land reclamation. This provision (IRC §468) allows mining companies to deduct the costs of mine closing and land reclamation in advance of the actual closing and reclamations, i.e., before the occurrence of the activity giving rise to the expenses. This provision is contrary to the general tax rule under both the cash method of accounting and the accrual method of accounting, which state that expenses to be incurred in the future cannot be deducted currently. Under the cash method of accounting, expenses can only be deducted when the payment is actually made. Under the accrual method of accounting, future expenses may be deducted in advance of actual payment but not in advance of the economic activity that gives rise to the expenses—they must be deducted in the year in which the economic activity takes place.

Revenue Losses from Special Tax Preferences

The Joint Tax Committee estimates the revenue losses from the above three special tax preferences or subsidies (formally called "tax expenditures"). The latest five-year estimates (from FY2007-2011) are as follows: $0.5 billion for expensing of mine exploration and development costs, $1.1 billion for the excess of percentage over cost depletion, and $0.2 billion for mine reclamation reserves deduction.[68] Thus the total revenue loss from these three provisions over five years is $1.8 billion, an average of $360 million/year. This is the amount by which the industry lowered its tax burden, or conversely, the loss in tax revenues to the federal government. The bulk of these preferences is claimed by corporations—only a small share is claimed by proprietorships and partnerships.

Alternative Minimum Tax

There is another provision of the current IRC that attempts to limit the benefits from the special tax breaks available to the mining industry and other industries: the alternative minimum tax. This alternative minimum tax is an additional tax on items of tax preference, which are a list of ten tax breaks or subsidies that have been identified as potentially able to reduce a business's or individual's tax liability to little or nothing. The intent is to assure that all taxpayers—individuals and businesses—pay some tax, which is not assured if taxpayers are able to claim a lot of special tax breaks.

In effect, the alternative minimum tax imposes an additional tax above and beyond the normal or regular income tax on the total amount of these ten items of tax preference. This is important for the mining industry because two of the ten preference items are tax breaks that are important to the mining industry: the excess of percentage depletion over cost depletion, and the excess of the exploration and development cost deduction over a hypothetical deduction that would have been allowed if the costs had been amortized ratably (deducted evenly) over a ten year period. A third item of tax preference that the mining firm would have to include in its list of tax preference items is the excess of accelerated depreciation over straight line depreciation.

[68] U.S. Congress. Joint Committee Print. *Estimates of Federal Tax Expenditures for Fiscal Years 2007-2011*. Prepared for the House Committee on Ways and Means and the Senate Committee on Finance by the staff of the Joint Committee on Taxation. September 24, 2007.

To the extent to which mining companies uses these and other items of tax preference, this could trigger the minimum tax, and thereby reduce the value of the special tax provisions.

Effective Tax Rates

These special tax preferences or subsidies, combined with accelerated depreciation (a significant tax benefit for highly capital intensive business such as hardrock mining) have historically resulted in relatively low effective average and

marginal tax rates. Thus, firms that mine hardrock minerals on public domain lands pay no royalty, and benefit from fairly significant tax subsidies. For example, CBO recently published a study of effective tax rates on different types of assets, and those used in mining (mining and oil field machinery, and mining structures such as mine shafts) generally ranked fairly low, relative to assets used in other industries.[69]

Fees Paid by the Hardrock Mining Industry

Finally, mining companies pay a variety of claims fees (location fees, Bureau of Land Management processing fees, annual maintenance fees). These are charges for specific types of administrative services provided by the BLM. The claims location fee is presently $30 per claim, which is about 20 acres. This fee is charged for first-time locators to locate and record a claim. The annual maintenance (or holding) fee, necessary to hold a claim on public land, is presently $125 per claim. This fee applies to claim holders with 11 or more claims (those with 10 or fewer claims are exempt). Both the location fee and the annual maintenance fee are adjusted for inflation. The BLM also assesses a processing fee of $15. These fees help the BLM cover its costs of administering the mining law and regulations. They cover costs for such actions as processing and recording applications, certain exploration permits, name changes, and corporate mergers, as well as lease consolidations, transfers, and reinstatements.

[69] U.S. Congress. Congressional Budget Office. *Taxing Capital Income: Effective Tax Rates and Approaches to Reform.* October 2005. Table 2, pp. 10, 11.

Appendix. Description of H.R. 2262

On November 1, 2007, the United States House of Representatives approved a substitute version of H.R. 2262 (with amendments), the Hardrock Mining and Reclamation Act of 2007.[70] This bill would:

- establish a new regulatory framework for administering permits to develop hardrock minerals;
- permanently end the sale or "patenting" of public lands for mining, which has been under moratorium since the early 1990s;
- establish royalty payments for hardrock mining operations on federal lands and use 75% of the proceeds for the cleanup of abandoned sites;
- impose an 8% gross income royalty future hardrock mining operations, and an 4% royalty rate on current mining operations;
- require miners to seek additional permits to explore for and develop mineral resources and meet certain standards related to reclamation of mined lands;
- create an abandoned mine reclamation program similar to the one currently in place for coal sites;
- make the income from hardrock mining fees and royalties available, subject to appropriation, to support reclamation programs and to provide assistance to certain state, local, and tribal governments; under an amendment to the Committee-approved bill, 50% of the cleanup funding would be directed to the state in which the royalties were generated;
- direct the Secretary of the Interior to prioritize reclamation projects that protect public health and safety, particularly from water pollution, and for projects that restore wildlife habitat; under an amendment to the Committee bill, watershed areas would be designated as eligible reclamation projects and among the top priorities for receiving cleanup funds;
- establish environmental standards specific to the hardrock mining industry. Environmental standards in the substitute version of H.R. 2262 would be less prescriptive and more performance-oriented than those in the original bill;[71]
- establish a new definition of "undue degradation" of public lands and resources and give the Secretary of the Interior broader authority to block mining operations that would cause such harm;

[70] See H.Rept. 110-412.

[71] Note that hardrock mining operations already have to comply with the National Environmental Policy Act, the Clean Water Act, and several other environmental laws.

- allow Native American tribes to petition the federal government to withdraw federal lands with cultural and religious values from mining activities (similar language has been in place for states and localities);
- set guidelines for administrative and judicial review of actions authorizing mining on public lands and allow citizen lawsuits challenging federal decisions.

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