

# State and Local Ad Valorem Taxation of Mineral Interests

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#### Abstract

Since subsurface minerals are usually severed from the surface (land) estate, unique problems are created for establishing the value of minerals for ad valorem taxation. All states having significant production of minerals levy either severance or property taxes (or both). The unique character of minerals makes valuation one of the most difficult processes for the assessor. The methods used vary by state. Because of the complexity, in many states the state government or private consultants determine value for local jurisdictions. The legal environment which governs the relationship between subsurface and surface owners influences the value and use of the land and the mineral. When full consideration is given, it is unlikely that the ad valorem taxation of mineral interests meets the criteria established by economists for what constitutes a "good tax". This paper explores the ways used to value mineral interests, the legal environment and what this implies for tax policy.

Keywords: Property taxes, ad valorem, severance, minerals, oil, gas, coal, state and local taxes, appraisal, assessment, tax incidence and shifting

#### Conclusions

- 1. Most subsurface mineral interests have been split from the surface estate creating a separate legal taxable entity for ad valorem purposes.
- 2. Like surface land, minerals are fixed in geographic location and are not affected by the rate of property taxation.
- 3. Two methods are used for the ad valorem taxation of mineral interests: the severance approach and the reserves approach.
- 4. There is no single model which explains taxation of mineral interests in the states studied.
- 5. Valuation of mineral interests provides unique problems in the process of valuation.
- 6. Subsurface mineral interests have dominance over surface interests in that surface owners may not "unreasonably' restrict the development of subsurface mineral rights.
- 7. While the exploitation of mineral interests predominates over surface interests under the rule of capture there are certain protections of surface owners' rights including: correlative rights, negligence and trespass.
- 8. Most states have adopted "accommodations" legislation which further protects surface owners.
- 9. The presence of mineral interests influences the value of the surface land.
- 10. The unique features of mineral rights make valuation more difficult than for other types of property.
- 11. There have been no appraisal standards developed for use in mass appraisal of mineral property.
- 12. Of the three approaches to valuation (cost, comparative sales and income) the last is the principal method used for ad valorem taxation of mineral estates.
- 13. Among the states there are two methods for applying the income approach: "severance" and "reserves". Under the former current or average income and production is used. Under the latter, mineral reserves in the ground is the base.
- 14. Among the most difficult steps in using the income approach is determining the discount rate.
- 15. In using the income approach adequate consideration must be given to determining allowable costs.
- 16. The question of "who pays the property tax on minerals?" is not settled as the taxes may or may not be shifted.
- 17. Ad valorem taxes on minerals do not conform to either the benefits received or capitalization theories of incidence.
- 18. Since there are insufficient sales of mineral interests in most cases, it is not possible for assessors to use statistical tools for assessment validation.
- 19. The ad valorem taxation of mineral interests does not conform to any of the established standards for a "good" tax.

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#### State and Local Ad Valorem Taxation of Mineral Interests

#### Overview

The old saying the three things determining the value of a property are location, location and location does not apply when there are subsurface minerals present. The extraction of minerals from beneath the earth predates recorded history. The presence or absence of these minerals have determined the desirably of surface land. Wars have been fought to gain or maintain possession. Second only to access to transportation, mineral deposits have determined the location of economic activity. (Hunker 1964) In past decades the availability of minerals, particularly those used in the production of energy, has become a major policy issue both at the national and subnational levels of government.

Most of the discussion and evaluation of property taxes, including the Land Value Tax (LVT,) has focused on the surface of land. All states which have significant mineral deposits levy either an ad valorem property tax or a severance tax (sometimes both) on at least some subsurface minerals and the rights to extract those minerals. How those minerals are used and the legal environment surrounding their extraction has a major impact on the use and value of the surface property.

In most cases mineral interests exist in two distinct legal estates. While the surface owner in a few instances may have retained or acquired the interest to the minerals under the land, in most cases the subsurface interest in the minerals has been severed from the surface estate creating a separate taxable entity. This process has over the years led to subsurface mineral interests being fragmented among many heirs and assignees. The subsurface mineral interest is usually leased by the owner of the mineral interest to an operator who develops the mineral. The owner retains only the royalty rights as a percentage of the income from the extraction, usually 12.5 percent. Out of the operator's income, usually 87.5 percent, must come all of the costs of exploration, extraction, preparation and transport of the mineral.

There are two basic approaches to ad valorem taxation of mineral interests. The "severance approach" taxes the mineral only when it is severed from the ground. Under this approach current or average production and income are used as the base. In some states this amount is discounted to obtain a present value. The severance approach more clearly resembles an income tax than an ad valorem levy.

The second is the "reserves" approach, where the value of the mineral remaining in the ground is taxed. This is a property tax and closely resembles how mineral interests are valued in the private sector for investment purposes. This approach is more difficult to administer as many more factors are considered than under the severance approach. Both methods are detailed in this report and specific discussions of each approach for the study states is in Appendix A.

The specific purposes of the study are:

- Evaluate the economics of property taxation of mineral interests and examine how these taxes conform to the principles of Henry George and other economists' definition of a "good tax".
- Collect information on property taxation of mineral interests and valuation methodology.
- Provide a detailed discussion of the legal issues created by property taxation of mineral interests.

#### Methodology

This report focuses on 12 mineral producing states. These states were included based on the following criteria:

- Value of minerals produced
- Volume of minerals produced
- Percent of state GNP from mineral extraction
- Portion of state/local budget from mineral taxation

The data for each state included in the study is provided in Table I. Because of the public interest involving coal, oil and natural gas and their dominance in mineral production and taxation, analysis has been on these energy minerals. Energy minerals (coal, natural gas and oil) are present in all study states while other minerals are important in only a few states

Table I proves the details on production, state rank and percentage of United States total production for all study states. Almost 60 percent of all energy mineral output is produced in the states covered in this report.

COMPARISON OF ENERGY / MINERAL PRODUCING STATES2012				
State	Energy Production (trillion Btu)	State	Percent of	
State		Rank	Total US	
Alaska	1,563	13	2.00%	
Arkansas	1,472	14	1.90%	
California	2,335	10	3.00%	
Colorado	2,921	7	3.70%	
Louisiana	3,794	4	4.80%	
North Dakota	2,138	12	2.70%	
Ohio	1,064	18	1.43%	
Oklahoma	2,961	6	3.97%	
Pennsylvania	4,720	3	6.00%	
Texas	14,201	1	18.00%	

#### Table I

West Virginia	3,721	5	4.70%
Wyoming	9,611	2	12.20%
All Other States	28,163		41.00%
US Total	74,639		100%

Source: EIA, Total Energy Production 2012

In addition, states were included based on the history of how mineral rights law developed. Eastern states saw mineral law developing from the English common law which granted surface, subsurface and air rights to the surface owner. In the west the dominant philosophy came from Spanish/Mexican law where mineral rights remained with the "sovereign" and did not transfer with the surface. The sovereign did have the right to sell, lease or assign subsurface rights. This difference is important as state rather than federal law dominates in the determination of mineral rights. (Baade 1992)

Information on the policies and practices of these states was obtained from a variety of sources.

- State codes
- State assessment manuals
- Contacts with state and local officials
- Books and major reports
- Law reviews
- Mineral associations
- Popular media

There is wide variation among the states as to what mineral interests are to be taxed, which taxes are used on mineral interests, how the value of the mineral interest is determined, rates of taxation, exemptions and administrative procedures. A summary of the study states is provided in Table II.

#### Table II

	Severance Tax			Ad valorem Tax		
	Coal	Oil	Gas	Coal	Oil	Gas
Alaska	Y	Y	Y	N	N	N
Arkansas	Y	Y	Y	Y	Y	Y
California	Ν	Ν	N	Y	Y	Y
Colorado	Y	Y	Y	N	N	N
Louisiana	Y	Y	Y	Y	Y	Y
North Dakota	Y	Y	Y	N	N	N
Ohio	Y	Y	Y	N	N	N
Oklahoma	Y	Y	Y	Y	Y	Y
Pennsylvania	Y	N	N	Y	N	N
Texas	Y	Y	Y	Y	Y	Y
West Virginia	Y	Y	Y	Y	Y	Y
Wyoming	Y	Y	Y	Y	Y	Y

Ad Valorem and Severance Taxes on Mineral Interests in Study States

Source: Appendix A

## Land Value Taxation and Ad Valorem Taxation of Mineral Interests

George focused on adoption of a Land Value Tax (LVT). The case for the use of a LVT was summarized by Bourassa:

In defense of land value taxation, proponents cites Henry George's argument that taxes on land are fairer than other forms of tax because land value is essentially the product of community rather than individual efforts. The value of a parcel of land reflects the value of a location, which is the result of government investment in infrastructure and provision of public services, as well as the combined activities of the other individuals and organizations in a community. (Bourassa 2009, 205)

While George viewed land as a gift of nature belonging to all, others have applied that concept to mineral resources.

With resources such as oil, which are depleted over time, new issues of efficiency and justice arise. Depletable resources ought to be regarded as part of the heritage to which everyone has equal rights, though some provision must then be made to provide incentives for discovery. (Tideman 1998, 272)

George did not directly comment on taxation of minerals, but much of what he postulated is applicable to that subject. Minerals like surface land are fixed in supply. Minerals are not mobile and will not be moved due to a change in the tax environment (H. Brown, The Taxation of Unearned Income 2nd ed. 1926) (Bourassa 2009, 195). Like land, minerals are a "gift of nature"

since it took no human effort to place them where they are located. (George 2010 [originally published 1871], 234)

Similar to surface land, value of mineral rights is determined by forces independent of the minerals' existence; namely the demand for use of the mineral over time. (Oberbillig 1968). Brown summarizes, "…in the case of such natural resources as coal and iron mines, oil and natural gas wells and power sites…The incomes derived by owners from such resources represent, not service, but the privilege of drawing tribute from the masses as a condition to allowing these masses to make use of the bounty of nature." (H. Brown, The Taxation of Unearned Income 2nd ed. 1926, 35)

George's philosophy was reflected in mineral law in Spanish/Mexican colonies of what are now Western states. Until annexation by the United States, those territories were governed by Spanish/Mexican law. Spanish law provided for ownership of mineral resources to be held by the sovereign. (Baade 1992). In commenting on the gold rush in California, George wrote, "By common consent, it was declared that gold-bearing land should remain common property." (George 2010 [originally published 1871], 211)

This view is in partial conflict with the English Common law, which prevailed in Eastern United States. The common law doctrine of *ad coelom* provides that the surface owners' property rights extended vertically upwards to the sky and downwards from the surface to the "depths of hell" which included subsurface mineral rights. (Lueck 2003) For "surface minerals" ownership was clearly the property of the surface owner. For subsurface hard rock minerals there was a separate legal estate. Without a general legal framework, rights were tied to and followed the original claim. (Anderson and McChesney 2003, 215)

These two views were partially reconciled for government land in the West by the *General Mining Act of 1872* (30 U.S.C 22–54) that remains in effect although significantly amended over time. (Gerard nd) The Act basically codified the gold mine camps customs that had prevailed in the absence of formal law defining property rights. (Karen and Wright 2012) This paper will not discuss the nuances of the law or the debate over its revision. Gerald summarizes, "The Mining Law allows United States citizens and firms to explore and establish rights to federal land without authorization from any government agency. This provision known as the "right to mine" regardless of alternative use, potential use or non-use value of the land." In turn the law has led to speculation in land as well as mineral rights. (Gerard nd)

## **Severance Funds**

Among the justifications for the use of severance and property taxes on minerals and mineral interests is the "natural heritage theory" which sees, "...depletion of a gift of nature (coal) belonging to the citizens of a state merits compensation for its irretrievable loss." (Kaiser and Fletcher Summer 1987, 596) As provided by Brunori:

...taxes are imposed both for the substantial revenue they raise...and to reimburse the state for the loss of its natural resources. Many natural resources, such as coal, are depletable; once extracted, they cannot be replaced. Severance taxes are a way to compensate the state

for that permanent loss. For that reason, severance tax revenue is often placed in a trust or other long-term fund designed to produce revenue when the natural resources are no longer available. (Brunori 2005, 105–106)

Richardson carries the concept further:

The long-term depletion of the energy reserves can be accommodated for current and future citizens by a permanent trust fund that converts the depletable...resource into a nondepletable financial asset. A permanent trust fund preserves the use of the natural wealth of a state for future generations. (Richardson, Severance Taxes 2005, 359)

This economic theory used to justify severance taxation of minerals may be equally applicable to ad valorem taxation.

The concept that the mineral wealth of a state belongs to, "all of the state's citizens" (R. Brown 2014) is entrenched in those states which divert all or a portion of the severance tax to funds established for the benefit of the state's citizens. Currently seven (7) states have such funds<sup>1</sup>. The justification for these funds appears to be, "…convert nonrenewable resource wealth into a renewable source of wealth for future generations" as well as being a major revenue source for the state. (Boettner, Kriesky and Paulhus, Creating an Economic Diversification Trust Fund 2012, 9)

These funds differ significantly as to the amount of tax diverted to them, the causes to which the earnings are dispersed (education, workforce training, social services, infrastructure), the mineral base for the tax (coal gas, oil or all minerals) and investment policy. (Boettner, Kriesky and Paulhus, Creating an Economic Diversification Trust Fund 2012, 20–25) In all states but West Virginia, the funds were established by constitutional amendment.

In those states applying local property taxes to minerals and mineral estates, there is no direct benefit to the jurisdiction's citizens from these funds because in almost all situations the earnings from the fund go to the state's general fund for allocation. However, in Montana and Utah a portion of the trust fund distributions are to be spent on local programs, primarily economic diversification and development. Further, Utah requires that 25 percent of the fund expenditures be returned to the locality where the tax was first levied. (Boettner, Kriesky and Paulhus, Creating an Economic Diversification Trust Fund 2012) In Alaska, the principal use of the fund is to send dividend checks to all eligible residents of the State although individuals may donate all or part of their dividend to non-profit organizations (Alaska Department of Revenue 2014).

## **Development of Mineral Resources**

It has been correctly noted, "Resources are not they become" (Hunker 1964, 21) as uses for them are discovered and technology developed to extract them. (Eggertsson 2012) The importance of technological advances in "creating" a mineral was commented upon by Clay and Wright regarding the development of gold mining in the West: "...advances in metallurgy effectively

<sup>&</sup>lt;sup>1</sup> Alaska, Montana, Wyoming, New Mexico, North Dakota, Utah, West Virginia

created new American mineral resources by fostering rediscoveries of deposits long known but considered submarginal." (Clay and Wright 2012, 86)

The process of using a mineral requires the investment of capital and labor. Compensation must be provided to those who make the investments and provide the capital. That value has to be separated from the value of the mineral itself. The land value may be referred to as the "predevelopment value" (Tideman 1998, 266) or "bare land value".

Exploration is followed by extraction that also is technology dependent. Once the well is drilled or the mine established, the mineral must be cleaned, refined, transported and usually converted by a manufacturing process.<sup>2</sup> While the ore itself may be a "gift of nature" the investment in technology and invested capital is not. The distinction has been noted for land,

...the conclusion that the accumulators of produced capital—and in many cases doubtless do—add to the volume of the annual aggregate income of society as much as they take out of this income in interest: while owners of land contribute no service in return for their income...On the one case the community pays for a service which is actually rendered to it. In the other case, it pays people who have...rendered no service. (H. G. Brown 1980, 4)

While predevelopment rent from land itself may be seen as "unearned income", returns to improvements and risk capital are "earned" as those resources have alternative uses and, given time, move to the highest return available.

Like surface land, mineral resources, once discovered, are in fixed supply. The amount produced or placed on the market, in both cases, is dependent on price for what the land or mineral produces. Price is a function of demand. "Energy prices…may be quite variable as the experience over the last half century confirms". (Richardson, Severance Taxes 1999, 229) There are many variables determining demand for a mineral. Since minerals, like land, are inputs converted for further use in production of higher value outputs, the level of economic activity in the short run and economic growth in the long-run are major forces behind changes in demand<sup>3</sup>.

Low mineral prices may temporarily reduce the amount of the mineral supplied if the cost of production exceeds the market price. Increasing price leads to revival of output from existing sources and the incentive to find new supplies. In the same way, land may be idled if prices for the product of the land do not recover at least marginal costs. Price fluctuations are external and not due to the contribution of the land or mineral owner. According to Ferraro, "The full cash value of extractive land is difficult to determine. It depends upon the future market value of the

<sup>&</sup>lt;sup>2</sup> Coal is primarily used as a boiler fuel in electrical generation. Petroleum is a fuel mainly used in transportation. Natural gas use is both as a fuel and a chemical building bloc. Uranium, when processed or enriched, has a variety of uses as a fuel and industrial applications. Most ores are inputs in a final manufactured product. Precious gems are often used as a commodity but do requireprocessing prior to use.

<sup>&</sup>lt;sup>3</sup> The Energy Information Administration found the declining sales and prices of fossil fuels from 2008-2012 was primarily due to the domestic and international economic slowdown of that period. Energy Information Administration (April 30, 2014) "Lower US electricity demand growth would reduce fossil fuels' projected generation share"

<sup>&</sup>lt;u>http://eia.gov/todayinenergy/details</u> accessed May 6, 2014. As a result gas wells were "shut-in" and production at coal mines reduced with many mines closedpermanently during this period.

product when and if extracted, and this value can be known only after a product has been extracted." (Ferraro 1967, 126)

# **Severed Mineral Interests**

In almost all situations, the mineral rights to the subsurface were severed from the surface rights at the time the property was sold or otherwise transferred. This creates two conflicting real property rights: those to the surface and those to the subsurface. The owners of the subsurface mineral rights have the legal right to extract the minerals even if it involves the use of the surface owner'2s land. There are issues associated with the leasing of mineral rights that directly affect the value and use of the surface land.

There may be more than a single "estate" in what is often called "land". In legal terms, "land" is an estate in real property with all the legal rights of ownership (Bagby 1993). These have been defined as the bundle of rights associated with ownership of property namely the right to use, sell, rent/lease, enter/leave, give away, or refuse to do any of these. (International Association of Assessing Officers 1997) A definition of property rights specifically related to resources such as minerals was provided by Cole and Ostrom:

- Entry: the right to enter to find a resource
- Withdrawal: the right to harvest and take some resources out of the resource system
- Management: the right to change the physical structures in a resource system
- Exclusion: the right to determine who could use the resource and what their specific rights would be
- Alienation: the right to sell one or more of the first four rights permanently or for given time period (Cole and Ostrom 2012, 40)

Ferraro provides a description of the property considered as "mineral" real property.

Extractive land may be defined as that class of land which derives its value by the extraction or removal of products from it. It includes those categories of lands commonly known as mining claims, petroleum lands, coal mines, quarries, gravel and clay pits, mineral and timber lands. (Ferraro 1967, 119)

For purposes of this study the rights in real property will be separated into "surface interests" and "subsurface interests". The latter are usually designated as "mineral interests" or "mineral

rights"<sup>4</sup> These mineral rights allow the property to be exploited for the exploration and extraction of minerals it harbors and can be separated from surface ownership.<sup>5</sup>

The mineral estate is a separate interest in land that can be severed from the surface estate. The severance generally occurs in one of two ways. Either the landowner sells the minerals and retains the surface, or more commonly, the landowner sells the surface and retains the minerals. (Fambrough June 1996)

In most other countries, the subsurface rights are retained by the government that can dispose or lease them. In the United States, the subsurface rights convey with the surface land,in which case the surface owner has complete ownership rights known as "fee simple" (Geoscience News and Information n.d.).

For a separate mineral right to be established there must be some form of "conveyance" or "reservation" (usually a deed) which clearly delineates what interests are being transferred. If there is no conveyance, the mineral rights are not severed and "run" with the land. To avoid litigation, the document must be clear as to what minerals are being conveyed (all minerals known or unknown or just a specific mineral like coal or gold) and the premises being conveyed (Matthews and Carlton 2008) (Morgan 2008).

Conflicting wording of deeds conveying title to mineral rights, creates serious issues which may influence the value of the subsurface and surface. From a legal standpoint there is a difference between a "mineral interest" and a "royalty interest". In numerous cases theses terms are used interchangeably or one is used when the other was meant. Burney explains the difference:

...a mineral interest is a cost-bearing interest that entitles the owner to a proportionate share of lease benefits, including bonus, rentals and landowner's royalty. A royalty interest...is a non-cost bearing interest devoid of the mineral-estate sticks<sup>6</sup>, except the right to share in proceeds from the sale of production. (Burney 2014, 182–183)

Failure to include unambiguous wording in mineral deeds, usually results in litigation.

Most mineral rights owners have no interest in developing the subsurface. As a result, the common practice is to lease their rights to another entity for the purposes of development. (Matthews and Carlton 2008) (Morgan 2008) The leases are known in law as "chattel real"<sup>7</sup> and in mineral producing jurisdictions are subject to ad valorem taxes. As real property these chattels are subject to property taxation as is other real property unless they are specifically exempted.

<sup>&</sup>lt;sup>4</sup> Using a technical definition, coal, oil and natural gas are not minerals as they are organic and not found in solid form in nature. Nevertheless, in all the study states they are included and classified as such. See Geology.com "What are minerals?"<u>Http://geology.com/minerals/what-is-a-mineral</u> Accessed January 28, 2014

<sup>&</sup>lt;sup>5</sup> Severed mineral rights are often defined as in the Illinois Code: "…severed mineral interest is any whole or fractional interest in any or all minerals which have severed from the surface estate by grant, exception, reservation or other means" 765 ILCS 5151(a)

<sup>&</sup>lt;sup>6</sup> "Sticks" include the right to develop, the right to lease, the right to receive bonus payments, the right to receive delay rentals, the right to receive landowner's royalty payments. (Burney 2014)

<sup>&</sup>lt;sup>7</sup> "Chattels are divided into chattels real and chattels personal; chattels real being interest in land which devolve after the manner of personal estate as leasehold...as being interests in real estate, they are called "chattels real" *Black's law dictionary free, 2nded,*. http://the lawdictionary.org/chattel/

When the owner of subsurface rights leases the mineral interest to an operator, the right remaining with the owner is the "royalty interest" (RI) which allows the owner to receive a portion of the income (royalty) when the mineral is extracted and sold. The operator extracting the mineral holds the "working interest" (WI). Typically the working interest receives 87.5 percent of the proceeds from the operation (but bears all the expenses) while the royalty holder receives 12.5 percent. (Morgan 2008, 9) Both interests are subject to severance and ad valorem taxes where those are levied.

## Use of the Surface Land

If the owner of the surface land also has the mineral rights, there is no problem as the owner holds *fee simple* and can control whatever activity relates to the extraction of the minerals. However, when there has been a severance, the mineral rights predominate (Tropp, Severed Minerals: Are Surface Owners Entitled to Damages for Diminution of their Property Value? February 1999) When severed mineral interests are present, the use of the surface land is limited by the subsurface rights. The presence of rigs, roads and other encroachments limit the use and possibly the market value of the surface land:a factor which should be considered in the valuation of the surface for ad valorem purposes.

It is clear that the mineral rights owner and the lessee have the dominant right over the surface rights owner.

The owner of sub-surface rights has the right to use the surface of the land to access and mine their minerals. This includes the right to open a mine, drill an oil or natural gas well, and build roads and other infrastructure to support the activity. ... The owner of mineral rights has the right to enter property to access their minerals. This right was created when these rights were separated. (Wilkerson n.d.)

How extensive the rights of mineral owners and their lessees are was summarized for Texas.

Lessees have broad rights to use the surface for the purpose of exploring and producing...These rights include the right to conduct seismic tests, drill wells at locations they select, to enter and exit well sites and other facilities, to build, maintain and use roads for access, ...to build and use pipelines, ...to use surface and subsurface water to operate injection wells and to dispose of lease-produced water (Texas Railroad Comission n.d.).

While the best solution is for the surface owner to obtain an agreement with the mineral owner(s) or the lease, this is often not possible. Since mineral rights often, if not usually, become fragmented among numerous heirs and assignees, such negotiation is best accomplished with the operator. Most mineral rights leases now contain clauses called "indemnity provisions" where the developer must compensate the mineral owner for the cost of any damages. This compensation is paid to the surface owner (Saxowsky n.d.) Depending on the terms of the indemnity provision, there may be a positive influence on the surface's value.

## **Rule of Capture**

Since oil was first extracted in the late 19th century, one of the governing principles in oil and gas law (as well as water law) is the "rule of capture". (Kramer 2005) The rule allows the owner, or operator, who has the mineral right to access oil or gas that is available from adjoining lands. In which case, the holder of the mineral right has no legal obligation to the adjacent landholder. Legal scholars call this the "pure" rule of capture. (Hunker 1964) (Ingram, Overview of Mine n.d.) (Kramer 2005)

Almost from its first application, problems with the pure rule of capture began to develop. The only way an adjacent owner could capture their mineral was to drill their own wells resulting in a significant number of wells nearly adjacent to each other. This "forest of wells" created problems. These are similar to the problems of overuse arising from the "tragedy of the commons." (Harden 1968) But these stem not from the absence of property rights but from the presence of property rights embodied in the rule of capture.

The first problem with the rule of capture concerned "waste" due to over production as too many wells would be drilled in essentially the same location reducing the pressure and thereby the production from the field (Interstate Oil and Gas Commission 2004). As a result, the mineral would be prematurely "exhausted" decreasing the overall productivity of the field. This led to all mineral producing states' adopting some form of "conservation" legislation and a "conservation commission" to enforce the regulations. (Washburn University School of Law 2013, 1) While there are state-to-state variations, most parallel the model legislation advanced by the Interstate Oil and Gas Compact Commission to which all oil and gas producing states belong.

Among the conservation regulations common to the states are:

- Classification and identification of reservoirs regardless of surface boundaries
- Permitting of operations and operators
- Drilling, casing, completing, operating and plugging of wells
- Intrusion of water into an oil or gas reservoir
- Testing of wells
- Maintenance of complete and accurate records
- Payment of nonparticipating royalties, lease royalties and overriding royalties
- Spacing and location of wells (including spacing units)
- Disposal of salt water and field wastes
- The amount of oil or gas that can be produced from a reservoir
- Allocation of allowed production among the wells using the reservoir
- Venting and flaring of gas (Interstate Oil and Gas Commission 2004, Part II, Sectio 5–7)

# **Correlative Rights**

Inherent in state legislation concerning the rule of capture is the advancement of "correlative rights".

Correlative rights encompass two basic legal rights. The first are *private* rights that are an inherent part of oil and gas ownership within a connected reservoir. The second is a *public* right that ensures that any limitation on ownership and capture rights imposed by conservation regulation will be administered in a fair and equitable manner. (Washburn University School of Law 2013, 2)

The second "right" sees the capture rule as creating "social costs" on society in general. Wasting a mineral was seen as being injurious to the public health, safety and environment and could therefore be subject to the police power of the state. (Kramer 2005, 912–916) This is the basis for most governmental action including:

- Waste disposal (ponds) and containment
- Air and water pollution
- Worker safety
- Bonding and insurance

# Accommodation Doctrine<sup>8</sup>

In the absence of an agreement, the surface owner has some legal rights to protect their interests. The surface owner's recourse for damages is provided by the "accommodation doctrine" under which the use of the surface is limited to what is "necessary and reasonable".

Even though an oil and gas lessee is entitled to enjoy "reasonable surface use" necessary or convenient for the exploration and development operations, this right does not entitle the lessee to have unfettered use of the surface. If the mineral owners or mineral lessee's use of the surface is not "reasonable and necessary," the surface owner may protect himself through an action in trespass or an appeal to equity for an injunction (Topp n.d.).

Courts in many mineral producing states have adopted the accommodation doctrine. (Massone n.d.) (McManus 2009) The surface owner can restrict the lessee if he can show that the mineral rights holder had other alternative means of producing the mineral that would be less disruptive and are reasonable for the mineral producer to use. (Siegel n.d.) As a general summary of the accommodations doctrine the factors considered by the courts have included:

- The use existed prior to the extraction activity
- The use of the surface property will be substantially impaired
- The lessee holder's use is not reasonably necessary because alternatives exist (Massone n.d.)

In the latter case, failure to remediate the land to its original condition in most states is considered an "unreasonable use" But, it is rare for a court to find that a lessee's activity was unreasonable. (Morgan 2008) In these cases, the burden of proof rests with the surface owner.

<sup>&</sup>lt;sup>8</sup> In some states the legal doctrine is called "due regard"

Some states have moved to put "accommodation" legislation in place to insure compliance and to clarify what is included. In West Virginia, the "Oil and Gas Production Damage Compensation Act" (WV Code 227-7-3) allows compensation for the following:

- Lost income or expenses due to the inability of use land actually occupied by the driller to the uses that were in place prior to the start of drilling
- Market value of crops destroyed, damaged or prevented from reaching market
- Damage to a water supply in use prior to the commencement of drilling
- Cost of repair of personal property up to the value of replacement of like age and quality
- The reduction in value, if any, of the surface lands after drilling measured from the date of commencement of the drilling activity (Archer nd)

There is a provision for a formula to be developed to ascertain how these damages are to be calculated.

North Dakota has gone further than other states in providing compensation for surface damages.(NDCC 38-11.1-04) "North Dakota legislature (sic) requires mineral developer to compensate the surface owner for all damages done; this is a broader obligation that the past requirement of compensating only for unreasonable damages." (Saxowsky n.d.) Damages to be compensated are lost land value, lost use of or access to surface owners land and lost value to improvements. As is the case in West Virginia, a formula is to be used to determine the amount of damages.

The Oklahoma Surface Damage Act (Okla. Stat. 318.2-318.9) has an even more extensive list of damages that may be allowed from drilling and production.

- The location of the drilling operations
- The quality and value of the land used or disturbed
- Side effects that restrict ability to use the surface
- Inconvenience from use by the operator
- Damages temporary or permanent
- Changes in physical condition of the land
- Irregularity of shape or reduction of access to remaining surface
- Destruction of native grasses, or growing crops (Ferrell n.d.)

The Arkansas law broadly defines what is eligible, "... damages to real property, growing crops, trees, shrubs, fences, roads, structures, improvements, livestock, personal property and measurable damage to the productive capacity of the soil" (Smith December 4, 2009)

Other states have acts related to compensation to be paid surface owners for damages. (Earthworks n.d.) While not identical in scope or coverage there are common characteristics:

- Prior notice to surface owner of intent to drill
- Furnish owner with plans for drilling including location of improvements
- Negotiate with surface owner regarding location of roads, rigs, ponds, pipelines, etc.
- Amount of compensation if any
- Provisions for reconciling disputes over damages
- Liability insurance or bond to cover damages<sup>9</sup>

## Negligence by Mineral Operator

The surface owner may be able to collect damages in cases where the developer of the mineral interest was negligent and this caused damage to the surface holder. This doctrine is part of the "common law" accepted in all states. Negligence involves "…conduct that falls below the standards of behavior established by law for the protection of others against the unreasonable risk of harm". (Dictionary n.d.) More precisely the operator…failed to exercise reasonable and ordinary care while conducting operations on the plaintiffs property" (Topp n.d.)

The specific causes of negligence include, "...the failure to inspect, failure to warn, failure to properly maintain and most importantly, failure to remove and dispose of certain substances, and failure to communicate the known or suspected hazards." (Smith December 4, 2009, 890) Examples include oil spills and leaks, abandoned pipe and equipment, and unnecessary erosion related to construction. (Topp n.d.) Other examples where the various courts found operators to be negligent are:

- Damaging surface property by operating broken equipment
- Allowing a saltwater disposal pit to overflow
- Failing to advise a surface owner in advance of development plans
- Denying a surface owner a chance to fence livestock
- Failure to guard against escaping gas
- Contamination of the surface due to unreasonable use (Massone n.d.)

## Trespass

Similar to negligence is the common law doctrine of "trespass". Trespass exists when one enters, "...another property without permission of the owner or his/her agent and causing damage no matter slight. Any interference with the owner's (or legal tenants) use of the property is sufficient showing of damage..." (Hill n.d.) This doctrine is most often employed when the agent of the mineral owner exceeds the legal boundaries of the lease for exploration, development or remediation. The most usual case of trespass is where the operator fails to remove equipment or stores equipment on site that is no longer needed or is in violation of the length of the operator's lease (Smith December 4, 2009). Trespass may also happen when rigs and other structures are placed at locations other than those indicated on the plan provided the surface owner.

<sup>&</sup>lt;sup>9</sup> AK Stat. 38.05.130, Il CS 765.530, MT Code (ann. 2001) 82-10-5, KY Code 353.595, 53 OKLA Stat 318.2-318.9, AR Act 507, SDCL 45-5A-1-11, PA Stat. Annotated 58-11-601.40, Tenn. Code Annotated (1989) 60-601-608, TX Natural Resources Code 52.297 and 53.155, WY Statutes 30-5-401-410.

There are also cases of "subsurface trespass" where a producer takes minerals that are not specifically covered by the mineral rights conveyance. Trespass can also occur if structures other than those necessary for mineral extraction are placed on the property even if within the confines of the lease boundaries. (This could also violate the accommodations doctrine.) In some situations where secondary recovery techniques are used to reinvigorate dormant wells, the project is not covered by the mineral lease and the producer is guilty of subsurface trespass if those minerals are extracted. (Morgan 2008, 14)

## **Adjacent Property**

There is often an impact from the exercise of a mineral right on adjacent property. There is no disagreement that the accommodations doctrine does not apply to neighboring property. The producer may not interfere with the neighbor's use and/or enjoyment. "While operators may have a lot of leeway when it comes to surface owners, the same cannot be said for neighboring property...right to use the surface estate may exist, there is no implied right to infringe on neighboring property". (Massone n.d.)

Horizontal drilling creates a unique situation. There is no doubt that the law allows an operator to capture all oil and gas which moves into the well "bottom" on the site of the lease. Subsurface trespass law prohibits an operator from "taking" the minerals from another by "slant drilling" where the pad on one piece of property places or slants a well (sometimes called deviation) onto another's property. (Younger 2013)

Hydraulic fracturing presents the situation where laterals are horizontally extruded (sometimes as long as two miles) from the well bottom across property lines where the surface owner has not authorized the laterals (Kramer 2005, 934). Gas trapped in Marcellus, Barnett or Utica shale does not "flow" as do conventional oil and gas as it is trapped in the shale formation. Does the rule of capture allow for the operator to "take" the fractured gas from the adjacent property? State courts have not been consistent on this issue. (Kulander and Shaw 2014) (Pierce December 6, 2010) (Robertson 2014)

#### **Pooling or Unitizing**

Many of the legal issues surrounding drilling are solved by "pooling or "unitizing" the field.<sup>10</sup> Before pooling, the only way an individual mineral rights owner or operator could secure a portion of the oil and gas under their property was to drill their own well (self-help doctrine) which created a strong incentive to drill excess wells (Flannery S.O. and Morgan 2011, 458–451). Conservation statutes in essence limited the drilling rights of mineral owners particularly those with small holdings.

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<sup>&</sup>lt;sup>10</sup> While communally used as synonyms" pooling" and" unitization" are different. "...pooling refers to the integration of smaller tracts and interests ...to obtain a drilling permit in compliance with spacing rules. Unitization. is the consolidation of mineral or leasehold interests covering all of a common source of supply" Flannery, S.O. and Morgan, R.J. (2011) "Overview of poolingand unitization affecting Appalachian shale development" *Energy and mineral law review*, 32/13, 463-464

Under pooling options, when separately owned mineral interests are within a proposed "spacing unit"<sup>11</sup> the owners may voluntarily pool their tracts and interests. If there is no voluntary pooling then in most states the oil and gas commission or other designated board may require pooling as provided in the model legislation. (Interstate Oil and Gas Commission 2004, Part IV, Section 10(a)) The owners or leaseholders usually must obtain agreement from at least 60 percent of all owners or leaseholders prior to requesting the formation of the unit. The courts have upheld these practices as being in the "public interest" (Williams and Myers 1957).

While there is little disagreement that pooling and unitization is environmentally beneficial, the approaches are not without their critics. Pooling displaces provisions in previous leases that specify the royalties to be paid to mineral owners. Since pooling requires the proration of royalties among those in the pool, the royalty clauses in the individual leases executed prior to the pooling are abrogated and the royalty payments divided according to the "division order"<sup>1212</sup> which created the pool or unit. (Fambrough June 1996, 7) Holders of the original mineral leases may view their portion, if reduced under the pooling or unitizing arrangement, as a "taking" of their individual rights to royalties as well as a violation of their individual liberty to contract (Cordato 2013).

A second argument strikes at the legal underpinning of the capture rule. This argument seeks to replace capture rights with correlative rights. (Price, Minimizing the Environmental Impact of Oil and Gas Development by Maximizing Production 2009) Capture rights require for a person to have any rights in a pool or unit must first own the mineral. Correlative rights of others (including surface owners) are not considered when the tract is unitized. The proposed change stresses the public interest in oil and gas development by requiring that the regulatory commission have the authority on its own initiative to require a pooling and specifying how the pool is to be exploited. The proponents of this approach see it as placing the interests of the public above those of the mineral owners and leaseholders contending this change would maximize the recovery of the mineral and assure that it is obtained in the most environmentally friendly manner (Price, Minimizing the Environmental Impact of Oil and Gas Development by Maximizing Production 85:4, 777–778).

## **Coal and other Hard Rock Minerals**

The rule of capture does not apply to the mining of coal or other hard rock minerals either above or below ground. These hard rock minerals do not migrate and are therefore subject to capture only if the right to extract them has either been obtained from the owner or, as is usually the situation, severed from the surface. Mining of hard rock minerals is subject to the accommodation doctrine in that the developer can make "reasonable" use of the surface.

<sup>&</sup>lt;sup>11</sup> "Spacing units" consist of "...the maximum area of a reservoir that may be efficiently and economically drained by one well..." Interstate Oil and Gas Compact, Part IV, Sec. 10 (a). The purpose is to maximize the recoverable reserves.

<sup>&</sup>lt;sup>12</sup> "Division orders are revocable agreements signed by the mineral owners (or under a pooling agreement) directing the distribution of proceeds from the sale of...hydrocarbons". Fambrough. op. cit. p.7 (parenthesis this author's) Usually this is done by prorating the acreage, but if the parameters of the reserves under each owners tract can be established that determination is used instead

Coal mining has been described as "...one of the most extensively regulated industries in the United States". (American Coal Foundation 2005) One source lists 61 separate federal laws, regulations and executive orders relating in some way to the mining of coal. (Tribal Energy and Environmental Information Clearing House n.d.) This is in addition to state and local regulations. Most of these are equally applicable to other hard rock industries.

There are different methods used to extract hard rock minerals: underground, open pit and surface<sup>13</sup>. In the case of open pit and surface mining the mineral rights owner must obtain control of the surface interest since the mining will destroy or significantly alter the land permanently. (Montgomery County Farm Bureau 2006) This is usually accomplished by purchase or lease of the surface rights. (Schaeffer 2010)

## Subsidence

A major issue with underground mining is subsidence. "Subsidence is the sinking or settling of the ground surface (and) can result from...caving in of natural or manmade underground voids" (Colorado Geological Survey 2011). The result of mine subsidence is either "sinkholes" or "subsidence troughs" which may happen many years after the mine has been abandoned. (Pennsylvania Department of Environmental Protection 2014) Subsidence is the result of inadequately supported mineshafts after extraction has been completed. In most cases, the damage is slight, but can be substantial (Kuipers February 2002) particularly if a public infrastructure is involved. (Ohio Department of Natural Resources 2010) The negative impacts of mine related subsidence were characterized in this manner:

Damages to structures are generally classified as cosmetic, functional, or structural. Cosmetic damage refers to slight problems where only the physical appearance of the structure is affected such as cracking of plaster or drywall. Functional damage refers to situations where the structure has been impacted, such as jammed doors or windows. More significant damage that impacts structural integrity is classified as structural damage. This would include situations where entire foundations require replacement due to severe cracking of supporting walls and footings. (Pennsylvania Department of Environmental Protection 2014)

For longwall mining<sup>14</sup> subsidence is planned. The mine operator must have the surface rights as well as the mineral rights or an indemnity agreement with the surface owner. The roof of the mine collapses behind the coal removal area. This creates a large trough on the surface. Since this subsidence is planned, the mining operator can take actions necessary to minimize the results, repair the damages or to compensate any surface owners. (Pennsylvania Economy League of Southwestern Pennsyvania April 2010)

<sup>&</sup>lt;sup>13</sup> A useful discussion of these methods is found in "Coal Mining Technologies" http://teeic.anl.gov/er/coal/restech/tech/index.cfm

<sup>&</sup>lt;sup>14</sup> "In longwall mining a cutting head moves back and forth across a panel of coal about 800 feet wide and 7,000 feet in length. The cut falls onto a flexible conveyer for removal, Longwall mining is done under hydraulic roof supports (shields) that areadvanced as the seam is cut. The roof in the mined out areas falls as the shields advance". (United Mine Workers of America nd)

The courts as a rule have not been sympathetic to claims for damages resulting from mining subsidence. Most states have followed the ruling of the US Supreme Court (Pennsylvania Coal Co. v. Mahon 1922). While the case specifically dealt with the "takings clause" of the 5th and14th Amendments to the U.S. Constitution, it did establish that surface owners should be aware of the potential for subsidence due to the severed mineral interest when they purchased the property and not automatically entitled to subsidence damages, (Brandes 2005)

For mines opened after 1977, subsidence was governed by the Surface Mining Control and Reclamation Act of 1977 (SMCRA) (Surface Mining Control and Reclamation Act of 1977 n.d.). The Act provided for two programs: one that regulates active coal mines and one for reclaiming abandoned mine lands. Regulations were promulgated to ensure that mines opened after the effective date of the legislation would provide adequate protection against subsidence. This was accomplished through a permitting and bonding process. All permit holders must post a bond sufficient to cover the costs of remediation.

In all states but Tennessee and Washington, the program is run by the states whose provisions must be as strict as the federal. Mine operators pay a tax of 31.5 cents per ton for surface mined coal, 15 cents per ton for underground mines and 10 cents for lignite paid into Abandoned Mined Land Reclamation Fund (Section 401(c)(1). Twenty percent of the money collected is available for "emergencies" including payments to surface owners for subsidence damage. (Surface Mining Control and Reclamation Act of 1977 n.d.)

To protect surface owners several states have enacted Mine Subsidence Insurance Programs under the revisions to SMCRA in 1984. The revision allowed for \$3 million for each state from the Abandoned Mined Land Reclamation Fund for the establishment of state insurance programs. (Ingram, Overview of Mine Subsidence Insurance Programs in the United States 1994). While there are 21 states which were authorized to create these programs, to date only eight have established programs.<sup>15</sup> (H. R. Williams 1957)

There is little uniformity among the state programs as to coverage or benefits. (United States General Accounting Office May 1991, Trusted Source 2014) A couple of states limit the coverage only to homeowner occupied dwellings, others include all residences. Most encompass all structures. None includes any personal property. Limits on coverage range from \$100,000 to \$500,000.

## Site Value Taxation and Mineral Rights

Appraisers differentiate between "land" and "site" value. "Because appraisers typically deal with land that has been improved to some degree, the term *site* is often more precise than *land*..." (Appraisal Institute 2008, 205) It does not seem appropriate to apply the concept of "site value" to minerals. Oldman and Teachout concluded, "Specifically excluded from the definition of site value is the value of existing building improvements and any other interests in property, such as subsurface mineral rights, that do not relate to the use of the site in a "land use" sense." (Oldman 1977, 183)

<sup>&</sup>lt;sup>15</sup> Colorado, Illinois, Indiana, Ohio, Pennsylvania, Kentucky, West Virginia, and Wyoming.

If subsurface rights are severed from the surface rights, this statement has limited validity as a separate legal estate has been created by the severance. But since use of the surface land is involved in the production of minerals, the existence of a severed mineral right will influence use of the site and hence its value. (Appraisal Institute 2008, 322–323) Baen concludes "Oil and gas mineral rights can have important implication for the valuation of the surface rights being appraised." (Baen, Oil and Gas Mineral Rights in Land Appraisal April 1988, 215) If mineral rights are not severed then they will be included in site valuation in addition to location and improvements.

## Approaches to Ad Valorem Taxation of Mineral Interests

The study states and localities who levy ad valorem taxes on minerals use two distinct approaches.

## **Severance Approach**

Some states tax the value of production only. That production is taken times the market price to obtain gross income which is reduced by operating costs to get net operating income (NOI). To reduce fluctuations in both production and prices, often both streams are averaged over a period of years. In some states, that use full market value as assessed value, this NOI is directly taxed at the same levy rate as other real property. In those states using fractional assessment, the NOI is taken times the assessment ratio and then the mill levy is applied to that NOI. In others, the NOI is discounted to obtain an estimate of market value. This discounted cash flow (DCF) approach is in essence an income or severance tax.

# **Reserves Approach**

Other states tax mineral reserves prior to extraction. This approach requires that the reserves be located and their geologic condition determined or estimated. The same problems are encountered with determination of NOI as with the severance approach. Taxation of reserves also involves forecasting of future prices, volume of production over the relevant period and interest rates. As a result a higher level of risk in setting value is present.

# **Unique Features of Minerals**

The unique charter of mineral estates has long been recognized as a problem for those attempting valuation. An early (1910) manual begins "The valuation of a mine or a mineral estate presents unusual difficulties as the special risks to which the revenue are subject and the peculiar character of the property necessitate the application of certain principles not common to the valuation of other properties." (O'Donahue 1910, 1).

Appraisal or valuation of mineral properties for property taxation as well as for sale, condemnation, inheritance, leasing, corporate reporting and submissions to various government

agencies<sup>16</sup> is highly complex and becomes even more so, "… when the surface owner does not own all of the mineral rights". (Baen, Oil and Gas Mineral Rights in Land Appraisal April, 1988, 209) There is no single method which is acceptable for all users. (Ellis, Abbott and Sandri 1999). Methods used for valuation of individual mineral holdings are often not appropriated for mass appraisals in ad valorem taxation.

The valuation of minerals and mineral interests uses the same basic approaches as used in the valuation of other real estate. But there are significant differences for which account must be taken for the different characteristics which distinguish them from other real estate. These are:

.....the depletable and often unique nature of the ore reserves, the unique location and characteristics of the deposit, the existence of geologic uncertainties, the length of time required to place a mineral property into production, the usually long-lived nature of the operation itself, and the pronounced cyclical nature of mineral prices. (Torries 1998, 5)

While this difficulty applies to fee appraisers working on valuations of individual properties, those difficulties are compounded when subject to mass appraisal. (Torries 1998, 2) Centuries ago Smith wrote, "The discovery of new mines, however, as the old ones come to be gradually exhausted, is a matter of greatest uncertainty, such as no human skill or industry can ensure." (A. Smith 1981 [originally published in 1776], Vol I 254)

## **Appraisal Standards**

Appraisal standards have been established by the Appraisal Standards Board<sup>17</sup> and incorporated in the Uniform Standards of Professional Appraisal Practice (USPAP) (Appraisal Standards Board 2014–2015). USPAP does not directly address appraisal of minerals or mineral interests, but does reference how leases and "split estates" are to be considered. Still, questions regarding its applicability to mineral estates remain. (Ellis, Abbott and Sandri 1999, 3)

For property taxation purposes it is important to note the difference between taxing the value of the mineral or mineral estate and the income produced by the sale of the mineral. Property taxes are designed to tax the mineral estate while severance taxes are constructed to tax the income from the mineral. In many states a severance tax is used in lieu of an ad valorem tax even though it may be called a property tax. Ferraro explains:

...the assessment is on the mineral lands as real property—not on the ore extracted as such. While the value of the ore is used as a measure of value, it is the mine that is being valued. The tax levied by this valuation is not a severance tax, but is a tax upon the real property and is levied at the same rate as that for other real property. (Ferraro 1967, 125)

<sup>&</sup>lt;sup>16</sup> Securities and Exchange Commission for publically traded corporations, U.S. Forest Service and U.S. Bureau of Land Management for leasing and the Internal Revenue service for corporate, partnership and individual income taxes.

<sup>&</sup>lt;sup>17</sup> The Appraisal Standards Board of the Appraisal Foundation was authorized by Congress as the source of appraisal standards and appraiser qualifications following the Savings and Loan debacle of the 1970's. The first USPAP was issued in April 1987.

In many states while the mineral reserve is not subject to ad valorem taxation, the appertaining fixtures (Baen, Oil and Gas Mineral Rights in Land Appraisal April 1988) are taxed as personal or real property.<sup>18</sup> Further, any structures "permanently attached" to the surface are taxed as real property in most states. Tank cars, coal hoppers, drag lines and haul trucks may also be subject to property taxation.

## Procedures for the Ad Valorem Taxation of Minerals

## Locating the Mineral

The first step in the valuation of property for ad valorem taxation is "Locating and identify all taxable property in the jurisdiction." (Thimgan 2010, 2) There are two aspects of location for mineral interests: legal location for determination of ownership and geologic location of the pool, reservoir or seam. In both instances precision is required.

Legal descriptions of land differentiate ownership within a specific set of boundaries usually called a parcel.<sup>19</sup> The land is legally described either by "metes and bounds" or the Public Land Survey System (PLSS) which uses a rectangular survey grid system<sup>20</sup>. In urban areas "lot and block systems" can be used (platted subdivisions). (Appraisal Institute 2008, 207–219) When mineral rights are severed a separate deed must be filed which corresponds to the legal description of the property (Morgan 2008, 17). The same requirement applies to leases.

The next step in the process of appraising minerals, is to define the geologic location of the deposit/reservoir, quality of the reserve and its quantity. "Whether one attempts to use comparable sales or an income approach to determining the value, it is difficult to develop a fair value for a delineated resource without knowing the basic information about its quantity and quality." (Ellis, Abbott and Sandri 1999, 2) As Torries has commented "The geologic evaluation is particularly important because ore deposition and characteristics form the basis of all the steps that follow; these are the factors over which companies have absolutely no control." (Torries 1998, 87)

Geologic location is accomplished by mapping. A geologic map is described as follows:

A geologic map displays the placement, distribution, characteristics and age relationship of rock units, along with structural features, on a two dimensional base map. Consequently geologic maps are fundamental tools for locating, describing, and evaluating mineral, energy and water resources. Geologic maps also show geologic hazards (such as fault zones, landslides, and flood plains... (Wyoming State Geological Survey 2014)

<sup>&</sup>lt;sup>18</sup> Well heads, electrical lines, pipelines, pumping units, tank batters (for oil storage) metering stations (for natural gas), tipples (for coal)

<sup>&</sup>lt;sup>19</sup> Also designated in some jurisdictions as lots, plots or tracts.

<sup>&</sup>lt;sup>20</sup> The original 13 states plus Tennessee, Kentucky, West Virginia, Texas and Hawaii use metes and bounds for legal description while all other states employ the PLSS

Geologic mapping is a highly technical process which over the years has become both more sophisticated and accurate. (Journel 2004) In order to attempt uniformity among the states, the US Geologic Survey in cooperation with the Association of American State Geologists has established a set of standards related to mapping. (USGS 2013). The techniques involved in developing a mineral map for appraisal purposes demand the expertise of a geologist or mining engineer specifically trained for the task. (Appraisal Institute 2008, 638) Some states have not completely mapped their mineral reserves (Geology.com 2014) which precludes property taxation of reserves.

Geologic mapping is needed under any mineral taxation scheme. If ad valorem taxes are levied on reserves then a precise location of the reserves is a prerequisite. If severance taxes are used then precisely defining the pool, reservoir or seam may not be required for property tax purposes except for the assignment of individual tax liabilities when those liabilities are to be deducted from royalty payments or directly paid by the mineral owner to the taxing authority.

Once the geologic map is complete it may be overlaid with a topographical map (Topo) representing the natural and man-made features using contour lines to express elevation. "Within the limits of scale it shows as accurately as possible the location and shape of both natural and man-made features. Natural features include relief,...and hydrographic features, such as lakes and rivers; man-made features...towns, roads, railroads, canals, dams, bridges tunnels...and parks" (Encyclopedia Britannica 2008).

In appraising property for ad valorem taxation, assessors use cadastral maps. These incorporate the legal descriptions plus size of the tract, parcel identification numbers (PINs), street and road names, right-of-ways, easements subdivision names, and jurisdictional boundaries. Cadastral maps<sup>21</sup>, in addition to showing boundaries and ownership of land, also show the physical features found on a topographical map. (Thimgan 2010, 91) "Topo" maps may be incorporated into the cadastral maps.

When a separate mineral estate has been created this may be shown by a "vertical description" <sup>22</sup> on the cadastral map. These maps provide a "three dimensional legal description" of the property. (Thimgan 2010, 134) These maps are created by the development of a multiple layered GIS platform which overlays the various components of the parcel map including mineral estates.

Once the mineral has been legally defined and it geologic location determined, it must be classified by type of reserve. For oil, natural gas and coal the following is used.

Energy reserves: Estimated quantities of energy sources that are demonstrated to exist with reasonable certainty on the basis of geologic and engineering data (proved reserves) or that can reasonably be expected to exist on the basis of geologic evidence that supports projections from proved reserves (probable/indicated reserves) Knowledge of the location,

<sup>&</sup>lt;sup>21</sup> Cadastral maps are also called: abstract maps, assessment maps, plat maps, property ownership maps or simply tax maps (Thimgan 2010, 92)

<sup>&</sup>lt;sup>22</sup> Sometimes called "air-rights descriptions" and is used to identify ownership in multistory buildings such as condominiums and leased offices.

quantity and grade of probable/indicated reserves is generally incomplete or much less certain than it is for proved reserves. (U.S. Energy Information Administration nd)<sup>23</sup>

While states include definitions of reserves in their codes, most only consider proved reserves when applying ad valorem taxes.

## Selecting the Method for Mass Appraisal

Most all of the methods used in mineral valuation apply to single-parcel property appraisal. While embracing the same appraisal principles, there are differences between single-property and mass appraisal particularly in the case of mineral estates. The IAAO provides this definition:

Mass appraisal refers to methods that have been developed to solve large-scale valuation problems, such as when many properties must be appraised of the same purpose, often as of the same date and at low per-property cost. Mass appraisal is characterized by standardized procedure, common data, and statistical testing. (Gloudemans and Almy, Fundamentals of Mass Appraisal 2011, 1)

The three approaches to property valuation are well established: Sales comparison, cost approach, and income capitalization (Appraisal Institute 2008) (International Association of Assessing Officers 1997)

- Sales comparison approach is "The process of deriving a value indication for the subject property by comparing similar properties that have recently sold with the property being appraised...The sales comparison approach may be used...when an adequate supply of comparable sales is available." (Appraisal Institute 2008, 297)
- Cost approach is when, "...a property is valued based on comparison with the cost to build a new or substitute property. The cost estimate is adjusted for the depreciation evident in the existing property." (Appraisal Institute 2008, 377)
- Income capitalization involves an analysis of, "...a property's capacity to generate future benefits and capitalizes the income into an indication of present value." (Appraisal Institute 2008, 445)

# Sales Comparison Approach

The preferred method for valuation of minerals and mineral reserves is the sales comparison (including chattel real). (T. Ellis 2001). The sales comparison approach is to be verified by the other two approaches for a reconciliation of final value. (International Association of Assessing Officers 1997, 289) However, for the sales comparison approach to be valid for appraisal of minerals there must be reasonably comparable properties, a ready market for those properties and sales of those properties at fair market value. "Unlike the common practice of confirming land

<sup>&</sup>lt;sup>23</sup> These are equivalent to those contained in the U.S. Geological Survey Circular 831, 1980. Demonstrated reserves include measured and indicate reserves inferred reserves but not inferred reserves. (Inferred reserves are those thought to exist but there is inadequate information available to classify them with any degree of certainty.

sales through cooperative buyers, sellers, and real estate brokers, the buying and selling of mineral rights often takes place on a strictly confidential basis". (Baen, Oil and Gas Mineral Rights in Land Appraisal April, 1988, 212)

Finding appropriate comparables for valuation of mineral interests is exceptionally difficult. "Mines and mineral areas are distinctive properties. Each mine is unique...Because of this dissimilarity in mines, comparable sales are seldom available..." (Oberillig 1968, 596)

Obtaining all the information on a trade necessary to evaluate it is generally difficult to impossible...mineral property trades generally include multiple assets, so one must adjust away those assets not relevant to the particular property. Then one needs to contend with all of the variants of the geological characteristics of the deposits, its stage of exploration or development, geographical location, including access to utilities and transport, environmental issues. Furthermore, the terms of the trade must adjust for carried interests, royalties, stock options, and payments spread out over many years dependent on exploration or feasibility study success. (Ellis, Abbott and Sandri 1999, 4)

There have been suggested methods to deal with the issue of severely limited date for the sales comparison approach. These include: using sales from a number of different minerals that have similar characterizes to the subject, finding sales of the mineral in other jurisdictions or even other nations and using sales from the past with appropriate time/trend adjustments. (T. Ellis 2001, 29)

There are websites where individuals list their mineral rights for sale and these can be a source of limited information regarding the market. (MineralHub 2010) (US Mineral Exchange n.d.). However, "When data is available, this is the most straightforward and simple way to explain and support an opinion of market value." (Appraisal Institute 2008, 300). Ellis contends the sales approach, despite its limitations, is most likely to prevail in litigation since, "Sales are market data. Judges and juries generally feel they can understand sales whereas they generally don't feel comfortable with NPVs...The courts generally consider a value estimate developed by the sales comparison approach to be the most reliable estimate of market value." (T. Ellis 2001, 28 and 34)

## Cost Approach

Those involved with the valuation of mineral property agree, "...the cost approach to appraisal is usually useless in valuing mineral properties and mines." (Ellis, Abbott and Sandri 1999, 3) The improvements and equipment used in the production of minerals can be valued. However, since the minerals themselves cannot be replaced or replicated the cost approach is not valid. There is some disagreement on this contention. As minerals have no value until they are produced and their production involves the use of capital (joint production), the cost approach may be a useful partial indication of the value of the mineral property. (Ferraro 1967, 121)

While there has been a movement among the states to eliminate personal property taxes on tangible personal property, (Errecart, Gerrish and Drenkard October 2012) in most of the states studied, ad valorem taxes were applied to machinery, equipment and non-permanent structures

which related to the production of the mineral<sup>24</sup>. This was true even in those states which had exempted other forms of tangible personal property. This coverage included pumps (rocking horses, Christmas trees) gathering stations, pipelines, tank farms, terminals, tipples, belt lines, excavators, trucks, rail cars and even the casing pipe in the well. This application was used most extensively in states where reserves were not taxable.

#### Income Approach

There are two methods used by the states to apply property taxes to mineral interests using the income approach. The first uses only current production and prices. These are not *ad valorem* taxes but are variants of severance taxes. This approach taxes mineral output and not mineral interests ("real property"). Of the two is this is the easiest to administer particularly if the state has a severance tax upon which the local tax can be "piggy backed".

The easiest method, as used in Idaho and Arkansas, is to take the net income from the operation times the assessment percentage times the levy. In Idaho there is full market value assessment (100%), so the property tax is "profit" times the levy. (Dornfest 2014) In Arkansas where the assessment ratio is 20 percent, the net operating income is taken times the assessment ratio times the mill levy to obtain the tax base. (Arkansas Assessment Coordination Department 2014)

The second approach taxes the value of "reserves" as the mineral remains in the ground prior to extraction. When this methodology is employed the value of the reserves is determined using a "discounted cash flow" (DCF) approach<sup>25</sup>. This is the basis for the "income approach" used for commercial enterprises. This approach is a true ad valorem tax. However the complexities which arise with this approach have led most states levying "property taxes" on mineral interests to use the severance approach.

Valuation of mineral interests by the income approach has an almost 140 year history. Introduced by Hoskold (Hoskold 1877) the basic calculations have been altered since. (Malone 1994, 4) Most businesses no longer use it, however, many jurisdictions use it for ad valorem purposes. (Torries 1998, 49) The income approach was endorsed by Brown, "...the value of land can be arrived at only by discounting its expected future rents or returns at some previously found rate of interest...The same principles apply in the case of such natural resources as coal and iron mines, oil and natural gas wells..." (H. Brown, The Taxation of Unearned Income 2nd ed. 1926, 25 and 35)

There are two income approaches to capitalization. Direct capitalization, "…is the method used to convert net income from the property into an indication of property value by using an overall capitalization rate developed from the market." (Thimgan 2010, 375) The formula is:

V=NOI/ OAR

<sup>&</sup>lt;sup>24</sup> Ohio and Pennsylvania have no tangible personal property taxes.

<sup>&</sup>lt;sup>25</sup> The DCF approach is taken to be synonymous with the Net Present Value ((NPV) approach and the terms are used interchangeably in both the literature and the law. From a technical standpoint NPV is one model used to determine DCF, the other being the Internal Rate of Return (IRR). (Appraisal Institute 2008, 521-538) (Thimgan 2010, 340-373)

Where:

V=Value of the property as of a specific date NOI=Net income from the property in a single year OAR=Rate of return as determined by the market.

Direct capitalization considers only a single year's income and requires the rate of return be calculated from sales that are "highly comparable" to the property under valuation. (Thimgan 2010, 376) In mass appraisal direct capitalization appears to be the most common method of determining value. (Gloudemans and Almy, Fundamentals of Mass Appraisal 2011, 171)

Use of direct capitalization may not be appropriate for valuation of mineral rights. As noted previously, comparable sales are difficult to find and without them direct capitalization does not render a satisfactory value. Also, with mineral prices being variable, sometimes highly so, using only a single year's net income will give either a too low or high value based on the underlying mineral price fluctuations.

The second income method is summarized by the IAAO as "yield capitalization"<sup>26</sup>:

Yield capitalization can be used to convert future net benefits into present value by discounting each future benefit at an appropriate yield rate. DCF is a year-by-year breakdown of the expected net benefits to be derived from the investment, which are converted into present value by discounting each future benefit at an appropriate yield rate...several years' incomes...are discounted at a discount rate derived from investors' expectation of return on and return of invested capital from alternative investments of comparable risk. (Thimgan 2010, 377)

The formula used to determine the value of a property (V) under this income approach is.

$$V = CF_1 / (1+Y_0) + CF_2 / (1+Y_0)^2 + \dots CF_n / (1+Y_0)^n$$

Where:

CF=cash flow for the period specified  $Y_0$ =the appropriate overall yield rate (discount rate) <sup>n</sup>=the number of years in the projection

While the yield formula appears easy in its application, it is not when applied to ad valorem taxation of mineral estates. The yield approach does require that the capitalization rate be determined by the market, but it is the market expectations of investors which is determinant rather than a rate determined by sales of comparable property. Since the yield capitalization model involves assumption and forecasts of future prices and market conditions, there are those

<sup>&</sup>lt;sup>26</sup> There is a distinction between "yield" and "direct" capitalization under the DCF. Direct capitalization derives the discount rate directly from comparable sales. Yield capitalization avoids the problem of not enough comparable sales for mineral properties by using the various techniques noted below. (Thimgan 2010, 391) (Appraisal Institute 2008, 466-467)

who are skeptical of its validity unless the value is confirmed using one or both of the other methods, (T. Ellis 2001) The Appraisal Institute summarizes:

Critics point out that projections not warranted by market evidence can result in unsupported market value indications and that the results of the analysis can change significantly due to even small changes in the projections. Other critics object to the uncertainty of forecasting financial results five or 10 years into the future and cite this as a reason for not using the DCF techniques (Appraisal Institute 2008, 540).

Since the income approach is the most common method used by ad valorem assessors, its limitations should be considered. One source has commented that the DCF approach requires the estimate of "...future commodity prices, production decline rates, the potential for future drilling and remaining reserves...Different oil and gas basins have different decline rates, activity levels, transportation rates, taxes and pricing differentials, so there is not a one-shoe-fits-all approach ..." (US Mineral Exchange n.d.)

Torries pinpoints the problem, "DCF analysis is static in that it accounts only imperfectly for uncertainty and does not recognize the possibility of changing operation to react to changing future economic conditions" (Torries 1998, 37) USPAP warns, "Because DCF analysis is profit oriented and dependent on the analysis of uncertain future events, it is vulnerable to misuse". (Appraisal Standards Board 2014–2015, U-71) Without any specific reference USPAP further states, "...it is the responsibility of the appraiser to ensure that the controlling input is consistent with market evidence and prevailing market conditions". (Appraisal Standards Board 2014–2015, U-71)

DCF is "forward looking" by establishing value based on remaining proven reserves and the future income from the property. Neither of these are known for certain. There are some authorities who question the use of discounting to achieve a valuation of mineral interests. Torries (Torries 1998) lists several criteria which must be met if DCF is to be valid:

- All input values must be known with certainty, and there must be no uncertainty of risk.
- All projects to be compared must have comparable discount rates that reflect the risk opportunity cost of capital.
- All projects must have comparable tax structures.
- All projects to be compared must have equal equivalent economic lives.
- All comparable projects must have identical initial investments. (Torries 1998, 42–43)

It is difficult to comprehend how these criteria can be met in a mass appraisal situation.

## **Determination of the Discount Rate**

Establishing an appropriate discount rate is one of the most essential yet difficult tasks facing the appraiser/assessor, "The discount rate, which reflects required rates of return on investment is key to accurate income models" (Gloudemans, Mass Appraisal of Real Property 1999). When the DCF approach is used to determine the value of a mineral interest, choosing the appropriate discount rate to use is, "…arguably the most crucial decision in applying the income approach." (Gloudemans and Almy, Fundamentals of Mass Appraisal 2011, 175). States use different methods. There is a high level of uncertainty and risk involved. (McMichael 1931)

A review of the appraisal literature reveals that there are many types of discount rates which can be calculated in different ways. (Torries 1998, 31–51) (Thimgan 2010, 339–402) (Appraisal Institute 2008, 539–559). IAAO list six different methods: (Thimgan 2010, 371–372)

- Comparable sales is of limited use in appraising mineral interest due to the lack of data.
- Band-of-Investment which includes components for both equity and mortgage rates weighted by the contribution each makes to the financing of the project. Use of this method requires the appraiser to know how mineral "plays" are financed in the industry. This method is also known as the Weighted Average Cost of Capital (WACC).
- Net income ratio requires the "net income ratio" (NIR) be divided by the Gross Income Multiplier (GIM). This approach is primarily used for rental properties when there are sufficient sales to determine the GIM.<sup>27</sup>
- Debt coverage ratio expresses the relationship between the Net Operating Income (NOI) and the total debt service which includes both principal and interest and the loan to value ratio. The approach is more appropriate for lenders than appraisal of mineral interests.
- Yield change techniques which assume that the income of the property will change over the period of the appraisal. This approach requires that an overall yield rate has already been determined.
- Band-of-investment technique with land and building components is similar to the bandof-investment approach except separate values are determined for land and improvements.

In practice some states derive a capitalization rate by summing different components (build up method) to obtain the overall rate (OR). For example in West Virginia those components include: (West Virginia State Tax Department Property Tax Division 2012)

• Safe rate which is the return on an investment of minimal risk often obtained from the yield on US treasury notes

<sup>&</sup>lt;sup>27</sup> The GIM is found by dividing the sales price of a property by its annual income. While income can be estimated it is difficult to obtain the needed sales for determination of GIM related to mineral property.
- Risk rate: since it is difficult to obtain this information from the market a percentage is added to the Prime Interest Rate as determined by federal government agencies.
- Nonliquidity rate refers to the average amount of time the mineral property is likely to be on the market before sale. This is accomplished by a market survey and adjusted by the yield on US Treasury Bonds for the time period.
- Management rate is to represent the cost of managing the investment which is set at 0.5%
- Property tax component is determined by multiplying the assessment rate times the previous year's statewide average for rural property.
- Inflation rate is a subtraction using the urban consumer price index of the U.S. Department of Labor.

In Texas mineral appraisals are conducted by private firms (Pritchard & Abbott, Inc 2014) (Combs nd) using a formula of the Weighted Average Cost of Capital (WACC) including:

- Inflation Rate as determined by the Urban Consumer Price Index of the U.S. Bureau of Labor Statistics
- Risk Free Component is the risk-free rate minus the inflation rate. Determined by the return on long term government bonds
- General Risk Premium represents the WACC minus the risk-free rate using typical oil or gas company ratios of debt and equity.
- Property Specific Risk Premium is to offset the risks of a particular mineral property<sup>28</sup> The assessor is left to estimate these. (Kert 2014)

One appraisal firm notes: "This method of appraising mineral interests enjoys the benefits of not only being the most accurate, but also the most efficient for ad valorem tax purposes...However, it is only as accurate as the engineering estimates of future production, price and expenses of operation" (Pritchard & Abbott March 3, 2014, 7).

In California the oil and gas-producing counties use a statewide survey of oil and gas sales as well as the band-of-investment (WACC) approach. (California State Board of Equalization August 1996, Revised January 1999) The report is completed by a private firm hired to establish a discount rate. (Harold W. Bertholf Inc. n.d.) The survey produces a range of discount rates for local assessors to use based on the assessor's determination of risk. The current usual range is between 10–20 percent. (Johnson 2014).

<sup>&</sup>lt;sup>28</sup> These include but are not limited to: Conditions in the lease, well with high water production, well near end of economic life, well under partial or active water drive (Uncertain recovery), lease of less than 6 months, unusually high operating expense, offshore lease, and secondary recovery project underway. (Pritchard & Abbott, Inc (a) 2014)

The Arkansas assessment process distinguishes between both working and royalty interests. The formulas provide for a 15% discount rate to be used in the DCF for the working interest for oil wells, but not for oil royalty interests or for any interests in natural gas or coal. (Arkansas Assessment Coordination Department 2014, 252) (McGee 2014)<sup>29</sup> These other mineral interests are valued more on a severance tax approach.<sup>30</sup> (Arkansas Assessment Coordination Department 2014, 253)

In most respects Colorado mimics Arkansas. (Woodruff 2014). Discounting using a state required Hoskold factor is employed for valuation of coal and other hard rocks. (Division of Property Taxation 2013, Addendum 6-C) For oil and gas interests the value of the well is determined by taking 87.5 percent of the net income<sup>31</sup> for the preceding year. (Woodruff 2014)

Assuming the discount rate has been determined the following issues remain in DCF appraisal (Oberbillig 1968, 597–600):

- Determination of mineral price,
- Determination of the appropriate discount rate,
- Determination of the mineral availability
- Determination of allowable costs.

#### **Determination of Mineral Prices**

Prices of minerals are highly variable and often fluctuate daily depending on the external factors which influence demand. Daily prices are posted on the NYMAX. But when property is being valued either by general appraisers or assessors, the valuation is as of a specific date. It does not appear reasonable to use the mineral price on that day due to the fluctuating nature of the mineral's price. Those swings are usually "smoothed" by some form of "averaging" from over one year to three to five years. This averaging means that mineral valuations will be below market value when prices are rising and above market value when those prices are falling.

There are two approaches used to establish mineral prices. When a state has a requirement that either monthly, quarterly or annual reports on production must be filed, these can be used. The other alternative is to use prices either from "hubs" or terminals where the mineral is priced for delivery. Unless each producing unit is valued separately, the prices actually will vary not only over time but by source even if the well is in the same field as other wells. Using an average rate obtained from a hub exacerbates the situation.

<sup>&</sup>lt;sup>29</sup> For working interests in natural gas the formula is Annual Value per MCF times the working interest percentage (usually 0.875) minus production expenses at 0.13 percent times the 0.20 percent assessment rate. Similar calculations are used for the royalty interests for oil.

<sup>&</sup>lt;sup>30</sup> In addition there is assessment of all "...fixed appurtenances" as well using the "well production equipment assessed value" (WPEV) which is added to the production value of the well. (Arkansas Assessment Coordination Department 2014, 253)

<sup>&</sup>lt;sup>31</sup> Net operating income is the price at point of first sales less the expenses involved in manufacturing and transporting the product which is taken as a "net back".

# Pricing Crude Oil<sup>32</sup>

As indicated previously, there are significant differences in the quality of mineral deposits even if they are included under the same generic name. For example there are 160 different "crude oils" traded on exchanges. (Oilprice.com 2009).EIA has commented: Crude oil type matters for several reasons. First, U.S. crude streams vary widely in quality. Second, the economics surrounding various options for the domestic and international use of oil production are directly dependent on crude oil's quality characteristics. Third, actual or potential export values also vary significantly with quality characteristics. (Energy Information Administration May 29, 2014)

Crude oil is described based on its geographic location as oil from different locations is unique in chemical composition. The differences in crude oils are based on "density" (light to heavy) and "sulfur content" (sweet to sour).

- Density is measured by "API gravity"<sup>33</sup>. "Light crude usually has an API gravity of 38 or more and heavy crude an API gravity of 22 or less. (NesteOil nd)
- Sulfur content is determined on a percentage basis. Sweet crude is defined as having a sulfur content of less that.05 percent, while sour crude has a sulfur content of greater than 0.5 percent. The lower the sulfur content the less refining is required to clean the oil. (NesteOil nd)
- Light, sweet crude is the most expensive of the various crude oils as it requires less processing and produces output of more value added products (gasoline, diesel, and aviation fuel). Heavy, sour crudes sell at a discount to light crude because they are more difficult to process and produce fewer value-added products.

For crude oil in the United States "West Texas Intermediate" (WTI) is most commonly used as a benchmark for valuing other crudes as it has a API gravity of around 40 and a sulfur content close to 0.3 percent. (CME Group 2013). Other crude oils are discounted from the WTI price. The WTI hub is at Cushing OK.<sup>34</sup>

Producers of crude oil must report to the government both the quantity of the stream and the price paid by the "first purchaser". The first purchase price is the price that is paid by the, "firm that acquires ownership by the first purchase transaction...that owns the crude oil the first time it is removed from the lease boundary" (Energy Information Administration effective until 12/31/2015) First purchasers are allowed to average the prices paid over a 30 day report period in which case the "weighted average cost" (WAC) of all crude oil purchased is used.

<sup>&</sup>lt;sup>32</sup> Oil is sold by the barrel which contains 42 gallons

<sup>&</sup>lt;sup>33</sup> API Gravity was established by the American Petroleum Institute and measures how heavy or light a crude oil is compared to water. When a "light crude" has an API Gravity of more than 10 it is lighter than water and floats. With an API gravity" of more than 10, crude oil sinks and is classified as "heavy". The lighter the crude the easier it is to "crack" or refine into useablepetroleum products...

<sup>&</sup>lt;sup>34</sup> Cushing OK is a major intersection for oil pipelines and storage sites for WTI handling 5-10 percent of US production

# Pricing Natural Gas<sup>35</sup>

The price of natural gas, less the costs of pipeline transportation and distribution, is labeled the "commodity price". The pricing point for most natural gas in the United States is the "Henry Hub"<sup>36</sup>. Unlike crude oil there are several other hubs where natural gas is gathered for shipment.

Most natural gas prices in the U.S. are "wellhead prices" which is the point of production or extraction. (American Gas Association 2008) Prices are posted for each of these hubs and establishe a commodity cost for natural gas. (National Energy Board 2013). The federal government no longer collects wellhead prices, but states with natural gas extraction require both production and average wellhead prices be reported.

Natural gas prices are determined in part by the chemical composition. When natural gas is extracted it contains methane (which is what is usually called natural gas) plus certain hydrocarbon gas liquids (HGLs). These HGLs include ethane, propane, butane isobutene and natural gasoline plus certain olefins (Energy Information Administration 2013). The HGLs have a value separate from methane which is used primarily for heating and as a boiler fuel. HGLs are the building blocks for petrochemicals. (American Fuel and Petrochemical Manufacturers nd)

Natural gas which has a high concentration of HGLs is known as "wet gas". "Dry gas" is either natural gas with a low HGL content or what remains after the HGLs have striped. (Energy Information Administration nd). Because wet gas has a higher value in manufacturing it commands a higher market price. As is the case with crude oil, the location of gas "plays" are identifiable by their geologic location allowing assessors to determine prices.

## Pricing Coal<sup>37</sup>

There is no single price for coal or a benchmark location upon which to base pricing. Coal from the Central Appalachian Basin is priced at "Big Sandy" where the coal is delivered for transportation to end users.<sup>38</sup> All other coal is priced at the "mine mouth" to avoid the costs of transportation (Federal Energy Regulatory Commission 2013).

Coal prices vary by "basin"<sup>39</sup> due to their Btu and sulfur, ash and CO<sub>2</sub> content. (Energy Information Administration 2014) Within each basin there are distinct "seams" or "beds" which are usually consistent in their geologic character. Since coal from each seam has distinct qualities, the task of the assessor in valuing coal reserves in their jurisdiction is made less difficult.

<sup>&</sup>lt;sup>35</sup> Natural gas is priced in units dollars per Thousand Cubic Feet.

<sup>&</sup>lt;sup>36</sup> Henry Hub located in costal Louisiana connects four major intrastate and nine interstate pipelines.

<sup>&</sup>lt;sup>37</sup> Coal is sold on the basis of short tons (2,000 lbs.) and MMBtu content

<sup>&</sup>lt;sup>38</sup> "Big Sandy refers to the intersection of the Ohio and Big Sandy rivers near Huntington WV. This is the largest coal transportation hub (rail & river) for the eastern US

<sup>&</sup>lt;sup>39</sup> The major basins are Powder River Basin (WY MT), Rocky Mountain (CO UT), Northern Appalachian (WV, PA,OH), Illinois (IL IN and Central Appalachian (WV, OH, KY, TN,, AL)

There are three distinct "ranks" of coal: Anthracite which is the highest ranked coal having a high heat content (BTU) and lower sulfur, Bituminous, which is the most prevalent in the U.S. and has a lower heat and higher sulfur content. Lignite (brown coal) which is the lowest ranked having a low heat content and a higher sulfur content. (Energy Information Administration nd) Powder River basin coal with its low BTU t sells for about 1/3<sup>rd</sup> the price of higher Btu coal from Northern and Central Appalachian basins. (Energy Information Administration 2014)

## Determination of the Mineral Availability.

When reserves are subject to the property tax the determination is to be made on "proved reserves".<sup>40</sup> These are reserves which in any given year are the estimates of the quantities of the mineral, "Which geological and engineering data demonstrates with reasonable certainty to be recoverable in the future from known…reservoirs under existing economic and operating conditions". (Energy Information Administration nd) EIA notes the problems inferred by the definition. Proved reserves can increase due to extension of old (previously discovered) reserves or due to additional drilling or by discovery of new reservoirs or seams... Technological advances (secondary recovery techniques, hydraulic fracturing) can also increase reserves or create entirely new ones. Economic conditions may make wells or mines uneconomic to operate

Proved reserves may be revised if the "decline rate"<sup>41</sup> for the field was either greater or less than originally estimated. All oil and gas well produce at a declining rate over time. A new well may experience a short term increase in production but is general short lived. For most wells the decline rate is falling at an exponential rate. (Crain nd) For established fields decline rates are less difficult to calculate, but for new wells in new fields it may take years for the decline rate to be established. (Baen, Oil and Gas Mineral Rights in Land Appraisal April 1988, 213–214) This adds a level of uncertainty to forecasts of net income.

Coal and other hard rock minerals suffer from depletion. IAAO offers this definition "Depletion is the loss of value due to consumption..." (Thimgan 2010, 258). As mining continues, the rock is "exhausted" reducing the amount of proved reserves. (Lewis 1979) This is often because the most profitable veins, those involving the least difficulty to mine, are taken first.

As the reserves of the mineral are subject to decline (oil and natural gas) or depletion (coal and other hard rocks) a point will be reached where the mineral can no longer be extracted profitably under existing market conditions. In which case the well or mine is abandoned, production ceases and little if any value remains unless there is a change in the price of the mineral which would justify restarting operations. (Lewis 1979, 1569) When minerals are no longer producing then neither the severance nor ad valorem tax are appropriate as no income is being generated. (Peppard 2010)

<sup>&</sup>lt;sup>40</sup> The U.S. Geological Survey uses the term "measured reserves" to refer to the same concept. Near equivalent terms are "energy reserves" and "demonstrated reserves". Proved reserves do not include "inferred reserves" or "unproven reserves" "indicated reserves". (Energy Information Administration nd)

<sup>&</sup>lt;sup>41</sup> For oil and gas fields this is primarily due to the loss of reservoir pressure of the changing relative volumes of the produced fluids. (Poston nd)

## **Determination of Allowable Costs.**

For an income stream to be properly capitalized for appraisal purposes, net rather than gross income is to be used. This is based on the theory the mineral has no value until it is made marketable. Coal, crude oil and natural gas, in their raw form, are rarely of sufficient quality that they can be marketed for immediate use. The delivered price paid for a mineral will not reflect the costs of cleaning, preparing, and transporting the mineral. There are costs that the operator must cover in order to operate the property. For natural gas these include:

- Compression deduction (natural gas) is for compressing the gas to a sufficient pressure to enter into a pipeline
- Dehydration deduction is a charge for the removal of water vapor
- Gathering deduction is the charge for a pipeline and transport to a sales point
- Processing deduction is for the further refinement of the gas
- Treading deduction is for removing impurities such as CO<sub>2</sub>,

Coal has to be washed of soil and rock, crushed into graded sized chunks, and certain impurities removed prior to use. (Stationary Sources Branch 1998) (Walters 2011) In most cases these costs are deductions from the payments to the royalty owners (MineralWeb (b) nd). Crude oil must be "demulsified" (removal of water) prior to refining (Abdurahman September 2013 2:5) in addition to separation of any natural gas.

Property and severance taxes are usually deducted from the payment to the royalty owner by the operator for purposes of administrative simplicity. But in some states the royalty owner is directly billed for taxes due. In all cases the royalty owner is legally responsible for the taxes. (MineralWise nd)

In some leases these costs are born by the owner of the working interest (WI) not by those who own royalty interests (RI) as the WI receive the greater proportion of the gross income from the extraction. (Pritchard & Abbott, Inc (b) 2014, 7)<sup>42</sup> But, the RI owner is responsible for severance and ad valorem taxes on their royalty percentage. When ad valorem taxes are to be paid by the RI, typical lease provision for natural gas reads as follows:

Royalties shall be paid without deductions for the costs of producing, gathering, storing, separating, treating, dehydrating, compressing, transporting, or otherwise making the oil and/or gas produced from the lease premises read for sale or use...with the exception of lessor's prorated share of any taxes...on the oil/or gas royalty. (Morgan 2008, 26)

<sup>&</sup>lt;sup>42</sup> Typically the RI receives 12.5 percent while the WI receives 87.5 percent, but this can vary (from 70-100 percent of gross income) depending on the terms of the lease.

The important issue is to make sure it is the mineral interest that is being valued and not the mineral business. In this regard appraisal using the income approach does not employ the same deductions and exemptions as are available under the federal corporate income tax.

# Who Pays the Property Tax On Minerals and Mineral Rights?

# Incidence of the Ad Valorem Tax on Mineral Interests

In evaluating the relationship between the LVT and the ad valorem tax on mineral ownership, consideration must be given to the party actually paying the tax. Economists make a distinction between the entity who must legally remit the tax (tax burden) and the entity whose income is reduced directly or indirectly by the tax (tax incidence). When the burden and incidence are not on the same entity the tax is said to be "shifted". (H. Brown, The Economics of Taxation 1938) As was expressed decades ago by Seligman, "Without a correct analysis of the incidence of a tax, no proper opinion can be formed as to its actual effect or its justice" (Seligman 1926, 1). The question is, upon whom does the ad valorem tax on mineral interests fall?

There is a continuing debate over, "who pays the property tax?" Netzer concludes, "It is generally agreed that taxes on the value of bare land…rest on the owners of the sites at the time the tax is initially levied or increased. The tax cannot be shifted." (Netzer 1966, 33) This position is support by Aaron, "The conclusion that the property tax on land is borne by owners is indisputable as long as the supply is fixed." (Aaron 1975, 22) However, he views the idea that land is fixed as "naïve" and continues,

The total supply of land is approximately fixed, but the demand for and the supply of land in particular jurisdictions depends on property tax policy. Demand for land is affected because land and capital are used jointly in most economic activities; consequently, the departure of capital from jurisdictions with relatively high taxes reduces the demand for land there (Aaron 1975, 40).

Conversely, in a jurisdiction where the tax on capital used in conjunction with the land falls, the demand for land will rise. Since minerals are produced in "joint supply" using capital, the analysis holds for mineral taxation as well.

Since mineral deposits are geographically fixed, as is surface land, then the logic behind the land value tax (LVT) possibly is applicable. As Seligman notes there has been a long history of philosophers who feel that the tax on land cannot be shifted. (Seligman, The Shifting and Incidence of Taxation, 5th ed. 1926, 145–200). This proposition was most articulately expressed by George (George 2010 [originally published 1871]) and his school (H. Brown, The Taxation of Unearned Income 2nd ed. 1926). Modern economists have also endorsed the view. (Musgrave and Musgrave 1989, 421)

That conclusion bears closer analysis as it pertains to minerals.

- First, mineral commodity prices are determined in internationally competitive markets. These international markets reflect general economic conditions during the course of a business cycle. The seller of minerals is at the mercy of prices over which the producer has no control. The calculus of operation says the mineral producer will only produce if the price is sufficient to cover the costs of production including the return to investment (ROI). Mines can be closed and wells capped in response to changes in prices. While the reserves may retain a future value, when prices are below costs, including the ROI, no production takes place and there is no return on the mineral interest. (O'Donahue 1910, 7–9)
- Second, mineral production represents an example of "joint inputs" (Alchian and Demsetz 1996). The mineral has no market value until it is produced and available for sale. This means that capital must be employed in the form of equipment for exploration, extraction, preparation and transportation. This investment is expensive and involves a high degree of risk. Private investors will only be willing to put money at risk if there is a reasonable forecast for future profitability. (Rudenno 2012, 3) Therefore taxes on minerals which lower returns below those available elsewhere will, given the circumstances, retard or eliminate investment and the mine or well will not be placed into production and will have no value except future prospects.
- The idea persists that capital is mobile, but this is only true of capital that has not been "sunk" into specialized equipment. While some equipment can be moved to other sites (drill rigs, drag lines, trucks, generators) much equipment cannot be moved as it is fixed. With insufficient return the fixed portion of the mine capital will not be replaced or maintained.
- Since minerals are in joint input involving the mineral deposit and the capital needed to effectuate its use, it is difficult to isolate a return specifically to the deposit rather than the entire operation. The supply of minerals is not as inelastic as may have been assumed. Changes in returns, including property taxes, will alter the level of production and market availability. Brown's remarks regarding taxing land value when capital investment is needed to bring value to the bare land are equally applicable to mineral interests, "But to tax this value when it is brought into existence through capital construction by the owners of the land so improved may operate to prevent such capital construction and such a tax may be, in some degree, shifted" (H. Brown, The Economics of Taxation 1938, 229)

The 30-year-old controversy over the "old" (benefit) view and the "new" (capitalization) view (Nechyba, The Benefit View and the New View: Where Do We Stand, Twenty-Five Years into the Debate 2001) (Fischel, Municipal Corporations, Homeowners and the Benefit View of the Property Tax 2001) (Zodrow 2001) has principally focused on housing in urban areas. Zodrow summarizes:

(T)he essential difference between the new and benefit views of the property tax is that the new view implies that relatively high levels of property taxation would drive mobile capital out of a jurisdiction resulting in lower capital intensity. By comparison, under the benefit view the property tax functions as a user charge for services rendered, (99)

Neither theory has been specifically applied to property taxes on minerals or mineral interests.

## **Benefits Theory**

The benefits theory of taxation was summarized by Cordes:

Under this view, governments provide goods and services that are of value to taxpayers, and taxes, although compulsory, become analogous to prices that people should pay for those services. Just as it is fair for consumers to "pay for what they get" in the marketplace, so too it is fair for them to pay according to how much they benefit from governmental spending. (Cordes 1999, 24)

Two other writers go even further:

The property tax has many merits, not least of which is that it is a benefit tax—it allows people in a municipality or school district to choose the mix of taxes and services they desire.

Because, at least theoretically, people can vote both at the ballot box and with their feet, government officials have a powerful incentive to provide an efficient mix of taxes and services (Green and Weiss 2009, 51).

It is unlikely that a property tax on minerals meets the benefits test. The owners of the minerals or holders of the mineral rights are not directly benefiting from the expenditures resulting when the taxes' proceeds are spent by the jurisdiction receiving them. Ownership of mineral rights has become widely dispersed due to inheritance and other transfers.

For those living on the surface and holding the mineral interests there may be a general benefit from the local expenditures which may in part justify calling property taxes paid on the minerals as benefit levies but only for those individuals. Local spending on schools, roads, recreation and public health may improve the quality of life for those in the taxing jurisdiction. (Fischel, Municipal Corporations, Howowners and the Benefit View of the Property Tax 2001) Mineral rights owners living outside the taxing jurisdiction will receive no direct benefit.

Over half a century ago, the lack of correlation between taxes paid and benefits received was made by Bickerdike:

...there is confusion on the subject of benefit owing to the fact that payment for municipal services cannot be made to correspond to payment for ordinary services...Even if they were purely beneficial, the benefit is too generally diffused to allow of the apportionment of payment...to those who directly enjoy it. (Bickerdike 1959, 381)

Those who agree with George about the benefits to society as a whole from a LVT feel the same reasoning may apply to property taxes on minerals, "A tax upon land values is therefore, the most just and equal of all taxes. It falls only on those who receive a unique and valuable benefit from society. And it falls on them in proportion to the benefits they receive." (George 2010

[originally published 1871], 233) Can the property tax on mineral interests be justified by George's analysis?

On the general benefits side of the ledger there can be included:

- Increased wages in occupations directly serving the industry and in occupations providing services to those working in the industry
- Increased property values for both mineral and non-mineral land
- Higher tax bases both on property and from sales and income levies
- "Instant millionaires" among those receiving signing bonuses for leasing property and receiving royalties

There have been studies performed that indicate these general regional benefits from taxation of mineral interests.<sup>43</sup>

There have been disagreements with these studies.<sup>44</sup> Anecdotal evidence from two of the "boom states", North Dakota (oil) and West Virginia (natural gas) provide illustrations of the general costs. (Briody 2013) (Sheerin and Bressanin 2014) (Niuzium, Runquist and Perry 2010) (Energy Citizens 2013) The costs include:

- Deterioration of transport system due to significant increases in traffic particularly by heavy trucks and machines.
- Increased demand for water and sewer services.
- More crime including prostitution and domestic assault.
- Inadequate housing.
- Transient workforce often leading to rising cases of homelessness.
- Expanded need for medical care and facilities.
- Degradation of the environment including water and air pollution.
- Disruption of traditional life styles.

Most of these costs of mineral extraction and production are "social costs" or "negative externalities" due to "market failure". Since these costs are not reflected in the market price for the mineral, they will be shifted to others. (Dudley and Brito 2012) (Stiglitz 1986) Taxation is

<sup>&</sup>lt;sup>43</sup> One recent study for North Dakota, looking only at benefits, found great increases in personal income, state and local taxesplus royalty, lease and bonus income to residents from recent shale oil development. (Bangsund and Hodur 2013). A 2012 study performed in Arkansas for Fayetteville shale counties produced similar results. (Center for Business and Economic Research May 2012) Using 2008 data, positive results for personal income, government revenue and employment were found in WestVirginia from the coal industry. (Kent and Witt February 2010). Highly positive results for income, jobs and taxes were reported for Alaska. (McDowell Group January 2012) For the Barnett shale formation in Texas a 2008 report also found significanteconomic gains. (Perryman Group March 2008) A more recent study for the Texas "lignite arc" calculated over \$2.5 billion ineconomic impact (Clower February 2013)

<sup>&</sup>lt;sup>44</sup> All these studies have been critiqued on grounds either that they were supported by mineral groups, did not consider health and environmental costs, disruption of communities as well as on methodological grounds (Kelsey n.d.) (Earthworks April 2011) (Boettner and Miller, The Impact of Coal on the West Virginia State Budget June 22, 2010), (League of Women Voter of Indiana County 2009-2010)

viewed as one method of internalizing these costs. But, there is no reason to believe that an ad valorem tax on mineral interests could provide compensation to those upon whom the negative externalities fall.

As noted before, there may be an indirect benefit to those living in the mining area if the property taxes on minerals are used to increase the amount and quality of public services such as local schools. This will result only if certain conditions are met.

- The income from property taxes remains in the jurisdiction where the taxes are levied. Property taxes on minerals (as shown in Appendix A) are often allocated by the states among all the local jurisdictions based on some criteria rather than remaining where the mineral is located. This result is more likely with a severance tax applied at the state level with a major distribution to the state general fund and a percentage distributed to all selected local jurisdictions sometimes with a greater portion going to the locality of origin.
- Local jurisdictions with mineral production within their boundaries see significant increases in the demand for public services such as roads, schools, water, sewer, waste disposal and medical facilities. This is most likely to be a burden during the development phase for oil and gas when initial drilling or mine opening is taking place. Many of these costs are relatively immediate while the income from the property tax comes over a longer period of time. Whether the local mineral property tax covers these costs or not is a major area of dispute. If the revenue does not cover these costs, then any claim to the tax meeting the benefit principle is lost.
- While the mineral deposit itself is not mobile, the capital used to develop and market the mineral is. This particularly is true if personal property is part of the tax base. Drilling rigs move to where the greatest return is as do drag lines, haul trucks, rail cars, continuous miner machines and other mining or extraction equipment. All these can and are moved although with some difficulty. In the short run these investments may be fixed, but overtime due to deterioration and non-replacement the investment in these becomes more mobile. These capital investments are essential to the mining process may leave the area.
- If there are few barriers to movement of mining related capital then, taxing jurisdictions may want to reduce the flight of mining related capital by lowering property taxes on equipment and increasing taxes on land. This may hold if benefits to the jurisdiction are perceived as greater than the costs. But in most cases that may be difficult to prove particularly to voters.
- Constitutional or legislative provisions calling for uniformity or equality in taxation may prevent lowering the tax on mining capital. (Coe 2009) Political pressure from residents who perceive the benefits of mineral production flowing to those outside the local jurisdiction may also inhibit lowering mineral property taxes.

In any case, there is little to support the theory that property taxes on minerals and mineral rights is a benefits tax. (Bahl, Martinez-Vazquez and Youngman 2010)

# New (Capitalization) Theory

The new view sees the property tax as being capitalized reducing the returns to less mobile capital such as surface land and by extension to minerals.<sup>45</sup> Since the returns to the less mobile capital are reduced, this capitalization process causes a reduction in the price of the less mobile factor. This reduction in return causes mobile capital to flee to lower tax jurisdictions and/or other uses.

A formal explanation is provided "Property tax rates that exceed the national average reduce the amount of capital in a jurisdiction, with capital migrating to relatively low tax jurisdictions; opposing effects occur in relatively low tax jurisdictions." (Zodrow 2001, 79) If this is correct then property taxes on minerals and mineral interest will cause a flight of capital from mineral exploration and development to less highly taxed investment alternatives or to jurisdictions possessing the mineral but having lower taxes on them.

As capital moves into other uses or jurisdictions the supply of capital is increased, forcing down the return to all other capital as well. (Nechyba, The Benefit View and the New View 2001, 117) This view may be extended to say with lower returns to capital there is less investment overall which reduces labor productivity and thereby wages resulting in a partial shift to labor as well as capital. The view assumes mineral interests are capitalized resulting in lower returns to owners of mineral interests and to investment in capital in general. (Zodrow 2001, 97)

The "new view" also may not fit the analysis of the burden of property taxation on minerals.

- Until new deposits are found or technologies developed to recover untapped existing supplies, minerals like surface land are in inelastic supply. Minerals are not mobile and an increase in taxes on them is not going to influence their presence. But as Aaron noted, since capital is to a degree mobile, the increase in property taxes and/or severance taxes will reduce the level of exploitation of a mineral in the higher tax jurisdictions. (Aaron 1975)
- If the same mineral can be extracted in an adjacent lower tax jurisdiction, the development of that mineral will be faster than in the higher tax jurisdiction. If demand is significantly high for a mineral so it is profitable to produce all that can be used regardless of the tax, then the difference in the property tax in the higher tax jurisdiction is backward shifted to the owners of the mineral or mineral rights in that jurisdiction.
- In the short run, much of the capital used in mineral production is specialized and fixed. That capital will be mobile only in the longer run primarily due to failure to upkeep and replace. The new theory holds more validity for longer periods than for shorter ones. As

<sup>&</sup>lt;sup>45</sup> The "new view" is almost a century old. See (Adams June 1916) (Davenport March 1917)

Brown has commented. "In the long run, a tax on capital in special fields...is certain to be shifted." (H. Brown, The Economics of Taxation 1938, 180)

• This argument mimics the one made regarding the stock of housing, "Houses are quite durable, and while they are easy to add onto, it is difficult to turn bricks from an existing house into machines or other forms of capital. Movement of capital *out* of a jurisdiction, therefore, happens through gradual depreciation." (Nechyba, The Benefit View and the New View 2001, 116)

As a result the capitalization of property taxes on minerals and mineral interests is likely to have little impact. It is doubtful that the effect on reduced return to capital invested in mining will be noticeable to the overall return on all forms of capital. For capital specific to the mining industry which already has been produced, the return to that specialized capital may be lowered from any new or additional property taxes levied on the minerals. In this case, the tax will fall upon the owners of already existing specialized capital and are unlikely to reduce the overall return to all investment. (H. Brown, The Economics of Taxation 1938, 179)

## Speculation in Minerals and the Property Tax

Do property and severance taxes on minerals reduce speculation? As regards land, it is stated that taxes on land, by reducing its net income to the owner, would influence the owner to not leave it undeveloped. "The speculative holder of the land, however would find a reason for not holding his land idle, and, if he could not use it, would have to let it go to those who could." (H. Brown, The Taxation of Unearned Income 2nd ed. 1926, 101). If the property tax liability on mineral interests is levied only on mineral severance (as many property taxes do), there is no incentive for the tax to spur use or development. On the other hand, if the property tax is based on the value of mineral reserves then there may be an incentive to exploit the mineral as the tax will be payable whether or not there has been severance.

Another factor which probably has a significant impact on the rate of exploitation of minerals is the dispersal of ownership of mineral interests. As noted before, after original severance mineral rights pass to many heirs and assignees who are interested in receiving a regular royalty payment. That is why leases for mineral interests contain time limitations on when exploration or other related activity must commence and continue or the lease is voided. (Morgan 2008) In this case the incentive to speculate by withholding production is reduced.

In the absence of taxation, speculation in minerals is encouraged. Land and minerals are not used (or in the case of land at its "highest and best use") in anticipation that the value of what the land produces or the price of the mineral will be greater in the future. (Leistritz and Voelker 1975) A full discussion of the issues surrounding speculation in both land and minerals is not covered in this paper. Speculation in commodities is almost old as markets. (Chancellor 2000, 3–6). The Chicago Mercantile Exchange maintains an extensive market in the trading of energy<sup>46</sup> and

<sup>&</sup>lt;sup>46</sup> Crude oil, heating oil, natural gas, coal and gasoline

mineral<sup>47</sup> futures. (CME Group 2014). Other commodity exchanges exist in many countries as well as the US.

Speculation in minerals (and other commodities) is usually accomplished by buying and selling commodity futures<sup>4848</sup>. There are two reasons for investing in commodity futures. The first, "hedging", is used by companies to assure the availability of the commodity at a fixed price. (Dumon 2013). The second is "speculation". Speculation can be defined as trading with the objective of achieving profits through successful anticipation of price movements. (US Commody Futures Trading Commission 2008). The latter is a "zero-sum game" in which "…one person's gain is equivalent to another's loss, so the net change in wealth or benefit is zero." (Investopedia n.d.)

George found speculation in land to be removing land from productive use, driving up the price of land and the unearned rent which could be received from land. (George 2010 [originally published 1871], 142–144) He extended this observation to mineral land, "It is well known that private mineral land is often withheld from use while poorer deposits are worked." (George 2010 [originally published 1871], 143). Any income gained from speculation is viewed as unearned income as no economic contribution has resulted from it.

It is the "speculative value" which a property tax may reduce. (H. Brown, The Taxation of Unearned Income 2nd ed. 1926, 126–127) As Brown argues, "The proper way for the community to deal with all such unearned incomes is to appropriate them to the public use by the method of taxation." (H. Brown, The Taxation of Unearned Income 2nd ed. 1926, 36) The question remains, does the property tax on minerals fulfill the objective of reducing speculation or the profits made from it? If the tax cannot be shifted elsewhere then it would reduce the incomes of those owning the mineral rights. In turn this creates a "liability without liquidity" which could encourage development of the mineral resource.

There has been no empirical test of whether or not mineral taxes effect speculation. But there are examples of where speculation in minerals has affected surface land prices, particularly agricultural land, even if the mineral rights were severed (Speakman 2013). The property tax at best is an indirect way of reaching unearned income from speculation. The primary purpose of the property tax is to provide revenue for local governments thereby preserving their autonomy. (Oats 2001, 26)

## **Performance Evaluation**

Mass appraisal is validated by statistical tests which comprise performance evaluation. (Gloudemans and Almy, Fundamentals of Mass Appraisal 2011, 198). USPAP states this requirement, "Mass appraisal provides for a systematic approach and uniform application of

<sup>&</sup>lt;sup>47</sup> Gold, silver, platinum, lead nickel tin, zinc and copper

<sup>&</sup>lt;sup>48</sup> Speculative trading involves trading futures contracts without the intention of obtaining the underlying commodity. Traders buy future contracts expecting that the price of the underlying commodity will go up increasing the value of the futures contract which can be sold to whomever wants the underlying commodity. If this happens the speculator reaps a profit, but if commodity prices move in the opposite direction then a loss is incurred.

appraisal methods and techniques to obtain estimates of value that allow for statistical review and analysis of results." (Appraisal Standards Board 2014–2015, Standards Rule 6-1(a)) The purpose of these statistical measures is to assure that evaluations are reliable and "fair" meaning both the "level" and "uniformity" of the mass appraisal are as correct as possible.

There are two major aspects of appraisal accuracy: level and uniformity. Appraisal level refers to the overall ratio of appraised values to market values. Level measurements provide information about the degree to which goals or certain legal requirements are met. Uniformity refers to the degree to which properties are appraised at equal percentages of market value. (International Association of Assessing Officers April 2013, 7)

In mass appraisal the most important statistical test is the "sales ratio study".<sup>49</sup> "Regardless of how values were generated, sales ratio studies provide objective, bottom-line indicators of assessment performance". (International Association of Assessing Officers 2013, 5.2 pp12) The IAAO has promulgated standards to be used for the conduct and interpretation of sales ratio studies. (International Association of Assessing Officers April 2013) The IAAO standard states:

That standard stresses the importance of using valid sales, "The reliability of a sales ratio study depends on the adequacy of the size of the sample sales included in the study". (International Association of Assessing Officers April 2013, 16)

The problem arises in the appraisal of mineral interests for ad valorem purposes is the insufficiency of usable sales.

These statistical tests are predicated on there being sufficient market data available to use in testing. The most widely accepted measure of assessment reliability is the ratio study where appraised values are compared to market values. Market values are represented by the sale prices of similar, comparable properties...Sales that do not represent open-market, armslength transfers should not be used in ratio studies (Gloudemans, Mass Appraisal of Real Property 1999, 218)

While the IAAO does provide means to increase the sales included<sup>50</sup>, none of these are relevant to mineral rights assessment as they all require sufficient sales data.

The sales ratio study is not the only statistical test of appraisal reliability which depends on a sufficient number of comparable sales. Means, medians and their ratios depend on sales as do the "coefficient of dispersion" (COD), the "coefficient of variation" (COV) and the "price-related differential" (PRD) that use the mean and median<sup>51</sup>. Without the use of these statistical tests there is no way to demonstrate the reliability of a mass appraisal. Yet the lack of useable sales significantly limits their application in mass appraisal of mineral interests.

<sup>&</sup>lt;sup>49</sup> The sales ratio study compares the appraised (or assessed) to market value (sales prices at the time of sale.) (International Association of Assessing Officers 1997, 125)

<sup>&</sup>lt;sup>50</sup> Restratification using homogeneous sales from a larger universe, extending the period from which sales are drawn, validating previously rejected sales, using fee appraisals and imputing appraisal performance.

<sup>&</sup>lt;sup>51</sup> For the methods and calculations of these and their use see (Gloudemans and Almy, Fundamentals of Mass Appraisal 2011, 197-248)

# Ad Valorem Taxation of Mineral Interests and "Good" Taxation.

## **Cannons of Taxation**

Although not entirely original with Adam Smith, his "Cannons of Taxation" are widely quoted and the basis for other determinations of a "good" or "fair" tax.

- The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the state.
- The tax which each individual is bound to pay ought to be certain and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, ought all to be clear and plain to the contributor and every other person.
- Every tax ought to be levied at the time, or in the manner in which it is most likely to be convenient for the contributor to pay it.
- Every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible, over and above what it brings into the public treasury of the state. (Of Taxes 1981 [originally published in 1776], 825–826)

These were refined and supported by Henry George who opined, "The best means of raising public revenue will be one that meets these conditions:"

- It should bear as lightly as possible on production, least impeding the growth of the general fund, from which taxes must be paid and the community maintained.
- It should be easily and cheaply collected, and it should fall as directly as possible on the ultimate payers—taking as little as possible from the people beyond what it yields the government.
- It should be certain—offering the least opportunity for abuse and corruption, and the least temptation for evasion.
- It should bear equally—giving no one an advantage, nor putting another at a disadvantage". (George 2010 [originally published 1871], 226).

Contemporary authors continue to support these standards albeit with different wording (Musgrave and Musgrave 1989, 216) (Ross 2014) (Witte 2009). The International Association of Assessing Officers advances these criteria:

• Fairness and Equity. This principal is based on either the "benefit principle" where taxpayers are paying for the benefits they receive from government, or on "ability to pay"

principle. The ability to pay principle has two components "vertical equity" and "horizontal equity". Vertical equity means that taxpayers with the greater ability should pay more for governmental services.

- Neutrality. A neutral tax is one that does not distort economic decisions. The more neutral a tax the more "efficient" the tax tends to be. If a tax distorts economic decisions it is said to impose an "excess burden" on the system.
- Uniformity. This standard requires that a tax is proportional to some other measure. Property taxes should be proportionate to the value of the real or personal property being assessed. Tax exemptions, classifications and rate differential violate this principle.
- Buoyance. A tax system meeting this criterion will see its yield rise and fall with the economy and the financial requirements of the jurisdiction. Unfortunately, this criteria may conflict with the need for stability in the yield of a tax to support local government.
- Practicality and Cost-Effectiveness. If the tax base is easily measured, difficult to evade and tax payers compliant then the tax is said to be practical. If the administrative cost of collection is low per dollar collected then the tax is cost-effective.
- Public Acceptance. For this standard to hold, citizens must have a sense that the tax system is basically fair and that it neither favors some taxpayers or is biased against others.
- Openness and Transparency. Transparency relates to how understandable the tax is. Openness asks, is the information easily available in a form the taxpayer or public official can comprehend? (Almy, Dornfest and Kenyon 2008, 27–33)

Other authors have added new requirements for a tax to be considered "good".

- Exportability. If the cost of a tax can be exported to those living in another jurisdiction, those living in the jurisdiction of origin may see the tax as good. (Deboer 1997)
- Foreign compatibility. Since markets for most products are international, taxes should not disadvantage domestic competitors (Clausing December 12, 2007)

# Transparency

The mineral interest owners may not even be aware the property tax exists. In states where the operator is responsible for the payment of the tax the operator reduces the royalty payment to the owners proportionately. Like income tax withholding and the escrowing of property taxes by financial institutions, this practice may violate the openness and transparency cannon.

In states where the operator reduces the royalty owner's share by the amount of ad valorem taxes which the operator has remitted to the state or local government, it is doubtful that many royalty

owners even know they are paying the tax, much less the amount and how it is calculated. The more dispersed ownership of royalty interests are, the greater this ignorance is likely to be.

Unless the levy rate is applied directly to the NOI, a state must rely upon the estimation of a discount rate (unless there is no capitalization). This crucial step adds to the complexity of the assessment process and violates the cannon of "transparency".

The complexity of administering the property tax is further attested by the number of states and local governments contracting to private firms all or major parts of the appraisal process or where the state does the work and supplies the local governments with the appraisals. In Wyoming, West Virginia and the state provided local governments with evaluations. In Texas, Pennsylvania local governments contract out the work. In Alaska and Wyoming the state performs all the taxing functions.

# Buoyancy

While the cannon of "buoyancy" may be met as the yield of the tax on mineral interests fluctuates with prices and production. (McLimoil and al. October 3, 2012, 71) States like Alaska, North Dakota, West Virginia and Wyoming where state and local revenues on minerals constitute a significant portion of their income, these variations in income may present acute problems. The cannon of "stability" is violated as governments dependent on the tax face greater budgetary uncertainty.

As the figures below show, prices for all energy minerals have varied significantly over the past few years. Between1999–2012 the price of oil alternated by 517 percent with production varying by almost 49 percent. For the same time period coal production varied by less than 10 percent but prices fluxed by nearly 95 percent. While natural gas production has gone up by 35 percent prices have changed by 307 percent.





Source: EIA; U.S. Field Production of Crude Oil



Figure II

Source: EIA; Coal Production, Selected Years, 1949-2011





Source: EIA; Natural Gas Summary

These swings in production and prices have made both severance and ad valorem taxes less reliable sources for support of government.

# Equity

As indicated earlier in this report, it is highly unlikely that the ad valorem tax on mineral interests conforms to either the "ability to pay" or "benefits received" cannons. If one assumes the tax is paid by the owners of the mineral rights and those holders are higher income individuals or corporate interests, then the tax does vaguely meet the ability to pay standard. Owners of mineral interests are widely dispersed. Ownership of mineral interest is often divided into small fractions due to inheritance or sale. It is unlikely, unless all the owners live in the taxing jurisdiction, they receive any benefits from the tax.

# **Public Acceptance**

Public acceptance of the property tax has in the past decades significantly declined. (Fisher 1996) A survey in 1972 found Americans' finding it the "least fair tax". (Advisory Commission on Intergovernmental Relations 1972) That opinion was corroborated by a more recent sampling. (Bowman, Rugg and Marsico April 2013) As a result of public opinion there has been a significant erosion of the property tax base, particularly for owner occupied housing. (Augustine, et al. 2009) No published research on public attitudes on ad valorem or severance taxes on minerals has been found.

The public may assume that the tax on mineral interests is only on wealthy individuals and "big out of state" corporations. If the tax is shifted to mineral interest owners, this assumption is not

the case and the cannon of "public acceptance" is distorted with public perception being more favorable toward the tax than would be the case if full understanding existed.

# Efficiency

George makes a case for the LVT on efficiency grounds, "Of all taxes, a tax on land is the easiest and cheapest to collect. Land cannot be hidden or carried off. Its value can be easily determined. Once assessment is made, nothing but a receiver is required for collection." (George 2010 [originally published 1871], 230) Despite minerals being in fixed supply and location, can the same be said for the ad valorem tax on them?

The ad valorem tax on mineral interests violates the cannons related to efficiency of collection. Compared to other taxes, the administrative costs of the property tax in general are high (Witte 2009, 313–314). In states using the severance approach, the administrative problems are minimized but still prevail. Production by well or mine is reported to the appropriate state agency. Prices are generally known from published sources, recorded at hubs or required to be reported along with production. Federal or state income taxes can also be used for audit purposes.

Administrative costs can be reduced if the operator is to remit the property taxes and to deduct them from the royalties paid. But the practice in some states is to send a tax ticket to each individual RI. In some cases the cost of sending the bill is greater than the royalty. For small amounts of tax due and with individuals living outside the jurisdiction, these often go unpaid. Those interests that can be are put up for sale at a sheriff's sale or claimed by the state. (Pinkerman 2014)

When the ad valorem tax is levied using the reserves approach the task of determining value is more difficult and speculative. Prices and output have to be forecast for the projected life of the well or mine. By their nature these projections are likely to be in error which adds an additional element of risk. This risk must be included in the discount rate. Further the reserves must be located and adequately defined as to their characteristics. Estimates of decline rates must be calculated. Since the determination of the discount rate involves a detailed examination of the factors which go into its calculations, the "cost effectiveness cannon" is also violated.

# Uniformity

If the tax is to meet the "uniformity" cannon then each well or mine will have to be evaluated separately on an annual basis. In states using the reserves approach to valuation, the process uses "averages" for coal, natural gas for oil production and prices which are applied to the activity in the jurisdiction. This approach does not recognize that the outputs from wells or mines are not homogeneous even if closely related in geologic proximity. Annual evaluation is needed to see if there have been new additions or depletions to the reserves since these are subject to change. While decline curves can be projected on an "average" or "typical" well, those curves are unlikely to represent any single well or mine's characteristics. Some states do require these annual, individual appraisals.

The appropriate level of production must be determined as well as the price or average of prices. Considering the variations in the quality of the mineral, using an average price for that type of mineral may over or underestimate the value of that well or mine's particular production. If this is not done then the "uniformity" cannon is not fulfilled.

Production from a particular source may also vary. A mine may close due to accident, labor dispute or safety violations. Oil and gas wells are temporarily shut due to regulations, maintenance and upgrades. Market demand for minerals depends on the business cycle which during a downturn may lead to reduced production or elimination of production from a marginal site. Valuing these properties using just a year's or a few years' average production may not represent the market value of the reserve.

# Neutrality

If property taxes distort locational decisions then the "neutrality" cannon is violated. Research indicates that property taxes have little impact on business locations due to those taxes being a small part of cost. But property taxes may have an impact among neighboring jurisdictions if other factors (labor force, rent, transportation, amenities etc.) are equal. A recent study found that property tax differentials may have an effect in a metropolitan area. "Property taxes are usually a less important determinant of firm location decisions compared to other factors...Yet because differences in these other factors are often small across jurisdictions,... property taxes play a more important role in the choice of a specific site in the broader region." (Kenyon, Langley and Paquin 2012, 29) Does this conclusion hold for ad valorem taxes on mineral interests?

There is little "hard" evidence to confirm or deny the impact of mineral taxation on production activity but anecdotes abound. An early econometric study of coal severance taxes the following conclusion was reached.

In the very short-run, the...final selling price can be approximated by adding the taxes and transportation charges to the current mine mouth price. The economist recognizes that market forces will limit the forward shifting...the individual producers in taxing states will be forced to lower their minemouth charge to absorb the tax...these market adjustments require time. This is especially true in the case of coal, for which large capital investments in transportation facilities and coal mining equipment might be required to bring about equilibrium...our empirical analysis that coal producers are able to shift forward some of the severance tax....(but).there can be regional differences. (Shelton and Vogt July 1982, 557)

An additional concern regarding neutrality has been advanced. (Nicely and Turner May 2011). If there are differences in either assessment ratios, property tax rates or exemptions between and among mineral properties, uniformity does not exist. If state law or regulation favors one type of property above another then one is discriminated against and the other favorably. Many states do employ different classifications, rates and preferences when ad valorem taxation of mineral interests are involved.<sup>52</sup>

<sup>&</sup>lt;sup>52</sup> See Appendix A

# Exportability

If the tax on minerals can be exported to other jurisdictions (states or foreign nations), there are claims that the portion of the ad valorem tax represented by those exports is paid by others (O'Leary December 2011). For example, 56 percent of the electricity generated in West Virginia is consumed in other states and over 90 percent of West Virginia electric generation comes from coal. In addition 45 percent of the coal production is exported to other states and 40 percent to other countries (Energy Information Administration 2014). It is contended the coal tax burden is forward shifted. This effect is unlikely. Electricity is sold into the grid and the least expensive electricity is dispatched first (Real Clear Energy 2012). If the property tax was embedded in the offering price of electricity to the grid, it would place West Virginia coal generated electricity in a less favorable position relative to lower tax states.

There is vigorous competition in the world markets among suppliers in coal producing countries to secure export markets. While China and India are one and three respectively in coal production, their output is not sufficient for their rapidly growing needs. (Energy Information Administration 2011) West coast export terminals for shipments to Japan and South Korea are in the process of beginning construction for Powder River Basin coal (McAllister 2012). Prices (including transportation costs), determine whose mineral sells into the market. Due to this fierce competition for international sales, the ad valorem or any other coal tax in the US is probably not shifted forward.

Regarding coal, there is also competition within the U.S. Despite its low Btu content but its relatively low sulfur content, Wyoming coal is being shipped to power plants in Texas, Illinois, Arkansas, Missouri and Indiana. Other states with significant "exports" of coal to other states include Kentucky, West Virginia, and Pennsylvania. The majority of this exported coal in burned in electric power plants. (U. S. Energy Information Administration December, 2013)

## Conclusions

Despite ad valorem and severance taxes on mineral interests not meeting the criteria for "good" or "fair" taxes, it is unlikely they will be discontinued. In many of the mineral producing states, these levies produce a significant amount of state and local revenue. Particularly in the local governments where there are high concentrations of minerals, loss of the property tax income would border on catastrophic. There are some mineral producing states for which mineral related taxes are their primary tax source.

This report has concentrated on energy minerals as they are omnipresent in the study states. There is great public interest in "energy independence" and recent the technology of hydro fracking has produced abundant new supplies of oil and gas. The remaining question is to what extent do these taxes limit the output of these resources?

Like land, minerals are in fixed supply and taxes on them are unlikely to cause them to move to lower tax jurisdictions. In this regard the taxes are similar to the Land Value Tax (LVT)

advocated by George and others. While the resources themselves are immobile, the capital (investment) necessary to discover, extract, prepare and transport them is not. To the extent taxes on mineral interests reduce or redirect investment away from mineral production, there is a negative impact, although the degree of that impact remains to be determined.

There is a strong philosophical support for the states to create some form of "legacy fund" into which a portion of the mineral tax is deposited. While only a few mineral states have these funds, they are justified on the premise that mineral resources are a gift of nature and belong to the public. Since the wealth of the state is diminished when these are exploited, at least some of the proceeds should be maintained for future use as a replacement for wealth foregone.

Neither the" benefits" or "new" (capitalization) theory fully answer the question, "Who pays the tax on minerals?" While the public may assume the taxes are paid by big natural resource corporations who extract the state's wealth for private gain or wealthy, out of state mineral rights owners, the answer is more complex than that.

For centuries mineral rights have been severed from surface rights creating unique problems in their evaluation. This is further complicated by the legal environment in which exploration and development takes place which gives primacy to subsurface rights. However there are limitations, both in legislation and common law, which limit subsurface rights owners' use of surface property which must be considered in valuation.

No standards have been promulgated by appraisal organizations which directly address determination of subsurface mineral values. Neither the cost nor comparative sales approach to appraisal are usually relevant. Due to the lack of comparable sales this approach is usually not available. For that reason states which tax minerals use the income approach. But this usage makes it very difficult if not impossible to employ the accepted statistical techniques for assessment validation.

The income approach is fraught with difficulties including determining allowable expenses, establishing the geographic location of the resource, calculating the appropriate discount rate and ascertaining the depletion rate. There is no uniformity among the states and local governments as to how these are established and used in the evaluation process.

The debate over the economic impact of mineral development, particularly in new fields, also is unsettled. Despite studies showing increases in income and taxes, there is concern regarding the long term environmental and social costs which critics claim is ignored in the other studies. Due to the complexity of mineral taxation, there is a need not only for more research but for greater transparency as to how the valuations are determined. A first step would be the establishment by The Appraisal Institute (AI) and the International Association of Assessing Officers (IAAO) of standards which could be used as guidelines.

# **Appendix A: Taxation of Mineral Interests in Selected States**

The following summaries deal with how the 12 states in the study tax mineral interests. These are only the highlights. They should not be used in place of legal or accounting advice. Any mistakes are the author's.

#### Alaska

The state of Alaska ranks 13<sup>th</sup> in overall energy production in the United States at 4,563 trillion Btu. It ranks fourth in crude oil production at 11,340 thousand barrels, 11<sup>th</sup> in natural gas production at 351,259 million cubic feet and 20<sup>th</sup> in coal production at 2052 thousand short tons.<sup>53</sup>

### State Revenue Sources

Oil and gas tax revenue is the main source of funding for the state of Alaska. The second largest is the corporate income tax. When combining the production and property taxes on oil and gas businesses, they constitute 85 percent of Alaska's revenue.



#### Figure A1

Source: U.S. Census Bureau | State Government Tax Collections, 2012

## **Types of Taxes:**

Alaska has three main taxes that it imposes on mineral extraction within the state, the Corporate Income Tax, the Petroleum Profits Tax (which serves as a tax on gross production) and a local property tax.

<sup>&</sup>lt;sup>53</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

## Corporate Income Tax.

Alaska's corporate income tax is on all mineral extraction companies based upon their gross income each year. All corporate taxpayers are subject to the same set of tax brackets, 1percent on the first \$10,000 of income, plus one percentage point for each additional \$10,000 up to a maximum of 9.4 percent on income over \$90,000."<sup>54</sup> The Division of Revenue deposits most corporate net income tax collections into the general fund. For oil and gas corporations only, the Division deposits collections from audit assessments into the Constitutional Budget Reserve Fund.

## Petroleum Profits Tax.

The Petroleum Profits tax or production tax is the largest generator of revenue in the state. Tax rate is determined individually for each field. It is decided by using the "economic limit factor" (ELF), which reflects the productivity of the particular field, multiplied by a base rate. For oil, there are two base rates 12.25 percent during a field's first five years of production, and 15 percent after that. For gas, the base rate is 10 percent for the field's entire life.

To protect the state's production tax collections against very low price levels, there are "floor" rates of 80¢ a barrel for oil and 6.4¢ per Mcf (1,000 cubic feet) of gas, and these are also multiplied by the ELF for each individual field. The floor rates for oil when the price is \$6.53 a barrel or less during the first five years of production, and when it's \$5.33 or less afterward. For gas, the floor applies when prices are below \$0.64 per Mcf.<sup>55</sup> Revenue generated from the production tax is deposited into the state's general fund.

## Property Taxes.

There are no taxes on reserves or minerals in the ground. All cities, boroughs and unified municipalities in the State of Alaska may levy a property tax but not on reserves. Property taxation is not mandatory. Of the eighteen (18) organized boroughs and unified municipalities, only fourteen (14) levy a property tax; and, of the one hundred forty-four (144) home rule, first and second class cities, only ten (10), which are located outside boroughs, and twelve (12) located within organized boroughs, levy a property tax.

The property tax value is determined by the Alaska Department of Revenue.<sup>56</sup> The property tax on gas and oil production is set at a fixed rate of 2 percent of the assessed value. Taxable property is limited to property used for oil and gas exploration, production, or transportation of crude oil or natural gas by pipeline (but not including a gas utility's gas transmission and distribution pipelines).<sup>57</sup> Revenue from oil and gas property taxes goes to the General Fund.

Payments received after the tax assessment are deposited into the Constitutional Budget Reserve Fund (CBRF)

<sup>&</sup>lt;sup>54</sup> AS 43.20.011

<sup>&</sup>lt;sup>55</sup> Alaska Oil and Gas Association; at: <u>http://www.aoga.org/wp-content/uploads/2011/01/9.-Nebesky-State-Revenues.pdf</u>

<sup>&</sup>lt;sup>56</sup> AS 43.56.060(a)

<sup>&</sup>lt;sup>57</sup> Alaska Oil and Gas Association

All real and personal property is taxable unless it is exempted. Municipal property taxation required exemptions are specified in AS.29.45.030 including natural resources in place, (ANCSA) Native corporations are also exempt from municipal property tax unless the property is leased or developed. In addition to these exemptions from property taxation, AS.43.56 provides for certain exemptions of oil and gas production and pipeline property, including oil and gas reserves in place.

While oil and gas property is exempt from local municipal assessment, the State levies 2 percent tax against this property and reimburses each municipality which has oil and gas property located within its boundaries, an equal amount to taxes which it would have levied. All of the exemptions discussed in this paragraph are mandatory exemptions.

Valuation is determined at the well head. Because little or no oil and gas is actually sold in the field, the production tax relies on a "netback" approach to determine the taxable value at the point of production. From the value of the oil or gas at the point where it is sold, there is deducted the costs of transportation from the field.

## Alaska Permanent Fund

The Alaska Department of Revenue, Permanent Fund Dividend Division is responsible for determining the distribution of an annual dividend paid to Alaska residents from investment earnings of mineral royalties. Each year the state collects oil and gas royalties (bonuses, rents and interest) and places this into the fund. "The Fund is invested in a diversified portfolio of public and private asset classes. All investments, whether in Alaska or around the world, must be expected to produce income with an acceptable level of risk. The Fund is not invested in projects that are focused on economic or social development."<sup>58</sup> In 2012, Alaska collected over \$8.8 billion in oil and gas royalties.<sup>59</sup> State residents are able to apply to the Permanent Fund Division and receive an annual dividend for the oil and gas extraction that occurs in their state. 2014's distribution is \$1,884.00 for each eligible resident.<sup>60</sup>

<sup>&</sup>lt;sup>58</sup> Alaskan Permanent Fund Corporation; at: <u>http://www.apfc.org/home/Content/aboutFund/aboutPermFund.cfm</u>

<sup>&</sup>lt;sup>59</sup> Alaska Department of Revenue; at: <u>http://www.tax.alaska.gov/programs/documentviewer.aspx?896r</u>

<sup>&</sup>lt;sup>60</sup> Alaska Department of Revenue, Permanent Fund Dividend Division at <u>http://www.apfc.org/home/Content.cfm</u>

#### Arkansas

The state of Arkansas ranks 14th in overall energy production in the United States at 1,472 trillion Btu. It ranks 19th in crude oil production at 556 thousand barrels, eight in natural gas production at 1,146,168 million cubic feet and 24th in coal production at 98 thousand short tons.<sup>61</sup>

#### Sources of revenue:

The most important source of revenue is the sales and use tax at 48 percent. Next is individual income tax at 29 percent. Corporate income tax accounts for 5 percent. All other taxes combined total only 8 percent. Severance taxes account for less than 1 percent of the State's general fund. Property taxes are the primary source of revenue for schools and other local governments accounting for 57 percent of all revenue for counties, cities and schools.





Source: U.S. Census Bureau | State Government Tax Collections, 2012

## **Types of Taxes**

## Corporate Income Tax

Arkansas levies a corporate income tax with six graduated brackets with a top rate of 6.5 percent using the following brackets.

<sup>&</sup>lt;sup>61</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

- 0-\$3,000 1 percent
- \$3,001–\$6,000 2 percent
- \$6,001-\$11,000 3 percent
- \$11,000-\$25,000 5 percent
- \$25,000-\$100,000 6 percent
- \$100.001 or more 6.5 percent

## Severance Tax

The severance tax is collected at the time of extraction. In 2013 the coal, lignite and iron ore tax was 0.02 per ton plus an extra 0.08 per ton. Oil has a two tier tax at 4 percent for wells producing less than 10 barrels a day and 5 percent for those producing more than 10 barrels per well per day. For natural gas the tax is based on the well classification by the Arkansas Oil and Gas Commission. Rates range from 1.25 percent on marginal gas, 1.5 percent on "new discovery" and "high-cost" gas<sup>62</sup> and 5 percent on all other natural gas production. (Arkansas Department of Finance and Administration 2008)

The severance tax is not shared with the counties where the mineral is produced. In the state of Arkansas, a severer that uses natural resources for their own use and not for sale is exempt from a severance tax. The tax also does not apply to natural gas returned to any formation in recycling, repressuring, pressure maintenance operation or other operation for the production of oil or other liquid hydrocarbon. Oil producers who dispose of salt water produced by their oil wells are allowed a severance tax credit equal the cost of maintaining the system but not in excess of the taxable value.

#### Property Taxes

There are no taxes on mineral reserves or minerals in the ground in Arkansas. The Arkansas assessment process distinguishes between working (87.5 percent) and royalty (12.5 percent) interests. Assessed value is determined using a discounted Cash Flow approach. A 15 percent discount rate is used in the DCF analysis for the working interest for oil wells, but not for oil royalty interests or for any interests in natural gas or coal. (Arkansas Assessment Coordination Department 2014, 252) Land is valued separately if the estate is severed. But the mineral value is included in the land value for a fee simple estate. (McGee 2014)<sup>63</sup> Severed interests are valued separately

In addition there is assessment of all, "fixed appurtenances" as well using the "well production equipment assessed value" (WPEV) which is added to the production value of the well<sup>64</sup>. (Arkansas Assessment Coordination Department 2014, 253) The WPEV takes \$1 per vertical foot of well, multiplies it times the assessment rate of 0.20.<sup>65</sup> To this is added the Well

<sup>&</sup>lt;sup>62</sup> Only available for first 36 months of production

<sup>&</sup>lt;sup>63</sup> Similar calculations are used for the working interests for oil.

<sup>&</sup>lt;sup>64</sup> Buildings roads and all other improvements of a permanent nature. (Arkansas Assessment Coordination Department 2014, 247)

<sup>&</sup>lt;sup>65</sup> For a 1,200 foot well the MPEV would be \$1,200 time the 0.20 assessment rate for a WPEV of \$240. (Arkansas Assessment Coordination Department 2014, 250)

Production Equipment Assessed value (cost approach). All equipment "behind the meter" should be included in the WPEV.

For natural gas the "Annual Value per MCF" Is determined by establishing an average Arkansas market piece either from Platts or the price at the eNable East Hub. The price is the average for the past three years. This average daily price is taken time 365 to obtain an annual value for the well.

For the working interest, this annual value is taken times 0.875. From this result production expenses of 0.13 is taken and the result is multiplied by the 0.20 assessment rate<sup>66</sup>. (McGee 2014) The royalty interest (12.5%) takes the annual value per MCF times the royalty interest times the assessment rate to obtain the assessed value per MCF, ADP. (Arkansas Assessment Coordination Department 2014, 251)<sup>67</sup>

For the working interest in oil a table is used depending on the production class. The amount per barrel is taken times the average daily production times the royalty interest to obtain the working interest assessed value.<sup>68</sup> For the oil royalty interest there is no discount included in the amount per barrel used in the assessment process otherwise the process is the same.<sup>69</sup>

Coal is assessed on an average per ton, per day times the annualized Arkansas price at the mine mouth to reach the assessment value. (McGee 2014)

<sup>&</sup>lt;sup>66</sup> Assume an average price of per MCF per day of \$3.36 times 365 equals an annual value of per MCF of 1,1226 times.87.5 percent (working interest), minus 13% production expenses, times the 20% assessment rate, produces a working interest value per MCF of \$187 (Arkansas Assessment Coordination Department 2014, 250)

<sup>&</sup>lt;sup>67</sup> Using the annual value per MCF of \$1,226 times the royalty interest of 12.5 percent times the 20% assessment rate produces a \$31 assessed value per MCF, ADP.

<sup>&</sup>lt;sup>68</sup> If the working interest per barrel is taken from a table. If the discounted cash flow is \$9,702 this is multiplied by 71 barrels average daily production times the working interest of 87.5% to obtain a working interest assessed value of \$602,737. To that is added the well production equipment value to obtain the net working interest assessed value of \$602,987. (Arkansas Assessment Coordination Department 2014, 252-253)

<sup>&</sup>lt;sup>69</sup> Assume the amount per barrel (without discount) is \$11,002. This is taken times the 71 barrels per day production time the 12.5% to get the royal interest assessed value of \$97,643. (Arkansas Assessment Coordination Department 2014, 254)

### California

The state of California ranks tenth in overall energy production in the United States at 2,335 trillion Btu. It ranks third in crude oil production at 17,137 thousand barrels, 13th in natural gas production at 246,822 million cubic feet and has minimal coal production.<sup>70</sup>

#### State Revenue Sources

There is not a severance tax levied by the State. The personal income tax is the primary source of revenue at 48 percent. Sales Taxes supply 38 percent with corporate taxes providing seven percent. California is one of the few states that has no severance tax on oil or gas





Source: U.S. Census Bureau | State Government Tax Collections, 2012

## **Types of Taxes**

Corporate Income Taxes

California has one of the highest corporate income tax rates in the country at 8.54 percent. In 2013, the amount of corporate income taxes collected were over \$2.1 billion.<sup>71</sup> All mineral

<sup>&</sup>lt;sup>70</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

<sup>&</sup>lt;sup>71</sup> CA State Controller's Office; at: <u>http://www.scoa.ca.gov/june\_2013\_revenue\_tracker.html</u>

producers are subject to the tax... In 2013, the amount of corporate income taxes collected were over \$2.1 billion.<sup>72</sup>

### Property Taxes.

California imposes a property tax not only on the gas and oil extracted, but on reserves This tax, like all other property taxes, is set at on 1 percent of assessed value as provided under Proposition 13..But due to the significant amount of reserves, this tax generates a significant amount of revenue for the local governments.

Local government in California levies ad valorem taxes on real property, including mineral properties. Values are determined and assessed at the county governmental using the DCF approach. An independent consulting firm establishes the discount rate to be used in the DCF analysis.

The statutory tax rate is 1percent, but is subject to increases depending on price changes. Values are based on an adjusted acquisition value or the current market value, whichever is lower. Adjustments to acquisition value are made for depletion and increase in reserves and added or removed improvements. In addition to local ad valorem taxes on minerals, the state of California has a very minimal property tax. All property in the state of California is subject to a 1% tax annually.

There is a small statewide assessment on oil and gas produced in California. This assessment goes to support the Department of Conservation's Division of Oil, Gas, and Geothermal Resources (Division), and is levied pursuant to Article 7, Division 3, of the Public Resources Code. The assessment rate is established in June of each year, and is based on the Division's estimated budget for the ensuing fiscal year and the total amount of assessable oil and gas produced during the prior calendar year. This rate is then imposed on each barrel of oil and each 10,000 cubic feet of natural gas produced. The assessment rate for fiscal year 2013/14 is \$0.1426683.<sup>73</sup> Each month all producers of oil and gas are required to report to the Division of Oil, Gas & Geothermal Resources the total amount produced and are to report annually the amount of assessable oil and natural gas produced during the year.<sup>74</sup>

<sup>&</sup>lt;sup>72</sup> CA State Controller's Office; at: <u>http://www.scoa.ca.gov/june\_2013\_revenue\_tracker.html</u>

<sup>&</sup>lt;sup>73</sup> CA Department of Conservation; at: <u>http://www.conservation.ca.gov/god/for\_operators/Pages/assessments.aspx</u>

<sup>&</sup>lt;sup>74</sup> CA Department of Conservation

### Colorado

The state of Colorado ranks seventh in overall energy production in the United States at 2,921 trillion Btu. It ranks seventh in crude oil production at 6,198 thousand barrels, sixth in natural gas production at 1,709,376 million cubic feet and ninth in coal production at 28,566 thousand short tons.<sup>75</sup>

#### **State Revenue Sources:**

Individual income taxes bring in 47 percent of tax collections followed by corporate taxes at 40 percent. Severance taxes bring in only 2 percent.





Source: U.S. Census Bureau | State Government Tax Collections, 2012

## **Types of Taxes:**

Colorado has two taxes that are levied on mineral interests within their state: the state severance tax and local property taxes in addition to the corporate income tax.

## Corporate Income Taxes

Mineral producers are subject to the corporate income tax at 4.63 percent.<sup>76</sup>

<sup>&</sup>lt;sup>75</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

<sup>&</sup>lt;sup>76</sup> Colorado C-Corporation Income Tax Booklet at <u>www.colorado,gov/pacific/sites/default/112Book.pdf</u>

## Severance Tax

Colorado has four provisions that affect an oil and gas operator's severance tax liability. First, it has a graduated severance tax rate of between 2 percent and 5 percent, depending on the operator's gross annual income.

- Up to \$25,000 is taxed at 2 percent;
- From \$25,000 to \$100,000 is taxed at 3 percent;
- From \$100,000 to \$300,000 is taxed at 4 percent; and
- Above \$300,000 is taxed at 5 percent.<sup>77</sup>

Colorado's code allows oil, gas, coal and other metallic mineral operators to deduct 87.5% of the property taxes paid on the value of production during the previous year from their severance tax liability.<sup>78</sup> In 2010, due to the property tax write-offs, the revenue generated from the state severance tax was \$48.2 million down from \$336 million the year before.

In Colorado, oil and gas production from striper wells are exempt from severance tax. This includes oil from a well that produces 15 barrels or less of crude oil per day or gas from a well that produces 90,000 cubic feet or less of gas per day, for the average of all producing days during the taxable year.<sup>79</sup>

For coal, the state of Colorado offers three discounts to the severance tax. For this tax, the first 30,000 tons severed by each coal operator per calendar quarter are exempt from taxation. The additional credits are a 50 percent credit for severance taxes levied on lignite coal produces and a 50 percent credit for severance taxes levied on lignite coal produces and a

Half of the severance tax is retained by the state and the other half distributed to local governments.

## Property Taxes.

Under the property tax, Colorado has two different methods of valuation for minerals. For coal, gold and other metallic minerals the point of valuation is after extraction but before any treatment, transportation or worker compensation costs are paid.<sup>80</sup> The value of the oil and natural gas is assigned by the Department of Revenue based upon the fair market cash value

Colorado values coal dependent on use classification. If the mine is producing during the last calendar year. Non-producing mines had no production during that year. Producing coal mines are valued using the income approach which contains seven factors (Colorado Division of Property Taxation 2010).

<sup>&</sup>lt;sup>77</sup> HB 77-1076

<sup>&</sup>lt;sup>78</sup> HB 77-1076

<sup>&</sup>lt;sup>79</sup> Colorado Severance Tax Booklet 2013; at: <u>http://www.colorado.gov/pacific/sites/default/files/DR0021BOOK.pdf</u>

<sup>&</sup>lt;sup>80</sup> C.R.S. 39-6-106

- Raw tons of coal extracted
- Royalty rate based on surface (9 percent) or underground (6 percent)<sup>81</sup>
- Discount rate (12.07 percent currently)
- Btu content (steam coal only)
- Whether coal has been washed
- Remaining economic life of the mine

<sup>&</sup>lt;sup>81</sup> 6
#### Louisiana

The state of Louisiana ranks fourth in overall energy production in the United States at 3,794 trillion Btu. It ranks ninth in crude oil production at 5,912 thousand barrels, second in natural gas production at 2,955,437 million cubic feet and 17<sup>th</sup> in coal production at 3,971 thousand short tons.<sup>82</sup>

#### State Revenue Sources

Severance tax revenue is the third most important source of funding for Louisiana at 10 percent of taxes collected. The sales and gross receipts tax comes is the greatest single source at 54 percent followed by corporate income taxes at 28 percent.





Source: U.S. Census Bureau | State Government Tax Collections, 2012

# **Types of Taxes:**

#### Corporate income tax.

All corporations including mineral producers pay the corporate income tax... The corporate tax rates are:

- 4 percent on the first \$25,000,
- 5 percent on the next \$25,000,

<sup>&</sup>lt;sup>82</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

- 6 percent on the next \$50,000,
- 7 percent on the next \$100,000 and
- 8 percent on excess over \$200,000.

## Oil and Gas Severance

The state severance tax rate for oil is 12.5 percent of value and accounts for over 85 percent of the oil severance tax collections. There is also an incapable (not working) rate and a stripper rate for low-producing oil wells. The severance rate for gas, in 2014 is 28.8¢ per Mcf, is responsible for over 91 percent of total gas tax collections. There are also reduced tax rates for low pressure oil-well gas and incapable (not working) gas-well gas.

The state severance tax rate for oil is 12.5 percent of value. There is also an incapable (not working) rate and a stripper rate for low-producing oil wells. The value is gross receipts received from the first purchaser by or the posted field price. Oil production may be certified for reduced severance tax rates provided by R.S. 47:633(7)(b) or (c)(i)(aa) by individual well.

### Property taxes

The assessment of property is the asset's fair market value. The assessment is made in accordance with the State Constitution (Louisiana Constitution of 1974, Article VII, Section 18) in conformation with guidelines promulgated the Louisiana Tax Commission. (Louisiana Tax Commission 2010) Property taxes on minerals in the ground are specifically prohibited by the Louisiana Constitution. "No further or additional taxes [in addition to the severance tax] or license shall be levied or imposed upon oil, gas, or sulfur leases or rights. No additional value shall be added to the assessment of land by reason of the presence of oil, gas, or sulfur therein or their production therefrom..." (Article 7, Section 4(B))

While there is no property taxes applied to mineral reserves in the ground, there is ad valorem taxation of wells and surface property. (Moss 2014) These assessments are accomplished at the local level by the parish assessor who is to follow the state guidelines. Among the property subject to ad valorem taxation is:

- The well itself including all equipment and tangible property located below the well head including casing pipe
- Surface property including "Christmas Trees", tanks, pipe stock, inventory, pipelines, docks, sheds, buildings, warehouses, gathering equipment, barges, watercraft, land plus furniture and fixtures. (Louisiana Tax Commission 2010, OS-5 (2010)) These are assessed using the cost approach (Moss 2014)

These properties are assessed based on detailed tables furnished by the Louisiana Tax Commission. (Louisiana Tax Commission 2010, OG-9-20 (2014)) These tables use 40 percent of "replacement cost new". In addition the depreciated value of the equipment is based on the age of the well, not on the age of the equipment. New equipment will be valued at a rate representing the 20 year life of the well. (Comeaux 2014) There is a 20 percent floor for depreciation of mining related equipment.

The Louisiana Constitution and Revised Statutes mandate that property subject to ad valorem taxation be listed at its assessed valuation, which shall be a percentage of its fair market value. These laws dictate:

- Land—commercial and residential 10%
- Residential buildings 10%
- Commercial buildings at 15%
- Commercial personal property, also known as movable property, 15%

Coal is a small source of revenue in Louisiana. Production and consumption of Louisiana's coal, all lignite, is used in-state for power generation. Although the annual output of lignite has risen to about 3 million short tons. Coal severance tax (R.S 47:633) is ten cents per ton (two thousand pounds). As of 2014 there is only a single coal mine operating in the State.

## North Dakota

The state of North Dakota ranks 12th in overall energy production in the United States at 2,138 trillion Btu. It ranks second in crude oil production at 32,229 thousand barrels, 15<sup>th</sup> in natural gas production at 179,004 million cubic feet and tenth in coal production at 27,529 thousand short tons.<sup>83</sup>

#### Sources of Sate Revenue

The Exhibit A6 indicates the revenue sources for North Dakota. Natural resource taxation accounts for 41 percent of total taxes. Due to the recent major expansion in oil production in the state, mineral extraction has become the greatest source of revenue for the state.



Figure A6

Source: U.S. Census Bureau | State Government Tax Collections, 2012

In 2014, the state of North Dakota produced 32,229,000 barrels of crude oil.<sup>84</sup> In 2012, taxation on oil accounted for over \$1,675,000,000 in state and county revenue.<sup>85</sup> Oil in the state of North Dakota is subject to two types of taxation, the Gross Products Tax and the Extraction tax. The gross production tax has been set at a flat rate of 5% for the past several years and the extraction tax is set at 6.5%.

<sup>&</sup>lt;sup>83</sup> U.S. Energy Information Administration; at: <u>http://www.eia.gov/state/rankings</u>

<sup>&</sup>lt;sup>84</sup> US Energy Information Administration; at: <u>http://www.eia.gov/state/rankings/?sid=ND#/series/46</u>

<sup>&</sup>lt;sup>85</sup> North Dakota Office of the State Tax Commissioner; at: http://www.nd.gov/tax/genpubs/51stbienniareport.pdf?2014091812028

In 2012 North Dakota produced over 179,000,000,000 cubic feet of natural gas.<sup>86</sup> This coupled with oil production generated nearly \$800,000,000 in revenue for the state and counties of North Dakota.

### **Types of Taxes:**

#### Corporate Income Tax

Like other corporations, mineral companies are subject to the corporate income tax. The tax has three steps:

- Under \$25,000, 1.48 percent
- \$25,000-\$50,000, \$370 plus 3.73 percent above \$25,000
- Over \$50,000, \$1,302 plus 4.53 percent over \$50,000

#### Oil and Gas Production Tax

There are two forms of taxation on oil and gas in North Dakota, the Oil and Gas Production Tax and the Oil Extraction Tax. (Natural gas is not subject to the oil extraction tax.) The oil and gas production tax, is set at 5 percent for oil and 0.0833 per Mcf for gas. In 2012, the oil extraction tax accounted for over \$865,000,000 in state and local revenue and the gross products tax on both gas and oil accounted for over \$795,000,000 in state and local revenue.<sup>87</sup>

The price for all minerals is determined "at the well" or at the "mine mouth" after extraction but before transport. However, this does vary depending upon the contract between producer and consumer. If in the contract the point of valuation can take place after transportation. "The gross value at the well for oil, gas and coal is the price paid for the oil under an arm's-length contract between the producer and the purchaser less, when applicable, transportation costs associated with moving the oil from the point of production to the point of sale under the contract."<sup>88</sup>.

The state provides tax incentives for oil and gas based on the classification of the well being drilled. Horizontal wells are free of severance tax for a period of 24 months or until payout of the well cost is achieved, whichever comes first. For deep wells (wells drilled to a true vertical depth of more than 15,000 feet, where production commences after July 31, 1994) there is no severance tax from the date production begins, for 24 months or until payout of the well cost, whichever comes first. For stripper wells (an oil well incapable of producing an average of more than 10 barrels of oil per producing day during the entire taxable month) the severance tax rate is a lowered 3.125%. However, oil produced from a certified stripper well is exempt from any severance tax in any month in which the average value is less than \$20 per barrel.

<sup>87</sup> North Dakota Office of the State Tax Commissioner; at:

<sup>&</sup>lt;sup>86</sup> US Energy Information Administration; at: hhtp://www.eia.gov/state/rankings/?sid=ND#/series/47

http://www.nd.gov/tax/genpubs/51stbienniareport.pdf?2014091812028

<sup>12028</sup> 

<sup>&</sup>lt;sup>88</sup> North Dakota Annotated State Code 57-51-02.3

There is a reduction in the tax if the producer inject produced water into an oil and gas reservoir, from the same reservoir and field, in order to increase the recovery of the mineral. The severance due would be decreased in the following manner: when produced water is injected into an oil reservoir for the purpose of increasing recovery, the severance tax on one barrel of oil incrementally produced shall be reduced by 20% of the tax that otherwise would be due.<sup>89</sup>

The State Constitution (Article 7 Section 19) provides, "State taxation on property for all purposes shall not exceed an annual rate of five and three-quarter mills on the dollar of assessed valuation." This restriction applies to all property including mineral property

### Oil Extraction Tax.

The oil extraction tax is levied at a rate of 6 ½ percent of the gross value at the well of crude oil.<sup>90</sup> 60 percent of this revenue is allocated to the state's general fund. Any revenue exceeding \$71 million is allocated, 2 percent or 4 million to the Oil and Gas Research Fund and the remaining to the Permanent Oil and Gas Trust Fund or Legacy Fund which is entitled to 30 percent of all tax revenue generated from oil and gas related taxes. Another 20 percent goes to the Water Resources Trust Fund and the remaining 20% to the school systems.<sup>91</sup>



Figure A7

One-fifth of the revenue generated by the gross production tax is allocated to both the Oil Impact Fund and the General Fund of the state. The other four-fifths of the revenue are allocated at the country level to fund local education as well as other county and city projects. The revenue generated by the oil extraction tax is distributed to the state general fund, the water resources trust fund as well as local school districts.

<sup>&</sup>lt;sup>89</sup> Department of Natural Resources | State of Louisiana; at:

 $http://www.dnr.louisiana.gov/assets/TAD/data/severance/la_severance_tax_rates.pdf$ 

<sup>&</sup>lt;sup>90</sup> North Dakota Annotated State Code 57-51-03

<sup>&</sup>lt;sup>91</sup> North Dakota Red Book 2013

Figure A8a







# Gross Production Tax

The oil and gas gross production tax is levied in lieu of local property taxes.

The payment of the taxes herein imposed must be in full, and in lieu of all ad valorem taxes by the state, counties, cities, towns, townships, school districts, and other municipalities, upon any property rights attached to or inherent in the right to producing oil or gas, upon producing oil or gas leases, upon machinery, appliances, and equipment used in and around any well producing oil or gas and actually used in the operation of such well, and also upon oil and gas produced in the state upon which gross production taxes have been paid, and upon any investment in any such property.<sup>92</sup>

Both the producer and purchaser of the oil are required to submit reports to the Tax Commissioner on a monthly basis. The reports show the volume and taxable value of sales of the production from each well.

<sup>&</sup>lt;sup>92</sup> North Dakota Annotated State Code 57-51-03

#### Coal Severance Tax

There is a separate coal severance tax which is set at a rate of 75 cents per ton.<sup>93</sup> 30 percent of the coal severance revenue goes to a permanent Constitutional Trust Fund administered by the Board of University and School Lands. The Trust Fund is used to supply loans to school districts for school construction and loans to cities, counties and school districts impacted by coal development.<sup>94</sup> The other 70 percent is distributed among the coal producing counties according to the amount of coal each county produces.

Revenue allotted to each county is further apportioned as follows: 40 percent to the county general fund; 30 percent to the cities within the county; and 30 percent to the school districts. Also, a nonproducing county within 15 miles of a currently active coal mine, and a city or school district in that county and within 15 miles of the mine, are entitled to a share of the coal producing county's severance tax revenue from that particular mine.<sup>95</sup>

In addition to a separate severance tax, coal is also subject to a conversion tax. "The coal conversion facilities privilege tax is imposed on the operator of a coal conversion facility for the privilege of producing electricity or other products from coal conversion plants."<sup>96</sup> The rates vary depending upon the types of plants. If the plant is generating electricity, it is subject to two levies which are .65 mills times 60% of installed capacity times the number of hours in the taxable period. The other levy is 25 mills per kWh of electricity produced for sale.<sup>97</sup> Other coal conversion plants are subject to a monthly tax measured by 13.5 cents per thousand cubic feet of gas produced for sale or 4.1% of gross receipts, whichever is greater.<sup>98</sup> Coal generated \$36.4 million dollars in revenue for the state and counties in 2012. <sup>99</sup>

# **Mineral Tax Revenue for Counties**

The severance tax on oil and gas as well as the coal conversion tax are taken in lieu of property taxes. In 2012, 57 percent of property tax revenue for local government comes from the severance taxes assessed on minerals. This revenue is distributed among counties and municipalities within the state to fund schools systems as well as various other local projects.

The oil extraction tax rate is 6.5 percent of the gross value at the well. However, the rate is reduced to 4% for oil produced from:

- A vertical or horizontal new well, after the appropriate exemption expires.
- A workover well after the exemption expires.

<sup>93</sup> North Dakota State Tax Commission; at: hhtp://www.nd.gov/tax/genpubs/98redbook.pdf?20140918112532

<sup>&</sup>lt;sup>94</sup> North Dakota Annotated State Code 57-51-03

<sup>&</sup>lt;sup>95</sup> North Dakota Annotated State Code 57-51-03

<sup>&</sup>lt;sup>96</sup> North Dakota Red Book 2013; at: http://www.nd.gov/tax/gepubs/2012-redbook.pdf?20140915083038

<sup>&</sup>lt;sup>97</sup> North Dakota Red Book 2013; at: http://www.nd.gov/tax/gepubs/2012-redbook.pdf?20140915083038

<sup>&</sup>lt;sup>98</sup> North Dakota Red Book 2013; at: http://www.nd.gov/tax/gepubs/2012-redbook.pdf?20140915083038

<sup>&</sup>lt;sup>99</sup> US Energy Information Administration

Exemptions to the oil extraction tax are:

- Oil extracted from a certified stripper well property. A stripper well property is property whose average daily production during a 12-month period did not exceed10 barrels per day for a well of a depth of 6,000 feet or less, 15 barrels per day for a well of a depth of more than 6,000 feet but not more than 10,000 feet, and 30 barrels per day for a well of a depth of a depth of more than 10,000 feet.
- Oil produced during the first 15 months of production from a vertical new well.
- Oil produced during the first 24 months of production from a horizontal new well.
- Oil produced from a horizontal reentry well for a period of 9 months beginning on the date the well is recompleted as a horizontal well.<sup>100</sup>

In the state there is a prohibition of the imposition of coal severance tax on coal used to produce steam used in agricultural commodity processing facilities in North Dakota or any facility owned by the state or a political subdivision of the state,.<sup>101</sup>

# **Legacy Fund**

The Legacy Fund was established by constitutional amendment and sets up a trust fund for a portion of the tax revenue that the state collects from oil and gas extraction. The State takes 30 percent of the revenue made from both the oil extraction tax and the gross products tax and places it into a trust fund. The state is allowed to invest the principle and the interest that is generated by the trust fund but the interest is not available for use until 2015. As of July 17, 2014, total deposits in the Fund equal \$2.207 billion<sup>102</sup>

<sup>&</sup>lt;sup>100</sup> North Dakota Tax; at: http://www.nd.gov/tax/genpubs/2012-redbook.pdf?20141022103136

<sup>&</sup>lt;sup>101</sup> North Dakota Tax; at: http://www.nd.gov/tax/genpubs/2012-redbook.pdf?20141022103136

<sup>&</sup>lt;sup>102</sup> North Dakota Office of the Treasurer; at: http://www.nd.gov/ndtreas/pressRelease/2014/140717.htm

#### Oklahoma

The state of Oklahoma ranks sixth in overall energy production in the United States at 2,961 trillion Btu. It ranks fifth in crude oil production at 11,340 thousand barrels, fourth in natural gas production at 2,023,461 million cubic feet and twenty second in coal production at 1054 thousand short tons.<sup>103</sup>

#### Sources of State Revenue

73 percent of state tax collections come from individual income taxes (39 percent) sales taxes (34 percent) and corporate taxes at 15 percent. Severance taxes are the final source at 12 percent.



Figure A9

Source: U.S. Census Bureau | State Government Tax Collections, 2012

# **Types of Tax**

#### Corporate Income Taxes

All corporations in Oklahoma pay a flat 6 percent tax. 77 percent goes to the general fund, 17.5 to the Education Reform Fund, and 5 percent for teacher retirement fund. A unique feature is the 1 percent going to local governments as a reimbursement for property tax exemptions.

<sup>&</sup>lt;sup>103</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

## Severance Tax

Oklahoma levies severance taxes, also referred to as the gross production taxes, on oil, gas, and other mineral products. Since the revenue depends both on the amount of minerals extracted as well as the price of the minerals, revenue can vary greatly from year to year. The severance tax is a variable rate dependent on the average calendar months price of extracted minerals as determined by the Oklahoma Tax Commission. The tax rates are:

For oil and gas,<sup>104</sup>

- If the statewide average price of Oklahoma oil equals or exceeds Seventeen Dollars (\$17.00) per barrel, the tax shall be seven percent (7%).
- If the statewide average price of Oklahoma oil is less than Seventeen Dollars (\$17.00) but is equal to or exceeds Fourteen Dollars (\$14.00) per barrel, then the tax shall be four percent (4%).
- If the statewide average price of Oklahoma oil is less than Fourteen Dollars (\$14.00) per barrel, then the tax shall be one percent (1%).• If the statewide average price of Oklahoma gas equals or exceeds Two Dollars and Ten Cents (\$2.10) per Mcf, the tax shall be seven percent (7%).
- If the statewide average price of Oklahoma gas is less than Two Dollars and Ten Cents (\$2.10) but is equal to or exceeds One Dollar and Seventy Five Cents (\$1.75) per Mcf, then the tax shall be four percent (4%).
- If the statewide average price of Oklahoma gas is less than One Dollar and Seventy-Five Cents (\$1.75) per Mcf, then the tax shall be one percent (1%).

Gross production tax revenues for natural gas and oil are apportioned in the following manner, given then the tax rate is 7 percent: 85.72 percent to the General Revenue Fund, 7.14 percent to the County Highway Fund and 7.14 percent to school districts.

Oklahoma law provides tax exemptions for seven types of oil and gas drilling. These are for:

- Economically at-risk wells,
- Horizontally drilled wells,
- Inactive wells,
- Production enhancement projects,
- Deep well drilling,
- New discovery wells and
- Three dimensional seismic shoots.

<sup>&</sup>lt;sup>104</sup> Oklahoma Tax Commission | Gross Production Monthly Rate; at: http://www.tax.ok.gov/gp2.html

The most generous exemption is for horizontally drilled wells which can be claimed in an unlimited amount regardless of price of oil and gas and for a duration of 48 months.<sup>105</sup>

### Property Taxes

Oklahoma does not have property taxes on minerals in the ground<sup>106</sup>. But it does have a tax on personal property used in the exploration of oil, natural gas or other minerals, including equipment and rigs. Personal properties are assessed and taxed based on the value of the properties. All tangible property is taxed on its current market value under the cost approach.<sup>107</sup>

<sup>&</sup>lt;sup>105</sup> Oklahoma Policy Institute | Oklahoma's Gross Production Taxes and Exemptions; at: http://www.okpolicy.org/files/GPTfactsheet.pdf

<sup>&</sup>lt;sup>106</sup> Oklahoma Policy Institute | Online Budget Guide; at: http://www.okpolicy.org/resources/onlin-budget-guide/revenues/an- overview-of-our-tax-system/oklahomas-major-taxes/severance-tax

<sup>&</sup>lt;sup>107</sup> Oklahoma Ad Valorem Tax Laws 2013, pp 7-8; at http://www.tak.ok.gov/advform/2013ADVTaxLaws.pdf

#### Ohio

The state of Ohio ranks 18<sup>th</sup> in overall energy production in the United States at 1064 trillion Btu. It ranks 16<sup>th</sup> in crude oil production at 677 thousand barrels, 19<sup>th</sup> overall in natural gas production at 84,482 million cubic feet, and 11<sup>th</sup> overall in coal production at 26,328 thousand short tons.<sup>108</sup>

#### **Sources of State Revenue**

Severance taxes in Ohio are not a significant source of revenue for the State. Individual income taxes account for 40 percent with sales taxes coming in at 36 percent. The commercial activities tax amounted to 7 percent.





Source: U.S. Census Bureau | State Government Tax Collections, 2012

<sup>&</sup>lt;sup>108</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

### **Types of Taxes**

#### Commercial Activities Tax.

The Commercial Activities Tax (CAT) is imposed on all business in the State, including mineral extraction. For all businesses gross income must be greater than \$150,000 to be taxable. The CAT is basically a gross receipts tax from which only limited exemptions are allowed<sup>109</sup>. For the first millions of gross receipts (above \$150,000) the tax uses a graduated rate;

- Gross receipts between \$1 and \$2 million \$800 plus 0.26 percent in excess of \$1 million
- Gross receipts between \$2 and 4 million \$2,100 plus 0.26 percent in excess of \$1 million
- Gross receipts above \$4 million \$2,600 plus 0.26 percent in excess of \$1million (Ohio Department of Taxation 2013, 17)

#### Severance tax:

The severance tax, is paid by owners or operators that extract natural resources in Ohio (Ohio Revised Code 5749.02)<sup>110</sup>. The tax is levied on the weight or volume of the natural resource. There are different rates for various minerals in Ohio. Oil is 10 cents per barrel, Natural gas 2.5 cents per Mcf. The base tax rate on coal is 10 cents per ton: An additional 1.2 cents per ton on surface mining operations and an additional 12, 14 or 16 cents per ton reclamation tax on operations without a full cost bond, depending on the amount were added (Ohio Tax Equalization Division 2014)

The amount of the additional severance tax on mining operations permitted under the coal mining and reclamation permit may increase or decrease depending on the amount held in the Reclamation Reserve Fund. If the balance exceeds \$10 million at the end of any fiscal year, the amount of the additional tax decreases to \$0.12 per ton produced. It the balance is less than \$5 million at the end of any fiscal year, the amount of the additional severance tax increases to \$0.16 per ton produced.<sup>111</sup>

The severance tax does not apply to resources severed if used on the land used on a homestead. The exemption is limited to resources with a yearly cumulative market value of \$1,000 or less.<sup>112</sup> The severance tax is distributed among a variety of State funds but none returns to the county of origin.<sup>113</sup>

<sup>&</sup>lt;sup>109</sup> (Ohio Department of Taxation 2013)

<sup>&</sup>lt;sup>110</sup> Ohio Laws and Rules | Ohio Revised Code; at: http://www.codes.ohio.gov/orc/5749.02

<sup>&</sup>lt;sup>111</sup> Taxation of Coal: A Comparative Analysis; at: http://

www.marshall.edu/cber/docs/2011\_02\_01\_Coal\_State\_Compare.pdf+&cd=1&hl=en&ct=clnk&gl=us

<sup>&</sup>lt;sup>112</sup> Ohio Department of Taxation | Severance Tax; at:

http://www.tax.ohio.gov/portals/0/communications/publications/severance\_tax.pdf

<sup>&</sup>lt;sup>113</sup> Ohio Department of Taxation; at:

http://www.tax.ohio.gov/Portals/0/communications/publications/annual\_reports/2012\_annual\_report?2012\_AR\_Section\_2 \_Sever ance\_Tax.pdf

### Property Taxes

There are differences in the property taxes for oil and gas in contrast for coal (Luck 2014). Oil and gas reserves are taxes under the procedure established by law (OH 5713.051). A formulas is used for determining value beginning with the first year of operation. The price is the average over the proceeding five years. The gross price is adjusted using a 13 percent per year decline curve. The calculation for one barrel of oil and one Mcf of gas is as follows:

- First year gross price
- Second year 0.87 of gross price
- Third year 0.75 of gross price
- Fourth year 0.659 of gross price
- Fifth year 0.573 of gross price
- Sixth year 0.498 of gross price
- Seventh year .0434 of gross price
- Eight year 0.377 of gross price
- Ninth year 0.328 of gross price
- Tenth year 0.286 of gross price OH 5713.051(6)(11)

From this gross revenue certain deductions are allowed:

- Operating expense 40 percent of gross revenue
- Capital recovery 30 percent of gross revenue
- Royalty expense

The resulting income is subject to a discount rate of 13 percent plus an additional percentage determined by the Tax Commissioner (OH 5713.05.17) to establish a net present value which is used to determine the tax base. The result is taken times 35 percent to establish assessed valuation. For gas well producing less than eight Mcf, the net present value is reduced by 50 percent.

In Ohio property taxes on coal are left to the counties with little state guidance. For example Jefferson County assesses all coal property at \$100 for each acre of coal. (Conn 2014)

The tangible property tax, which was applied to property used in business including mineral extraction has been gradually phased out and was repealed in 2009.<sup>114</sup>

<sup>&</sup>lt;sup>114</sup> Ohio Department of Taxation | Personal Tax; at:

 $http://www.tax.ohio.gov/portals/0/communicaitons/publications/annual_reports/2010\_annual\_report/property\_tax\_tangible\_personal\_property.pdf$ 

### Pennsylvania

The state of Pennsylvania ranks third in overall energy production in the United States at 4,720 trillion Btu. It ranks 20th in crude oil production at 490 thousand barrels, third in natural gas production at 2,253,696 million cubic feet and fourth in coal production at 54,719 thousand short tons.<sup>115</sup>

### Sources of State Revenue

Since there are no severance taxes at the state level in Pennsylvania, the state relies primarily on sales taxes (54 percent) and individual income taxes (32 percent)



Figure A11

Source: U.S. Census Bureau | State Government Tax Collections, 2012

# **Types of Taxes**

Since the Pennsylvania Code (72PS 520.201a& 419) does not specifically allow taxes on oil and gas property, Pennsylvania is the only mineral producing state in the nation which does not impose a severance tax on oil and gas or allow for local ad valorem taxes. (Independent Fiscal Office March 2014, 2) While there have been multiple taxes proposed, particularly on unconventional shale gas, none have yet passed the General Assembly.

<sup>&</sup>lt;sup>115</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

# Corporate Income Taxes

Pennsylvania has the highest nominal corporate income tax rate in the nation at 9.99 percent. (Independent Fiscal Office March 2014, 29–30) This tax is paid by corporations doing business in mineral extraction. Critics claim that the effective tax rate is lower do to provisions in the law which exempt certain forms of income from the tax and that it does not apply to Sub-Chapter C or Limited Liability Corporations.

### Property Taxes

Coal is subject to local ad valorem taxes. The Courts have interpreted the word "land" in the Code to include coal and other hard rock minerals since they are fixed and not "fugacious" as is oil and gas.<sup>116</sup> While each county, school district or municipality is allowed to do its own determination of values, most use the county's determination. Local governments can set both the tax levy (within limits) and the assessment ratio (not to exceed 100 percent) (Governor's Center for Local Government Services 2004, 5–13). These provisions apply to coal taxation which cannot be taxes at a higher rate or percentage than other property.

Coal counties in Pennsylvania use consultants to establish values (Kern 2014). In the major coal producing county in the State, the consultant determines value based on:

- Location of the coal vein
- Mineabillity of the coal (economic feasibility)
- Costs of transportation
- Content of the coal (BTU, Ash, Sulfur)

Data on prices and production are supplied by the coal companies. The coal companies also file depletion reports estimating how long the coal will last. A Discounted Cash Flow analysis is then completed to determine the per-ton value of the coal which is converted into a per-acer amount for tax purposes. (Fraiser 2014). In Green County 35 percent of local revenue comes from coal with one school district receiving almost 70 percent from that source.

# Impact Fee

However in 2012 a local "Impact Fee" was enacted (Act 13 of 2012) to be administered by the Pennsylvania Public Utility Commission (Savage March 15, 2013). "The impact fee is unique because it is determined primarily by age of the well, and it is not affected by the volume of gas extracted or its price, except in limited circumstances." (Independent Fiscal Office March 2014, The impact fee is imposed over a 15 year period for each well beginning with the imposition of the fee of first year of actual production from the well. The fee does depend on the value of production and declines every year over the 15 year life of the fee. The schedule is provided below.

<sup>&</sup>lt;sup>116</sup> Coolspring Stone v. County of Fayette 929 A 2d 1150 (2007)

Year	\$02.25	\$2.26 2.99	\$3.00 4.99	\$55.99	\$6 or higher
1	\$40,000	\$45,000	\$50,000	\$55,000	\$60,000
2	\$30,000	\$35,000	\$40,000	\$45,000	\$55,000
3	\$25,000	\$30,000	\$30,000	\$40,000	\$50,000
4	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
5	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
6	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
7	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
8	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
9	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
10	\$10,000	\$15,000	\$20,000	\$20,000	\$20,000
11	\$5,000	\$5,000	\$10,000	\$10,000	\$10,000
12	\$5 <i>,</i> 000	\$5,000	\$10,000	\$10,000	\$10,000
13	\$5,000	\$5,000	\$10,000	\$10,000	\$10,000
14	\$5,000	\$5,000	\$10,000	\$10,000	\$10,000
15	\$5,000	\$5,000	\$10,000	\$10,000	\$10,000

Table III: Schedule for Local Impact Fees on Gas Production in Pennsylvania.

Source: Pennsylvania Public Service Commission

In determining the fee, the average price of natural gas for the year is used and is adjusted for inflation using the CPI.

Twenty five and one half million (\$25.5m) of the fee is distributed first to several state agencies related directly or indirectly to regulation or use of minerals<sup>117</sup>. Of the remaining money 60 percent goes to counties and municipalities (unconventional Gas Well Fund) to offset the impact of extraction on local services. The remaining 40 percent goes to statewide initiatives with potential local impacts (Marcellus Legacy Fund) (Savage March 15, 2013)

The funds which go to the local governments are split among counties with wells, municipalities with wells and municipalities in counties without wells. Funds are distributed on a percentage basis comparing the number of wells in the jurisdiction by total number of wells in the State. That percentage is then compared to the amount available for distribution

<sup>&</sup>lt;sup>117</sup> County Conservation Districts, Fish and Boat Commission, Public Utility Commission, Emergency Management Agency, State Fire Commissioners, Department of Transportation and the Marcellus Legacy Fund (Natural Gas Energy DevelopmentProgram

#### Texas

The state of Texas ranks first in overall energy production in the United States at 14,201 trillion Btu. It ranks first in crude oil production at 93,505 thousand barrels, first in natural gas production at 7,475,495 million cubic feet and sixth in coal production at 44,178 thousand short tons.<sup>118</sup>

#### Sources of Tax Revenue

The sales tax is the source for 70 percent of the tax revenue. While Texas does not have a corporate income tax, the franchise tax accounts for 9 percent with severance taxes on minerals constituting the remaining 7 percent.



#### Figure A12

Source: U.S. Census Bureau; State Government Tax Collections, 2012

<sup>&</sup>lt;sup>118</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

# **Types of Taxes**

### Franchise Tax

Texas does not use a corporate income tax but employs a franchise tax that applies to all partnerships, corporations, LLCs, trusts professional association, joint ventures, and other legal entities. (TTC 171.002) The tax is levied on total taxable income<sup>119</sup>. The rates are:

- 1 percent for most entities including mineral extraction and distribution
- 0.5 percent for wholesalers and retailers.
- 0.575 percent for entities with less than \$10 million in total revenue electing EZ computation (Texas Comptroller of Public Accounts nd)

#### Severance Tax

Texas calls their severance taxes "production taxes" as they are levied on the value at the time of production. (Texas Code Ann. 23.012 [Vernon 1992]) Only when income is earned from a mineral interest is there a taxable event. (Destec Properties Limited Partnership v. Freestone Central Appraisal District, No 10-98-033-CV (Tex. App.-Waco 1999)

There are different rates for various minerals in Texas. Oil 4.6 percent of market value of oil produced, Natural gas 7.5 percent of market value of gas produced, Condensate 4.6 percent of market value. There are a large number of exemptions, credits and incentives (Railroad Commission of Texas 2014) which significantly reduce the yield of the taxes. In addition there is a 2.42 percent gross receipts tax on firms performing certain services associated with gas and oil wells. (Texas Comptroller of Public Accounts 2001).

Coal is not subject to a severance tax in Texas. (Texas Comptroller of Public Accounts 2006)

#### Severance Tax Distribution

A very small (0.5%) of the severance tax goes for enforcement. Of the remainder, Texas deposits 75 percent of the yield of severance taxes above what was raised in 1987 into the State's "Rainy Day Fund". The purpose of the fund is to provide a "fiscal cushion" if and when State revenue falls. It currently stand at more than \$14 billion. There are proposals to divert some of the fund's revenue into state road and infrastructure projects. (Fisher 2013) The remaining 25 percent is deposited in the Foundation School Fund for distribution to local districts.

#### Property Taxes

The Court provided that the income approach was the appropriate method for determining value rather than comparable sales,

<sup>&</sup>lt;sup>119</sup> Tax base is the entities margins which equals the least of four calculations: total revenue minus cost of goods sold, total revenue minus compensation, 70 percent of total revenue or total revenue minus \$1 million. (Texas Comptroller of Public Accounts 2014)

The "comparable sales" method of valuing property becomes less accurate when applied to property interests such as an overriding royalty interest because of the absence of an open market and because the value of the interest lies primarily in its income producing potential. (Destec Properties v. Freestone Central Appraisal District)

Under Texas law "minerals in place" are considered real property and taxed as such. When the mineral is severed from the ground it becomes personal property. (Gilliland 2011, 13) The use of a state promulgated manual for determining the discounted cash flow is to be used: market surveys, oil and gas sales and weighted average cost of capital (band of investment). The process is described as follows,

The appraiser calculates the present worth of forecast revenue stream by multiplying the projected net income (cash flow) for each year by the calculated discount factors for that year. These discount factors are derived from the discount rate (also known as the yield rate) and the process is known as discounted cash flow (DCF) analysis. (Combs 2012, 1)

Mineral property is appraised in Texas by the Central Appraisal District (CAD) in each county. In most cases, private firms do the mineral valuations for the CADs. In Texas mineral appraisals are conducted by private firms (Pritchard & Abbott, Inc 2014) (Combs nd) using a formula of the Weighted Average Cost of Capital (WACC) including:

- Inflation Rate as determined by the Urban Consumer Price Index of the U.S. Bureau of Labor Statistics
- Risk Free Component is the risk-free rate minus the inflation rate. Determined by the return on long term government bonds
- General Risk Premium represents the WACC minus the risk-free rate using typical oil or gas company ratios of debt and equity.
- Property Specific Risk Premium is to offset the risks of a particular mineral property<sup>120120</sup> these the assessor is left to estimate. (Kert, Director, Mineral Appraisals, Pritchard and Abbott, Ft. Worth TX 2014)

The formulas prescribed by the state in Texas are:

 $PV=CF1 \times (PWF1) + CF2 \times (PWF2)...CFn \times (PWFn)$  where PV= present value in dollars CF= the cash flow or income for the period specified PWF= the end of the period present worth factor  $1/(1+i)^n)$  i= discount rate n=the period for the present worth factor being calculated

<sup>&</sup>lt;sup>120</sup> These include but are not limited to: Conditions in the lease, well with high water production, well near end of economic life, well under partial or active water drive (Uncertain recovery), lease of less than 6 months, unusually high operating expense,

In determining the discount rate the components are:

- Inflation Rate as determined by the Urban Consumer Price Index of the U.S. Bureau of Labor Statistics
- Risk Free Component is the risk-free rate minus the inflation rate. Determined by the return on long term government bonds
- General Risk Premium represents the WACC minus the risk-free rate using typical oil or gas company ratios of debt and equity.
- Property Specific Risk Premium is to offset the risks of a particular mineral property<sup>121</sup> these the assessor is left to estimate. (Kert, Director, Mineral Appraisals, Pritchard and Abbott, Ft. Worth TX 2014)

These are then summed to obtain the discount rate used in the assessment process. A range of discount rates should be determined applicable to individual wells (Combs 2012, 8) Texas also makes use of market surveys and sales of oil and gas properties when available to verify the discount rate.<sup>122</sup>

Since coal is surfaced mined in Texas it its value is included with the surface value of the land using the same formula as for oil and gas. Coal in Texas is mostly lignite (brown coal) and found in eight counties in an arch from the northeast to the south central part of the state. It is all surfaced mined and burned at a power plant adjacent or nearby the mine (Clower and Reyes February 2013). Only the active part of the mine is valued for ad valorem mineral taxation.

<sup>&</sup>lt;sup>121</sup> These include but are not limited to: Conditions in the lease, well with high water production, well near end of economic life, well under partial or active water drive (Uncertain recovery), lease of less than 6 months, unusually high operating expense,offshore lease, and secondary recovery project underway.

<sup>&</sup>lt;sup>122</sup> The Society of Petroleum Evaluation Engineers (SPEE) Annual Survey, Western States Petroleum Association (WSPA) Analysis of Oil and Gas Property Transfers and Sales.

# West Virginia

The state of West Virginia ranks fifth in overall energy production in the United States at 3,721 trillion Btu. It ranks 17th in crude oil production at 669 thousand barrels, ninth in natural gas production at 539,860 million cubic feet and second in coal production at 120,425 thousand short tons.<sup>123</sup>

# Sources of Tax Revenue

West Virginia relies heavily on corporate income taxes (48 percent) and individual income taxes (33 percent) with severance taxes being providing 12 percent of tax collections



Figure A13

Source: U.S. Census Bureau | State Government Tax Collections, 2012

# **Types of Taxes**

# Corporate Income Tax

West Virginia's corporate income tax rate has been reduced to 6.5 percent of taxable income (WVC 11-24-4). The tax is based on the federal corporate income tax with certain adjustments

<sup>&</sup>lt;sup>123</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

for multi-state income. Mineral companies organized as C corporations pay the tax. However other business entities do not.

# Severance Tax

The current rate is five percent on "gross value" which is gross income minus an amount "determined after application of post-production process generally applied by the industry to obtain commercially marketable or usable natural resource products" (WVC 11-12B-1 et seq.)<sup>124</sup> There have been additions to the severance taxes to draw down the unfounded liability in the state's pensions.

The severance tax is not imposed on natural gas from any well that produced an average of less than 5,000 cubic feet per day during the calendar year. For a maximum period off ten years, all natural gas from any well that has not produced marketable quantities of natural gas for five consecutive years has no severance tax imposed on it. For coal, there are reduced severance tax rates for thin seam coal produced from underground mines. Coal produced by underground mines from seams 37 inches to 47 inches thick is taxed at a rate of one percent.

# Property Taxes

West Virginia uses different methods to assess coal and other energy fuels. For property tax purposes. For property taxation of minerals West Virginia uses a yield capitalization mode which is similar for all mineral properties. (WVCSR 110-1J-4.5)(WVCSR 110-1I-4.1.7) The discount (yield) rate is determined by the following factors.

- The **safe rate** refers to a rate of return on an investment which poses low risk. This rate is calculated using a three year weighted average of interest rates as given on 13 week United States Constant Maturity Treasury yields.
- The **risk rate** is an estimation of the interest rates which are required on loans for either purchase or development of natural gas property. This calculation is made by first determining the prime interest rate charged by banks for the previous three years and adding 2 percent to each rate. This rate is compared to the 13 week United States Constant Maturity Treasury Yields as used for the safe rate. A weighted average of the prime interest rates, increased by 2 percent each year, is then calculated.
- The **nonliquidity rate** uses a yearly survey to estimate the amount of time natural gas property will remain on the market before being sold. United States Constant Maturity Treasury Yields of at least 13 weeks are then examined to identify those with similar time differentials. The interest differential between the rates is the nonliquidity rate.
- The **management rate** is the cost of managing the investment and is set at a rate of 0.5 percent.

<sup>&</sup>lt;sup>124</sup> The 5% rate for coals reflects a 4.65 percent state tax and a 0.35 local tax on extractions. (Muchow 2014)

• The **inflation rate** is an estimation of the consumer price index of the United States Department of Labor, Bureau of Statistics. A three year weighted average of this rate is used for the inflation rate.

The current capitalization rate for 2014–2015 is 12 percent for coal and 14.8 percent for oil and natural gas (Matkovich August 29, 2014)

# Coal

The ad valorem tax on coal is determined at the state level (WV Code 11-1C-10; WV Code 11-1C-5(b) at 60 percent of market value and furnished to the counties for the distribution to the jurisdictions within the county. Coal in active mines is taxed differently than reserve coal which is not in current production (reserve coal). The appraisal process for reserve coal is conducted under the Reserve Coal Valuation Model (RCVM) using a discounted cash flow methodology. (Hansen May 2009) The procedure is spelled out in the West Virginia Code of State Rules (WVCSR 110-11).

Coal resources are divided into several classes: active mining property, reserve coal property, unmineable coal beds, mined-out coal property and barren coal property<sup>125</sup> each of which is taxed in a different manner.

For active mining property the following approach is employed.

The present value of the property is calculated by taking a weighted average of the previous 3 years production figures and converting these production figures into estimated income using coal prices for the previous year. The present value is determined through discounting. Estimated income is determined from production figures by using the average prices per ton for steam and metallurgical coal. (Kent, Ad Valorem Taxation of Coal Property in West Virginia and other States—Part 1 2010 7:3, 45)

The process for reserve coal is complex (Kent, Ad Valorem Taxation of Coal Property in West Virginia and other States—Part 1 2010 7:3, 46–49). The RCVM lists six item which determine the "factor" for the coal bed.

- Market interest factor which measures the level of mining activity in the area
- Market mineabillity factor related to the cost of recovered from the mine
- Prime coal bed factor which indicates the order in which portions of the coal will be mined
- Environment factors which may limit mining such as regulations
- Conflict factor occurs when mining may interfere with surface use
- Volatility factor determines if the coal is suitable for mining at projected prices.

<sup>&</sup>lt;sup>125</sup> Active mining property refers to a permitted coal-mining operation where coal is actively being extracted, reserve coal property is property not currently permitted or being mined but capable of being mined, mined out property includes coal bed or portions of coal beds where coal has been removed and no additional coal could be extracted by accepted mining practices, barren coal property is where coal has eroded away or never existed

On the basis of these six factors each bed is given an index factor as 20, 40 or 80 (t-factor) which indicates the approximate number of years the coal will be mined. "An index factor of 20 represents a *good bucket* equal to \$1,000 per acre, A factor valuation of 40 represents a *medium bucket* roughly equal to \$100 per acre, and a factor valuation of 80 represents a *bad bucket* which is roughly equal to \$5 an acre". (Kent, Ad Valorem Taxation of Coal Property in West Virginia and other States—Part 1 2010 7:3, 46) The term "bucket" refers to the quality of the coal seam.

When discounting is used to determine present value the length of time over which the coal will be extracted is most important in determining value. If the T-factor is 20 then the discounting process lasts for 20 years. If the t-factor is 40 or 80 then the discounting runs for a much longer period and the resulting present values are substantially lower.

Following that classification a present value formula is used to calculate the value per acre of each individual coal bed.

 $(I/10)(ROY[1"(BTU+S]))(([1/(1=I)^{u+0.5})(1/10)](BTU2000)(1800)(RR)(T hk))$ 

\$/MMBtu is the coal price per million BTU (determined by average price paid by power plants and survey of other users)

ROY is the average royalty rate (by survey of lessors of operating leases)

1" (BTU+S) is the BTU sulfur adjustment factor (by the WV Geological and Economic Survey)

 $1/(1+I)^{(t=.0.5)}$  standard midyear present worth factor (I in the factor is the discount rate)

BTU is the BTU content of one pound of dry coal by location

2000 is pounds per ton conversion factor

1800 is tons per acre foot conversion factor

RR is the clean coal recovery rate (percentage of tons mined subtracted from total tons in field)

Thk is the coal bed thickness in feet

The next step is to calculate the aggregate ratio for all unmined coal in the state using the following formula.

Ag/Val= (Average Coal Price)(Average Royalty Rate)(Annual Production)/(Capitalization Rate)

The aggregate active value is then determined by adding the values for all acres on active mining property. Subtracting the aggregate active value from the aggregate value yield the aggregate reserve value. From this the present worth factor is provided.

$$PW=1/(1+I)^{(t+0.5)}$$

The result is placed in the first formula along with the other variables to obtain the Present Value per Acre which is then multiplied by the number of acres in the bed. The result is the value of the bed for assessment purposes. Mined out coal and barren coal are valued at \$1 per acre

# Oil and Gas

The Property Tax Department values both producing and reserve natural gas and oil reserves as real property and assesses at 60 percent of appraised value. Once the assessment is complete, a distribution of assessed value is made to each county based on production and the counties then apply applicable local levy rates. Producing natural gas real property in West Virginia is valued through a yield capitalization model on net receipts (gross receipts less royalties paid less operating expenses) for the working interest and a yield capitalization model on gross royalty payments for the royalty interest. (WVCSR 110-1J-4.ff)

The value of nonproducing oil and natural gas property is determined by taking the "sum of the projected annual income stream from delay rental during the lease term discounted in each year by a capitalization rate." Nonproducing oil and natural gas property is considered barren of the natural resource, along with abandoned or plugged natural gas property, is valued at \$1 per acre. A cap of 125 acres per natural gas well is imposed on abandoned or plugged natural gas property. (Kent and Eastham, Taxation of Natural Gas: A Copmparative Analysis December 7, 2011)

Tangible personal property is fully taxable in West Virginia (WVC 11-5-1 et. seq.)

Personal property used in oil or natural gas production means machinery and equipment in and about the well and all other tangible personal property used in oil and/or natural gas production from the well to the field line point of sale. It shall not include vehicles or other tangible personal property not permanently used in production. (WVCSR 110-IJ-3.18)

While there is not a similar rendition for coal in the rules, coal personal property is covered under the general legislative provision. Personal property is taxed at 60 percent of market value using the cost approach.

# **Distribution to Counties**

Under the West Virginia Law apportion of the severance tax on coal is distributed to the counties. Beginning in 2012 one percent of the coal severance tax collected goes to Coal Severance Tax Fund. That percentage increases each year until it hits five percent in 2016. (WV State Treasurer 2014) Seventy five percent of the amount collected goes to the "coal producing counties while 25 percent goes to all the other counties where no coal production takes place.

The counties are then to allocate the money on a proportionate basis among the cities and schools. (WVC 11-13A-6) Ten percent of the oil and gas severance tax is returned to the counties. (WVC 11-13A-5b)

# **Future Fund**

Beginning in 2014 three percent of the annual severance tax collections are to be sequestered in the West Virginia Future Fund. (SB 461) The Fund cannot be tapped until 2020 at the earliest Income from the earnings on the fund are to be used for education, workforce development, economic development, and infrastructure or tax relief. There is a limitation on the deposits which can be made. In any year when the "Rainy Day Fund" is less than 13 percent of the general fund or is tapped to balance the budget or hiring freezes are in place, no deposits will be made into the Future Fund. (Pritt 2014). Distribution of the coal severance tax are taken out before the amount available for the future fund is determine

### Wyoming

The state of Wyoming ranks second in overall energy production in the United States at 9,611 trillion Btu. It ranks eight in crude oil production at 6,066 thousand barrels, fifth in natural gas production at 2,022,275 million cubic feet and first in coal production at 401,442 thousand short tons.<sup>126</sup>

#### Sources of Tax Revenue

Wyoming has neither a personal nor corporate income tax. The severance tax is the major state revenue producer. Following it is the general sales and gross receipts tax with property taxes coming in third.



#### Figure A14

Source: U.S. Census Bureau | State Government Tax Collections, 2012

# **Types of Taxes:**

# In General

Wyoming utilizes a severance tax at the state level and a local gross production tax in lieu of an ad valorem tax for local governments. The severance tax and the gross products tax employ the same base. Gross production is determined by reports from the companies. Prices are used from arm's length sales. There are allowed deductions for transportation and processing costs. The

<sup>&</sup>lt;sup>126</sup> U.S. Energy Information Administration; at: http://www.eia.gov/state/rankings

result is the value used for both taxes. The difference between the two taxes is the local jurisdiction set the rate at the local level. (Grenvik 2014)

### Severance Tax

The severance tax rate is determined at the state level each year. Currently, the statewide severance tax rate on oil and gas is 6 percent. The tax on surface coal is 7 percent and underground coal has a severance tax of 3.75 percent (Grenvik 2014) Reserves for oil, gas and coal are not taxed, only production.

The State has dedicated a portion of the severance tax to the Permanent Wyoming Mineral Trust Fund. (PWMTF). 2.5% of all severance tax revenue is placed in the PWMTF.<sup>127</sup> (Wyoming Taxpayers Association nd). The income from the PWMTF is placed in the State's general fund.

#### Gross Products Tax (Property Tax)

The gross products tax is assessed in lieu of property taxes. The tax is determined by the state and then remitted to the counties for distribution.<sup>128</sup> The gross products tax accounted for 63 percent of all revenue received by the over 500 local governments in 2012. (Wyoming Tax Payers Association 2012, 13).

While the "Gross product of minerals and mine products" is assessed at 100 percent, industrial property is assessed at 11.5 percent and all other property at 9.5 percent.<sup>129</sup> The state levies a property tax for the general fund at a rate of 5 mills.<sup>130</sup> Subject to limitations, local governments may levy the tax at locally established mill levies.<sup>131</sup> While varying by jurisdiction, the statewide average local millage in 2012 was 6.5 percent of taxable value. (U. S. Bureau of Land Management: Wyoming 2012)

<sup>&</sup>lt;sup>127</sup> Wyoming Tax Payers Association; at: http://www.wyotax.org/severance\_taxes.aspx

<sup>&</sup>lt;sup>128</sup> WS 39-13--101 through 111

<sup>&</sup>lt;sup>129</sup> WS 39-13-103( bii)(B iii)

<sup>&</sup>lt;sup>130</sup> WS 39-13-104(a)

<sup>&</sup>lt;sup>131</sup> WS 39-13-104(b)

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