

## Note

# PROPERTY TAXATION OF THE MINING INDUSTRY IN ARIZONA

DESMOND P. KEARNS\*

Arizona's present system of mine property taxation is grossly inadequate for a state whose mines produce more than half of the United States' copper. A new approach, which would take proper account of the magnitude and type of mining in Arizona, is required.<sup>1</sup>

Although the Arizona property tax laws were substantially revised in 1967, a special tax session of the state legislature is planned for September 1971<sup>2</sup> during which they and other tax laws will be reexamined.<sup>3</sup> In anticipation of, and to facilitate that reexamination, this note will analyze the Arizona property tax laws applicable to the mining industry, to determine whether their basic purposes have been served adequately. This note will also illustrate the advantages and disadvantages of the various systems of mine property taxation and recommend a system for Arizona which will recognize the peculiar mining conditions which exist in this state.<sup>4</sup>

---

\* Second year writer, *Arizona Law Review*; Registered Professional Engineer (Mining).

<sup>1</sup> The Arizona mining industry paid more than \$44 million in state and local taxes in 1969, of which more than \$21 million were property taxes. These figures were supplied by the Arizona Mining Association from data compiled by Price Waterhouse & Co. and represent the taxes paid by member companies of the Arizona Mining Association. Approximate figures were published in *ARIZONA MINING ASS'N, ARIZONA MINING—AN EPIC* 4 (1969). See *id.* at 3 for a list of member companies. Full cash values for all the mines and smelters in Arizona were published in the *Arizona Legislative Review*, June 10, 1970, at 1. Member companies of the Arizona Mining Association own 98.85 percent of the total full cash valuation. Therefore the above quoted figures for taxes paid are close approximations of the total taxes paid by the entire mining industry in Arizona.

<sup>2</sup> *Tucson Daily Citizen*, May 15, 1971, at 1, col. 8; *id.*, May 10, 1971, at 22, col. 5-7.

<sup>3</sup> Property taxes constitute a significant part of Arizona's tax revenue at the state and local level. In the fiscal year 1969-70, property tax collections for state purposes amounted to \$68,015,038 or 15.22 percent of all state tax revenues. 1969-70 *ARIZ. TAX COMM'N ANN. REP.* 13. Included in these figures are general, aircraft, and motor vehicle taxes which are collected by the Department of Property Valuation, and private car and flight property taxes which are collected by the State Tax Commission. At the local level, property taxes are the major, and in many instances the only, source of tax revenue. In 1969-70, \$218,034,565 in property taxes were levied by local taxing districts in Arizona. *THE ARIZONA TAX RESEARCH ASS'N, ARIZONA PROPERTY TAX RATES AND ASSESSED VALUATIONS* 2 (Supp. 1970). No figure is available for total tax collections by local taxing districts.

<sup>4</sup> The scope of this paper is limited strictly to property taxation. No attempt is made to discuss the other major taxes, such as income and severance taxes, which

Fair market value is the basis of practically all valuation for property tax purposes. In its purest form, this method equates the fair market value with the price that a willing buyer would pay to a willing seller for the property. It will be shown that this method, in its pure form, has little useful application in Arizona in mine valuation. Because large copper mines are rarely bought and because they are not susceptible to physical appraisal by traditional methods, no market value is established for them. In the absence of such market data, Arizona establishes the fair market value of its mines by the capitalization of future net proceeds. As applied in Arizona, the capitalization method is complex, expensive to administer, uncertain in result, and subject to an excess of administrative discretion.

The alternative to fair market valuation is a proxy method. This method does not purport to establish a true value but instead substitutes a legislative formula which will give an assessed valuation upon which to levy taxes. The disadvantage of a proxy method is that it does not reflect true value, but the advantages are that it is simple and inexpensive to administer, easy to understand, certain in result, and requires a minimum of administrative discretion. Proxy valuation methods which will be discussed in this note are the statutory gross proceeds and net proceeds formulas.

This note is concerned with the method of assessing the mines for taxes rather than with the problem of how much the mines should pay. The latter question is primarily political and turns on whether the State of Arizona wishes to encourage mining by maintaining a favorable tax climate, because the industry provides employment, leads to secondary industries, increases the cash flow in the state, and provides a broad tax base, or, wishes to discourage and penalize the industry by high taxation because the industry may pollute air and water and, as a direct consequence of operations, create unsightly waste dumps.

In order to recommend the most appropriate mine property tax system for Arizona, it is necessary to state some of the elements and purposes of a tax system which best serve the interests of the state in acquiring revenue and of the industry in performing its objectives. Accordingly, these basic criteria are: (1) provision of sufficient revenue; (2) provision of a steady source of revenue; (3) certainty and predictability; (4) ease, economy and simplicity of administration; and (5) recognition of the con-

---

affect the mining industry. Because income taxes are not discussed there will be no treatment of depletion allowances.

Although it is somewhat dated, an excellent overview of mine taxation is A. PARSONS, *TAXATION OF MINING ENTERPRISE—FEDERAL, STATE, AND LOCAL* (1950). Mr. Parsons prepared his paper for the U.S. Bureau of Mines in June 1950. The entire article, with an addendum, was included as an exhibit with Mr. Parsons' testimony in *Hearings on Stockpile and Accessibility of Strategic and Critical Materials to the United States in Time of War, pt. 7, Tariffs and Taxes and Their Relationship to Critical Materials, Before the Special Subcomm. on Minerals, Materials, and Fuels Economics of the Senate Comm. on Interior and Insular Affairs*, 83d Cong., 2d Sess. 187-270 (1954).

cept of ability to pay.<sup>5</sup> Each of the various tax systems will be examined and measured against these characteristics and the system most beneficial to Arizona will be described in terms of how it would serve the peculiar needs of the industry and the State.

The importance of the undertaking attempted here, like that of the legislature's forthcoming special tax session, is best typified by the following words of Justice Benjamin Cardozo: "We seek to find peace of mind in the word, the formula, the ritual. The hope is an illusion. . . . There is nothing that can relieve us of 'the pain of choosing at every step.'"<sup>6</sup>

## TABLE OF CONTENTS

The Mining Industry in Arizona .....	765
The Evolution of State Property Taxation of the Mining Industry in Arizona .....	770
History and Development .....	770
Current Property Tax Laws Applicable to the Mining Industry .....	773
Constitutionality of Arizona Property Tax Laws .....	776
Classification of Mine Property Taxes by	
Valuation Methods .....	779
Fair Market Value .....	779
Market Data .....	779
Capitalization of Future Net Proceeds .....	780
Life of the Mine .....	785
Discount Rates .....	787
Annual Net Proceeds .....	791
Proxy .....	796
Gross Proceeds .....	796
Net Proceeds .....	798
Conclusions and Recommendations .....	801

## THE MINING INDUSTRY IN ARIZONA

Mining has always been important in Arizona and has contributed substantially to the economic development of the state throughout its history. It was gold and silver that lured Coronado's expedition into Arizona in search of the Seven Cities of Cibola. Prior to the first reported mineral discovery in Arizona by Antonio Espejo in 1583, however, there seems to have been little mining conducted other than by the Indians to satisfy their personal needs. Even following Espejo's discovery there was no increase in mineral activity until the 18th century when some gold and silver mining was done on a small scale.<sup>7</sup>

<sup>5</sup> Some of the criteria to be considered in choosing revenue sources and apportioning governmental burdens are discussed in H. GROVES, *FINANCING GOVERNMENT* 14-28 (6th ed. 1964), where the author analyzes the four canons of taxation enunciated by Adam Smith. A. SMITH, *WEALTH OF NATIONS* (1776).

<sup>6</sup> B. CARDOZO, *THE GROWTH OF THE LAW* 66-67 (1924) (footnote omitted).

<sup>7</sup> ARIZ. DEP'T OF MINERAL RESOURCES, *MINING IN ARIZONA, ITS PAST, ITS*

The Gadsden Purchase of 1854 coincides with the beginning of substantial mineral prospecting in Arizona, and claims were staked in Ajo that year.<sup>8</sup> The 1870's saw the discovery and establishment of many of Arizona's most important mining districts such as Globe-Miami, Silver King, Superior, Bisbee, Jerome, Tombstone and Clifton-Morenci.<sup>9</sup> Silver mines were important until 1893 when silver was demonetized, and gold mines were important until 1942 when the gold mines were closed to release workers for copper production which was critical to the war effort.<sup>10</sup> Since those dates, virtually all of the silver and gold production in Arizona has been a by-product of the copper mines.<sup>11</sup>

For a number of years after 1880, when it first became a major copper producer,<sup>12</sup> most of Arizona's copper production was mined from high-grade ore bodies, but the grade of ore has been gradually reduced.<sup>13</sup> Despite the reduction in grade, the copper industry has steadily expanded owing to improvements in techniques, technology, equipment and metallurgy. In 1969 the Arizona mines produced more than twice as much copper as their yearly production in the early 1950's.<sup>14</sup>

In 1969, as in every year since 1910,<sup>15</sup> Arizona was the leading producer of copper in the United States.<sup>16</sup> Arizona also ranked second in the production of silver and molybdenum, and fourth in gold.<sup>17</sup>

Table I shows Arizona's mineral production for 1969.<sup>18</sup> It will be noted that copper accounts for \$761,840,000, or 88.6 percent of the total value of mineral production. Moreover, 96.3 percent of the copper was produced by only 17 major mines owned by 10 companies.<sup>19</sup> The next

PRESENT, ITS FUTURE 5-7 (rev. ed. 1970) [hereinafter cited as MINING IN ARIZONA]. The Indians mined coal to burn, turquoise for jewelry, iron oxide for paint, clay for pottery and salt for seasoning. *Id.* at 5.

<sup>8</sup> *Id.* at 7.

<sup>9</sup> *Id.* at 8.

<sup>10</sup> *Id.* at 25-26.

<sup>11</sup> *Id.* at 26.

<sup>12</sup> *Id.* at 11.

<sup>13</sup> *Id.* at 11-12. In the decade 1910-1919, the average ton of copper ore mined in Arizona yielded 48.4 pounds of copper compared with 11.3 pounds in 1968. *Id.* at 13.

<sup>14</sup> ARIZ. DEP'T OF MINERAL RESOURCES, COPPER INDUSTRY STATISTICS FOR 1969 COMPARED WITH OTHER YEARS, ARIZONA, THE UNITED STATES, AND THE WORLD 10-11 (Sept. 1970) [hereinafter cited as COPPER INDUSTRY STATISTICS FOR 1969].

<sup>15</sup> 31 ARIZ. DEP'T OF MINERAL RESOURCES ANN. REP. 3 (1969-70).

<sup>16</sup> U.S. BUREAU OF MINES, DEP'T OF INTERIOR, MINERALS YEARBOOK, vol. 1-2, at 13, table 5 (1969); 31 ARIZ. DEP'T OF MINERAL RESOURCES, *supra* note 15; COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14 at 7.

<sup>17</sup> MINING IN ARIZONA, *supra* note 7, at 5; ARIZ. DEP'T OF MINERAL RESOURCES, *supra* note 15.

<sup>18</sup> Figures for 1970 are not available.

<sup>19</sup> ARIZ. DEP'T OF MINERAL RESOURCES, *supra* note 15, at 4. The text, at 4, states 16 mines but in Table VI of the report 17 mines are listed. The discrepancy is apparently accounted for by Twin Buttes Mine which started to produce in 1969.

The companies and their mines are as follows:

Phelps Dodge Corporation—Morenci, New Cornelia, Lavender and Copper Queen; Kennecott Copper Corporation—Ray; The Anaconda Company—

TABLE I: MINERAL PRODUCTION IN ARIZONA IN 1969\*

Mineral	Quantity	Value (thousands)
Clays	120	\$394
Copper (recoverable content of ores, etc.)	thousand short tons	
Diatomite	801,363	761,840
Gem stones	725	W
Gold (recoverable contents of ores, etc.)	NA	153 <sup>b</sup>
Gypsum	110,878	4,603
Helium, grade A <sup>c</sup>	83	424
Iron ore (usable)	thousand cubic feet	
Lead (recoverable content of ores, etc.)	56,300	1,126
Lime	18	136
Mercury	217	65
Molybdenum (content of concentrate)	thousand short tons	
Natural gas (marketed)	76-pound flasks	5,704
Petroleum (crude)	thousand barrels	W
Pumice	thousand short tons	20,947
Sand and gravel	million cubic feet	199
Silver (recoverable content of ores, etc.)	thousand short tons	7,056
Stone	thousand short tons	814
Tungsten concentrate (60-percent WO <sub>3</sub> basis)	thousand short tons	18,066
Uranium (recoverable contents U <sub>3</sub> O <sub>8</sub> )	thousand pounds	10,997
Zinc (recoverable content of ores, etc.)	thousand short tons	5,812
Value of items that cannot be disclosed: Asbestos, cement, coal (bituminous, 1968), feldspar, mica (scrap), perlite, pyrites, vanadium, vermiculite, zeolite, and values indicated by symbol W	1	2
Total	W	W
Total 1967 constant dollars	9,039	2,639
	XX	18,956
	XX	859,303
	XX	724,791 <sup>p</sup>

<sup>p</sup> Preliminary. NA: Not Available. W: Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed." XX: Not applicable.  
<sup>a</sup> Production as measured by mine shipments, sales, or marketable production (including consumption by producers).  
<sup>b</sup> Based on Engelhard selling quotations.  
<sup>c</sup> Bureau of Mines estimate from noncompany sources.  
 \* Table 1 is taken from U.S. BUREAU OF MINES, DEPT OF INTERIOR, MINERALS YEARBOOK, THE MINERAL INDUSTRY OF ARIZONA 1 (Preprint 1969).

largest mineral in value is molybdenum which in Arizona is mined solely as a by-product of the copper ores.<sup>20</sup> In addition, 96 percent of Arizona's silver<sup>21</sup> and 98 percent of the gold<sup>22</sup> were produced as by-products of copper. In Arizona, therefore, the problem of mine property taxation is, in reality, the problem of how to tax these 17 large, low-grade copper mines.<sup>23</sup>

In 1969, Arizona produced 51.9 percent of the United States' copper and 12 percent of the world's copper.<sup>24</sup> Thus Arizona's importance in

**TABLE II: COMPARISON OF EMPLOYMENT AND WAGES  
IN VARIOUS ARIZONA BUSINESSES IN 1969<sup>27</sup>**

	<i>Average Number of Employees<sup>a</sup></i>	<i>Total Wages</i>	<i>Average Annual Wage</i>	<i>Average Weekly Wage</i>
Copper Mining only <sup>b</sup>	18,372	\$ 163,930,795	\$8,923	\$171.60
Copper Smelting <sup>c</sup>	1,087	9,252,223	8,512	163.69
All Copper Mining & Smelting	19,459	\$ 173,183,018	\$8,900	\$171.15
Other Mining & Quarrying	1,524	12,095,708	7,937	152.63
All Mining, Quarrying & Smelting	20,983	\$ 185,278,726	\$8,830	\$169.81
Manufacturing (Excluding Smelting)	92,370	\$ 723,505,497	7,833	150.63
Construction	33,303	307,238,608	9,226	177.42
Trans. & Utilities (Excluding Railroads)	25,544	203,764,145	7,977	153.40
Wholesale-Retail Trade	112,774	592,249,783	5,252	101.00
Services & Misc. (Including Agriculture)	85,118	477,274,188	5,607	107.83
Totals and Averages	370,092	\$2,489,310,947	\$6,726	\$129.35

<sup>a</sup> This number includes all covered employees on payroll, and is not restricted to production workers only, on which the average hourly and weekly earnings report.

<sup>b</sup> This number includes all copper mining and milling employees and some copper smelting employees not reported under Manufacturing by the Employment Security Commission.

<sup>c</sup> Total covered Smelting Employees—1,986 in 1969.

Twin Buttes; American Smelting and Refining Company—Mission and Silver Bell; Inspiration Consolidated Copper Company—Inspiration and Christmas; Duval Corporation—Mineral Park and Esperanza; Magma Copper Company—San Manuel and Superior; Pima Mining Company—Pima; Tennessee Copper Company—Copper Cities; and Bagdad Copper Corporation—Bagdad. *Id.* at Appendix VII, Table VI.

<sup>20</sup> COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14, at 26.

<sup>21</sup> ARIZ. DEP'T OF MINERAL RESOURCES, *supra* note 15, at 6.

<sup>22</sup> Calculated from figures in COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14, at 28, 36.

<sup>23</sup> More big copper mines are opening each year in Arizona. See ARIZ. DEP'T OF MINERAL RESOURCES, *supra* note 15, at 4.

<sup>24</sup> COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14, at 10.

United States and world copper production is self-evident. Because the United States' copper production is not sufficient to meet its needs, it is a net importer, with net imports for 1969 amounting to over 200,000 short tons.<sup>25</sup> This was the lowest amount during the last four years, however.<sup>26</sup> Without attempting to predict future demands, the recent history of copper supply and demand would seem to indicate room for further expansion by the Arizona copper industry in order to meet the excess of United States' demand over present domestic production. Expansion of the copper industry requires an equitable tax system which will allow American copper producers to compete on equal terms with foreign competitors, particularly during times of overproduction or diminished demand.

The mining industry's importance to Arizona at the state and local level may be seen from the employment and payroll data shown in Table II. More than 20,000 Arizonans were employed in mining and smelting in 1969 and their individual wages were higher than those in all other industries except construction. The industry presents a broad tax base, and paid more than \$44 million in state and local taxes in 1969.<sup>28</sup> Other benefits to Arizona's economy include mine purchases totalling more than \$137 million in 1969,<sup>29</sup> and the Arizona individual income, property and sales taxes paid by mine employees.

The copper mining industry is rapidly expanding in Arizona. For example, the Anaconda Company's Twin Buttes Mine began operations in 1969 and Duval Corporation's Sierrita Mine opened in 1970,<sup>30</sup> and expansions have been undertaken at Magma Copper Company's San Manuel and Superior Mines. Additionally, Magma is building an electrolytic refinery with a capacity of 200,000 tons of refined copper per year.<sup>31</sup> Inspiration Consolidated Copper Company opened a copper fabricating plant in 1969 to become the first fully-integrated copper operation in Arizona.<sup>32</sup> Although Arizona has considerable smelting capacity, the Inspiration plant is the only fabricating plant in the state. Most fabricating plants are located on the East Coast, as are the majority of copper refineries.<sup>33</sup>

Advances in technology, metallurgy and exploration techniques have permitted extensive mining of low grade ore by high tonnage operations,

---

<sup>25</sup> *Id.* at 6.

<sup>26</sup> *Id.* at 3. "Historically, imports meet about one-fourth of the U.S. demand for copper." U.S. BUREAU OF MINES, DEP'T OF INTERIOR, BULL. 630, MINERAL FACTS AND PROBLEMS 290 (1965).

<sup>27</sup> COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14, at 35.

<sup>28</sup> This figure was supplied by Arizona Mining Association from data compiled by Price Waterhouse & Co., and published in ARIZONA MINING ASS'N, *supra* note 1, at 4.

<sup>29</sup> *Id.* at 7.

<sup>30</sup> For recent accounts of these two mines see 171 ENGINEERING & MINING J. No. 8, at 70 (Sierrita), 74 (Twin Buttes) (Aug. 1970).

<sup>31</sup> COPPER INDUSTRY STATISTICS FOR 1969, *supra* note 14, at 26-27.

<sup>32</sup> *Id.* at 27. Integrated in this context indicates that a single company markets a manufactured copper product from copper ore which it mined.

<sup>33</sup> U.S. BUREAU OF MINES, *supra* note 26, at 268-290.

but the copper mining industry in Arizona is faced with major problems. The biggest problem, of course, is the low grade of the ore. The ore mined in 1969 had a recoverable copper content of only 0.58 percent. Many of the mines are working in ore of such uniformly low grade that a prolonged reduction in demand, a drop in copper price, or a rise in production costs per ton, which could be aggravated by an increase in taxation, could render the operation unprofitable and transform the entire ore body into waste.<sup>34</sup> Another major problem is competition from copper substitutes such as aluminum, steel and plastic which are making inroads into existing and potential copper markets.<sup>35</sup> Other problems include the high cost of exploration for ore bodies to replace the existing mines, fluctuations in copper price,<sup>36</sup> labor disputes,<sup>37</sup> and the difficulty of predicting supply and demand patterns upon which to base planning.<sup>38</sup>

## THE EVOLUTION OF STATE PROPERTY TAXATION OF THE MINING INDUSTRY IN ARIZONA

### HISTORY AND DEVELOPMENT

The early history of Arizona mine taxation has been well documented by other writers<sup>39</sup> and no purpose would be served in repeating

---

<sup>34</sup> For example, the Duval Corporation's Sierrita Mine has ore reserves of 414 million tons with an average copper content of only 0.35 percent or seven pounds of copper per ton. PENNZOIL UNITED, INC., ANNUAL REPORT 16 (1969). The mine will produce 130 million pounds of copper annually for the first five years, *id.*, 12 million pounds of molybdenum, and 455,000 ounces of silver annually. PENNZOIL UNITED, INC., ANNUAL REPORT 16 (1967). A drop in copper price could have serious consequences for this mine.

That there is a considerable degree of risk in this project may be intimated by the following extract from PENNZOIL UNITED, INC., ANNUAL REPORT 21 (1968):

Duval Sierrita Corporation, a subsidiary of Duval Corporation, [which is a 99 percent owned subsidiary of Pennzoil United, Inc.] has contracted with the General Services Administration (GSA) to develop a low-grade copper-molybdenum property . . . . The estimated cost of the facility is \$163,500,000 . . . . Duval Sierrita will be financed by advances from the GSA by an amount not exceeding \$83,000,000, bank loans to Duval Sierrita of \$48,750,000 (initially 70 percent of the bank loans will be guaranteed by GSA), with the remainder of the funds . . . to be supplied by Duval Corporation. The total required investment by Duval Corporation in Duval Sierrita (including loans) is estimated to be \$31,750,000 . . . . Under the terms of the GSA contract, the advances will be repaid by the sale of copper to the government at a contract price of 38¢ per pound. . . . *Duval Sierrita has not been consolidated with the Company since the debts of Duval Sierrita are not an obligation of Duval Corporation or of the Company* and since Duval Corporation will not receive any dividends from Duval Sierrita until the GSA advances and the bank loans have been repaid. (emphasis added).

<sup>35</sup> U.S. BUREAU OF MINES, *supra* note 26, at 282, 296.

<sup>36</sup> For a discussion of fluctuating copper prices see notes 154 & 155 and accompanying text *infra*.

<sup>37</sup> The major copper industry labor strikes of 1959-60 and 1967-68 are discussed in ARIZ. DEP'T OF MINERAL RESOURCES, THE COPPER MINING INDUSTRY 1966-70, at 1-11 (1969).

<sup>38</sup> U.S. BUREAU OF MINES, *supra* note 26, at 296; The Arizona Daily Star, Jan. 3, 1971, § E, at 7 (article by John A. Lentz, Vice-President and General Manager, Phelps Dodge Corporation).

<sup>39</sup> W. ROBERTS, STATE TAXATION OF METALLIC DEPOSITS 68-69, 72-73, 189-274

it here. Warren Roberts, who made a detailed comparative study of state taxation of metalliferous mines, has stated, however, that nowhere else has there been the constant political excitement over the subject of mine taxation as in Arizona.<sup>40</sup> He explained:

The mines have been extremely productive and well scattered, so that the entire population, during most of the territorial and state history, has taken sides on the question. Legislative sessions, like naval engagements, have merely been the more spectacular interludes in a constant maneuver of forces. At one time the valuation of mines was over half the total valuation of the state, and both the taxpayer and tax beneficiary could afford under such circumstances to devote a considerable amount of energy to the matter of taxation.<sup>41</sup>

Since Arizona achieved statehood in 1912 the mining industry has been subject to ad valorem property taxation in one form or another.<sup>42</sup> A statute in effect from 1913 to 1967 required that "[a]ll taxable property shall be assessed at its full cash value,"<sup>43</sup> but there was never substantial compliance with the statute by the county assessors or the State Tax Commission.<sup>44</sup> In 1951, an independent study for the State Legislative Committee on State Operations found that the property tax administration had nearly disintegrated.<sup>45</sup> The report cited a real property sample survey conducted in 1951 by the property tax division of the tax commission:

The 1951 survey shows a range of ratios [of the assessed valuation to the selling price] from a low of 1/5 of 1 percent to a high of 341 percent, and county averages from 14 percent for Gila County to 29 percent for Mohave County, with a state average of 22 percent.

The 1951 survey demonstrates particularly the tremendous inequities between assessments of individual parcels of property in all counties, for example, in high and low counties: Mohave

---

(Harv. Econ. Studies vol. 77, 1944); L. YOUNG, MINE TAXATION IN THE UNITED STATES 39-43, 198-99 (Univ. of Ill. Studies in the Social Sciences vol. 5, No. 4, 1917, reprinted 1967); Irvin, *History of Arizona Mining Taxation*, in UNIV. OF ARIZ., SYMPOSIUM ON MINE TAXATION 4-1 (1969); D. O'Neil, Forty Years of Mine Taxation in Arizona 1907-1946 (Dec. 1946). Roberts carefully documents the political struggle over mine taxation and the part it played in Arizona's quest for statehood.

<sup>40</sup> W. ROBERTS, *supra* note 39, at 189.

<sup>41</sup> *Id.*

<sup>42</sup> See authorities collected in note 39, *supra*.

<sup>43</sup> Ch. 35, § 11, [1913] Ariz. Laws 3d Spec. Sess. — (text of statute may be found in ARIZ. REV. STAT. ANN. § 42-227 (1956)). This statute was amended in 1967 to its present form which requires valuation of property at market (full cash) value but assessment at various percentages of full cash value for four classifications of property. ARIZ. REV. STAT. ANN. § 42-227 (Supp. 1970-71). The classifications are specified in *id.* § 42-136.

<sup>44</sup> See, e.g., 16 ARIZ. TAX COMM'N BIENNIAL REP. 6 (1942) (which called attention to the gross inequality of valuation procedures as between counties); Pay Dirt No. 160, Oct. 19, 1951, at 1. For an overview of Arizona taxation in 1964 when the legislature was attempting to revise the property tax laws, see Starrett, 18-part series on Arizona taxation, Tucson Daily Citizen, Jan. 27-Feb. 15, 1964.

<sup>45</sup> GRIFFENHAGEN & ASSOC., REPORT ON ARIZONA STATE TAXES—A SURVEY AND PROGRAM FOR IMPROVEMENTS 57 (Oct. 25, 1951).

County from 4 percent to 341 percent, and Gila County from 1 percent to 56 percent.<sup>46</sup>

This state of affairs existed in the face of the state law which required that the ratio of assessed valuation to the selling price should be 100 percent.<sup>47</sup>

In 1960, the Southern Pacific Company brought suit to recover taxes paid under protest for the first half of 1959, and to enjoin future discriminatory assessments arising from alleged systematic undervaluation practices by the county assessors.<sup>48</sup> The superior court granted the defendant counties' motion to dismiss the complaint for failure to state a claim. On appeal, the Supreme Court of Arizona held that the Southern Pacific Company had stated a claim for which injunctive relief was proper, but made its decision prospective only and refused to grant a refund of the taxes paid under protest.<sup>49</sup> The state was put on notice that such discriminatory practices would not be tolerated in the future and that plaintiffs would be entitled to relief even though it might entail adverse economic consequences to the state:<sup>50</sup>

unless or until the legislature exercises its authority and establishes classifications of property which permit an assessment at a different percentage of full cash value, courts have no alternative other than to prohibit officials from assessing appellant's properties at a different percentage of full cash value from other properties.<sup>51</sup>

---

<sup>46</sup> *Id.* at 59.

<sup>47</sup> Ch. 35, § 11, [1913] Ariz. Laws 3d Spec. Sess. — (text of statute may be found in ARIZ. REV. STAT. ANN. § 42-227 (1956)). In *Southern Pac. Co. v. Dewitt*, 288 F. Supp. 570, 573 (D. Ariz. 1968), the court noted that this statute "was completely disregarded by the county assessors. For many years the assessors assessed similar property at varying percentages of their full cash value, but always less than full cash value."

<sup>48</sup> *Southern Pac. Co. v. Cochise County*, 92 Ariz. 395, 377 P.2d 770 (1963). In June 1959 the plaintiff's property was assessed by the State Tax Commission. The plaintiff objected to the assessment and appeared before the State Tax Commission (then sitting in its capacity as the State Board of Equalization), and offered to show that the full cash value of its property in Arizona was \$73 million and that its property was assessed at not less than 89 percent of full cash value, but that other property subject to assessment by the respective county assessors was assessed at no more than 20 percent of full cash value on the average. The Board was asked to equalize the assessment either by lowering it to the average assessment of other property or by raising other assessments to full cash value. The request was denied by the Board. After paying the taxes under protest, the plaintiff brought this suit. *Id.* at 398, 377 P.2d at 772. For a discussion of the 1963 *Southern Pacific* decision, see Comment, *Standing of the Undervalued Property Owner*, 5 ARIZ. L. REV. 94 (1963).

<sup>49</sup> 92 Ariz. at 406, 377 P.2d at 778. The court took judicial notice that the taxing subdivisions of the state had long predicated their fiscal affairs upon discriminatory taxing practices, and reasoned that to grant a refund to the plaintiff, together with other similar claims, would have threatened the financial solvency of many of the taxing units in the state. The court noted that the plaintiff had tolerated the discriminatory practices since 1903 or earlier, and had made only perfunctory protest, never before seeking judicial intervention. Thus the court felt justified, perhaps under notions of estoppel, in denying the plaintiff's demand for a refund.

<sup>50</sup> *Id.* at 407, 377 P.2d at 779.

<sup>51</sup> *Id.* at 403, 377 P.2d at 776.

The court's statement provided the impetus for the state legislature to examine and amend the property tax laws.<sup>52</sup> In 1963 it created the Division of Appraisal and Assessment Standards<sup>53</sup> and charged its director with revaluing all the property in the state and making a study of assessment methods and standards.<sup>54</sup> As a result of this program, the legislature in 1967 enacted the present property tax laws.

#### CURRENT PROPERTY TAX LAWS APPLICABLE TO THE MINING INDUSTRY

The Arizona Constitution article 9, section 2 requires that "[a]ll property in the state not exempt under the laws of the United States or under this constitution, or exempt by law under the provisions of this section shall be subject to taxation to be ascertained as provided by law."<sup>55</sup> Mines are not included in any of these exemptions and are thus subject to the state property tax laws.<sup>56</sup> Another provision of the Arizona Constitution requires that "[a]ll taxes shall be uniform upon the same class of property within the territorial limits of the authority levying the tax, and shall be levied and collected for public purposes only."<sup>57</sup>

The legislature, in 1967, placed all real and personal property in one of four classes.<sup>58</sup> Class 1 includes producing mines and mining claims and

<sup>52</sup> Southern Pac. Co. v. Dewitt, 288 F. Supp. 570, 575 n.9 (D. Ariz. 1968).

<sup>53</sup> Ch. 43, [1963] Ariz. Laws 77-83. This law, with the exception of Ch. 43, § 1, 42-136, was repealed by Ch. 149, § 8, [1968] Ariz. Laws 486. Section 42-136 was repealed by Ch. 6, § 1, [1967] Ariz. Laws 3d Spec. Sess. 905.

<sup>54</sup> For a description of this study, see ARIZONA ACADEMY, ELEVENTH ARIZONA TOWN ON ARIZONA'S TAX STRUCTURE AND ITS ADMINISTRATION 101-09 (1967) (research report by Ariz. State Univ.).

<sup>55</sup> See also ARIZ. REV. STAT. ANN. § 42-271 (1956).

<sup>56</sup> See ARIZ. CONST. art. 9, § 2; ARIZ. REV. STAT. ANN. § 42-271 (1956).

<sup>57</sup> ARIZ. CONST. art. 9, § 1. This inclusion of the phrase "within the limits of the authority levying the tax," permits variation in the property tax rate in separate taxing districts within the state, without offending the uniformity clause. Thus there is not strict uniformity of property taxes throughout the state, but only within the jurisdictional limits of the unit levying a particular tax. Those taxes which are levied by the state require statewide uniformity, however.

<sup>58</sup> ARIZ. REV. STAT. ANN. § 42-136 (Supp. 1970-71):

There are established the following classes of property for taxation:

1. Class one:

(a) Flight property . . . .

(b) All real and personal property used in the operation of private car companies . . . .

(c) All real and personal property of railroad companies used in the continuous operation of a railroad . . . .

(d) Producing mines and mining claims, the personal property used thereon, the improvements thereto and the mills and smelters operated in conjunction therewith valued under the provisions of § 42-124.

(e) Standing timber.

2. Class two:

(a) All real and personal property used in the operation of telephone and telegraph companies . . . .

(b) All property, both real and personal, of gas, water and electric utility companies and pipeline companies . . . .

3. Class three:

All real and personal property devoted to any commercial or industrial use other than property included in classes one, two and four, including but not limited to land, the improvements thereto or any part of such

all associated property.<sup>59</sup> Class 1 properties are valued at market value or full cash value, and assessed for tax purposes at 60 percent of full cash value.<sup>60</sup> Nonproducing mines and mining claims<sup>61</sup> are not included in Class 1 and fall in Classes 3 or 4 according to their nature and use.<sup>62</sup>

There are two separate interests in public domain land of the United States upon which unpatented mining claims have been located: the fee simple in the land, which is in the United States, and the possessory interest in the mining claim, which is in the locator. The fee simple is exempt from taxation under the Arizona Constitution.<sup>63</sup> The locator's right in the claim

is held only as [a] possessory right until such time as patent is issued. *Guerin v. American Smelting, etc., Co.*, 28 Ariz. 160, 236 P. 684. The miner (locator) holds a qualified title dependent upon possession and maintained by compliance with local

land or improvements leased or rented for residential use.

4. Class four:

(a) All real property and the improvements thereto, if any, used for agricultural purposes, and all other real property and the improvements thereto, if any, not included in classes one, two and three.

(b) All personal property used for agricultural purposes, and all other personal property not included in classes one, two and three.

<sup>59</sup> ARIZ. REV. STAT. ANN. § 42-136(1)(d) (Supp. 1970-71). For text of statute see note 58, *supra*.

<sup>60</sup> ARIZ. REV. STAT. ANN. § 42-227 (Supp. 1970-71) which provides in part:

A. For property tax purposes the valuation of all taxable property shall be determined at its market value. The valuation of land and improvements thereon shall be determined separately. The combined valuation of all land and improvements shall not exceed the market value of the total property.

B. As a basis for determining the assessed valuation for the different classes of property specified in § 42-136, the following percentages shall apply:

1. Class one: sixty percent of its full cash value.
2. Class two: forty percent of its full cash value.
3. Class three: twenty-five percent of its full cash value.
4. Class four: eighteen percent of its full value.

ARIZ. REV. STAT. ANN. § 42-124 (Supp. 1970-71) provides for the valuation of all patented and unpatented producing mines, the personal property used thereon, the improvements thereto and the mills and smelters operated in conjunction therewith within the state by the Department of Property Valuation.

<sup>61</sup> Producing mine or mining claim is defined in ARIZ. REV. STAT. ANN. § 42-201 (9) (Supp. 1970-71) as

any mine or mining claim from which any coal, mineral or mineral substance, other than clay, sand, gravel, building stone or any mineral or mineral substance normally processed into artificial stone, has been extracted for commercial purposes at any time during a period of three years prior to the first Monday in January of the tax year.

<sup>62</sup> See *id.* § 42-136; Department of Property Valuation, Taxation of Mines and Utility Property, Arizona 1969 (mimeograph sheet distributed by department). Nonproducing mines and mining claims are valued by the county assessor of the county in which they are located. ARIZ. REV. STAT. ANN. § 42-221(B) (Supp. 1970-71).

If the nonproducing claims are used for a commercial or industrial purpose they will be placed in Class 3, but if they are used for agricultural, residential or other purposes not included in Classes 1, 2 or 3 they will be placed in Class 4.

<sup>63</sup> ARIZ. CONST. art. 9, § 2 which provides in part: "[t]here shall be exempt from taxation all federal . . . property." See also ARIZ. REV. STAT. ANN. § 42-271 (1956).

directions. He is not compelled to advance to patent nor to pay for the use of the land. His title is *not absolute* in a technical sense, nor secure in a practical sense, until he gets the fee simple title by issuance of a patent.<sup>64</sup>

The United States Supreme Court has held that unpatented mining claims are property in the fullest sense of the word and may be bought, sold, transferred, mortgaged, and inherited without infringing upon the title of the United States.<sup>65</sup> In *Elder v. Wood*,<sup>66</sup> the Court approved state taxation of the possessory interest in unpatented mining claims.

In general, the Supreme Court of Arizona has held that unpatented mining claims are possessory in nature and real rather than personal property.<sup>67</sup> For taxation purposes, however, an Arizona statute provides that "[r]eal estate" includes the ownership of, claim to, possession of or right of possession to, lands or patented mines,<sup>68</sup> and that "[p]ersonal property" includes property of every kind, both tangible and intangible, not included in the term real estate.<sup>69</sup> It is reasonable to conclude from these statutory definitions, as the Supreme Court of Arizona did by dicta, that unpatented mining claims are considered to be personal property for taxation purposes.<sup>70</sup> The Arizona statutes specifically provide for valuation, by the Department of Property Valuation, of both patented and unpatented mining claims which are part of a producing mine.<sup>71</sup>

Arizona does not tax nonproducing unpatented mining claims for their mineral value although they may be taxed if the surface is used for non-mineral purposes.<sup>72</sup> There appears to be no good reason for the non-mineral purpose exemption, since unpatented mining claims are personal property for taxation purposes. Class 3 of the classification statutes includes all personal property used for any commercial or industrial purposes other than property included in Classes 1, 2 or 4, and Class 3 includes all other personal property.<sup>73</sup> The only justification may be the difficulty of assigning a monetary value to the claim since any value possessed by the ore may be unknown or highly speculative. Under the present laws, an

<sup>64</sup> *Walkeng Mining Co. v. Covey*, 88 Ariz. 80, 85-86, 352 P.2d 768, 771 (1960).

<sup>65</sup> *Forbes v. Gracey*, 94 U.S. 762, 767 (1876); see *Elder v. Wood*, 208 U.S. 226, 232 (1908); *Belk v. Meagher*, 104 U.S. 279, 283 (1881).

<sup>66</sup> 208 U.S. 226, 232 (1908).

<sup>67</sup> *Sil-Flo Corp. v. Bowen*, 98 Ariz. 77, 83, 402 P.2d 22, 27 (1965); *Bagg v. New Jersey Loan Co.*, 88 Ariz. 182, 189, 354 P.2d 40, 44 (1960); *Whalley v. George*, 52 Ariz. 267, 275, 80 P.2d 449, 452 (1938).

<sup>68</sup> ARIZ. REV. STAT. ANN. § 42-201(10) (Supp. 1970-71).

<sup>69</sup> *Id.* § 42-201(8).

<sup>70</sup> *Whalley v. George*, 52 Ariz. 267, 275, 80 P.2d 449, 452 (1938); accord, 1968 OP. ARIZ. ATT'Y GEN. 20-21. See *Earhart v. Powers*, 17 Ariz. 55, 148 P. 286 (1915); *Waller v. Hughes*, 2 Ariz. 114, 11 P. 122 (1886). In *Earhart and Waller*, the court upheld the taxation of the possessory interest in unpatented mining claims as a tax on personal property.

<sup>71</sup> ARIZ. REV. STAT. ANN. § 42-124(A) (Supp. 1970-71).

<sup>72</sup> Interview with William Hanneaman, Mine Assessment Engineer, County Assessor's Office, Pima County, in Tucson, March 8, 1971. [hereinafter cited as Hanneaman interview].

<sup>73</sup> ARIZ. REV. STAT. ANN. § 42-136 (Supp. 1970-71).

arbitrary value could be assigned by the county assessor as is done in the case of nonproducing patented mining claims,<sup>74</sup> which are assessed at 18 or 25 percent of full cash value, depending on their use.<sup>75</sup>

The power to levy taxes including property taxes has been conferred on a number of political subdivisions of the state including counties,<sup>76</sup> cities and towns.<sup>77</sup> Once a year the State Tax Commission sets the state property tax rate,<sup>78</sup> the board of supervisors of each county sets the county tax rates for all purposes,<sup>79</sup> and the governing body of each city and town sets a municipal tax rate.<sup>80</sup> These rates are an amount per \$100 of assessed valuation which, when multiplied by the property's assessed valuation, establish the tax liability of each property owner. All of the taxing jurisdictions within the state must levy their property taxes upon the assessed valuations established by the Department of Property Valuation and the county assessors.<sup>81</sup>

While the state tax rate is set by the Tax Commission,<sup>82</sup> the state's property tax laws are administered by the director of the Department of Property Valuation,<sup>83</sup> an independent agency of the state government.<sup>84</sup> Finally, the functions of the state board of equalization are performed by another independent agency, the State Board of Property Tax Appeals.<sup>85</sup>

#### CONSTITUTIONALITY OF ARIZONA PROPERTY TAX LAWS

In *Apache County v. Atchison, Topeka & Santa Fe Railway*,<sup>86</sup> the two principal railroads in Arizona brought suit to recover property taxes paid under protest for 1968 and the first half of 1969. The railroads alleged that the Arizona property classification statutes<sup>87</sup> were unconstitutional, and thus rendered the assessed taxes invalid, on the grounds that

<sup>74</sup> In Pima County, for example, a value of \$80 per acre is assigned arbitrarily as the full cash value of patented mining claims. Hanneman interview, *supra* note 72.

<sup>75</sup> See note 62 *supra*.

<sup>76</sup> ARIZ. REV. STAT. ANN. § 11-201 (1956).

<sup>77</sup> ARIZ. CONST. art. 9, § 6, authorizes the legislature to confer on incorporated cities, towns and villages, the power to make local improvements by special assessments, or by special taxation of property benefited. It also authorizes the legislature to vest in all municipal corporations the power to assess and collect taxes for corporate purposes. See, e.g., ARIZ. REV. STAT. ANN. § 9-240(B)(26) (Supp. 1970-71) (town incorporated under common council government). Cities which have adopted home rule charters pursuant to ARIZ. CONST. art. 13, § 2, such as Phoenix, Yuma, and Tucson, may empower themselves to levy taxes through provisions in their charters. *Trigg v. City of Yuma*, 59 Ariz. 480, 130 P.2d 59 (1942); *Home Owners' Loan Corp. v. City of Phoenix*, 51 Ariz. 455, 77 P.2d 818 (1938).

<sup>78</sup> ARIZ. REV. STAT. ANN. §§ 42-108, -108.01 (Supp. 1970-71).

<sup>79</sup> *Id.* §§ 42-108.01(C), -304(A) (Supp. 1970-71).

<sup>80</sup> *Id.* §§ 42-485 (1956), -304(A) (Supp. 1970-71).

<sup>81</sup> *Id.* § 42-482 (1956).

<sup>82</sup> *Id.* §§ 42-108, -108.01.

<sup>83</sup> *Id.* § 42-123(A)(1) (Supp. 1970-71).

<sup>84</sup> *Id.* § 42-121(A).

<sup>85</sup> *Id.* § 42-141.

<sup>86</sup> 106 Ariz. 356, 476 P.2d 657 (1970), *appeal dismissed*, 91 S. Ct. 1257 (1971).

<sup>87</sup> ARIZ. REV. STAT. ANN. §§ 42-136, -227 (Supp. 1970-71).

the statutes (1) imposed an undue burden upon and discriminated against interstate commerce; (2) violated the due process clause of the Arizona constitution and the due process and equal protection clauses of the United States Constitution; and (3) violated the uniformity clause of the Arizona Constitution. The trial court declared the statutes unconstitutional on the third ground, placed the railroads in Class 2 (with an assessed valuation of 40 percent of full cash value) rather than in Class 1 (with an assessed valuation of 60 percent of full cash value), and ordered a refund, with interest at 6 percent, of the difference in tax liabilities.<sup>88</sup> On appeal the Supreme Court of Arizona reversed, declaring the statutes to be a constitutional exercise of legislative power.<sup>89</sup>

Although this case precludes further constitutional challenges to classification statutes by railroads, there is no similar bar against a mining company, since a railroad, which is a public utility having powers of eminent domain and operating as a carrier in interstate commerce, is readily distinguishable from a mine which has none of these characteristics, but instead is part of a privately controlled industry engaged in the extraction and processing of natural resources. Notwithstanding these differences, any similar challenge by a mining company is likely to be unsuccessful.

A mining company could not contend that the statutes impose a burden on interstate commerce. The mine products may enter interstate commerce eventually but early cases held that a tax on such products prior to entering interstate commerce is not a burden on interstate commerce.<sup>90</sup>

Moreover, the decision of the Supreme Court of Arizona in *Atchison* followed a pattern long established by United States Supreme Court decisions holding that separate classification of railroad property does not violate the equal protection clause of the federal constitution.<sup>91</sup> Under the equal protection clause the power of the state to classify for purposes of taxation is of wide range and flexibility,<sup>92</sup> but the classification may not be

---

<sup>88</sup> Brief for Appellee at 4, *Apache County v. Atchison, T. & S.F. Ry.*, 106 Ariz. 356, 476 P.2d 657 (1970).

<sup>89</sup> 106 Ariz. at 364, 476 P.2d at 665.

<sup>90</sup> *Oliver Iron Co. v. Lord*, 262 U.S. 172 (1923) (an occupation tax on the mining of iron ore was upheld although substantially all of the ore was immediately and continuously loaded on cars and shipped into other states); *Heisler v. Thomas Colliery Co.*, 260 U.S. 245 (1922) (a tax on anthracite coal when prepared and ready for shipment to a market in other states was held not to be an interference with interstate commerce). In *Oliver Iron Co.*, the Court said:

Mining is not interstate commerce, but, like manufacturing, is a local business subject to local regulation and taxation. . . . Its character in this regard is intrinsic, is not affected by the intended use or disposal of the product, is not controlled by contractual engagements, and persists even though the business be conducted in close connection with interstate commerce. 262 U.S. at 178-79.

<sup>91</sup> See, e.g., *Kentucky Railroad Tax Cases*, 115 U.S. 321 (1885). See also *Sholley, Equal Protection in Tax Legislation* 24 VA. L. REV. 229, 235 (1938), and cases cited therein.

<sup>92</sup> *Louisville Gas Co. v. Coleman*, 277 U.S. 32, 37 (1928).

arbitrary, and must be based on a real and substantial difference,<sup>93</sup> though the difference need not be great or conspicuous.<sup>94</sup>

There are many distinctive features of mines which would justify placing them in a class separate from other property. For example, mining is concerned with the extraction and depletion of natural resources; large ore bodies do not lend themselves to valuation by the same techniques as other property, i.e., by fair market value, because large ore bodies are rarely sold; and the ore body, which is the principal asset, is a diminishing asset. In *Heisler v. Thomas Colliery Co.*,<sup>95</sup> the United States Supreme Court sustained a tax imposed upon anthracite but not bituminous coal, and held that the classification was not unreasonable and arbitrary but satisfied the requirements of the equal protection clause because of basic differences between the two coals.<sup>96</sup>

The constitutionality of separate classification of mining property also gains support from the following language of the Supreme Court in *Lake Superior Mines v. Lord*:

Certainly, ores differ as much from other products of the land as anthracite coal does from the bituminous variety, and ore gives character to appellants' holdings. Lands chiefly valuable for ore are depreciated by its extraction, and probably will yield less and less under an *ad valorem* tax as the mining continues. The situation is very different where the principal value depends on other uses which do not deplete. The selection of the business of mining only, for imposition of the occupation tax, was not arbitrary and, certainly, we cannot say that the classification by the legislation now assailed was without any reasonable basis.<sup>97</sup>

The uniformity clause of the Arizona Constitution<sup>98</sup> has been interpreted to permit classification of property for the purposes of taxation.<sup>99</sup> In *Atchison*, the court extended this interpretation to allow the classification of similar articles of property into separate classes on the basis of use.<sup>100</sup> As demonstrated, mines can be placed in a separate class from other property. Thus the uniformity clause is no bar to the assessment of similar articles of property at a given percentage when used in the mining industry and at another percentage when used in a different industry or for a different purpose. For example, an air compressor may be assessed at 60

<sup>93</sup> *Southern Ry. v. Green*, 216 U.S. 400, 417 (1910).

<sup>94</sup> *Keeney v. New York*, 222 U.S. 525, 536 (1912).

<sup>95</sup> 260 U.S. 245 (1922). This case was cited by the Supreme Court of Arizona in *Apache County v. Atchison, T. & S.F. Ry.*, 106 Ariz. 356, 362, 476 P.2d 657, 663 (1970), *appeal dismissed*, 91 S. Ct. 1257 (1971).

<sup>96</sup> 260 U.S. at 257.

<sup>97</sup> 271 U.S. 577, 582 (1926) (tax on royalties from mineral lands).

<sup>98</sup> ARIZ. CONST. art. 9, § 1.

<sup>99</sup> *Southern Pac. Co. v. Cochise County*, 92 Ariz. 395, 400, 377 P.2d 770, 774 (1963); *Powell v. Gleason*, 50 Ariz. 542, 551, 74 P.2d 47, 52 (1937); *People's Fin. & Thrift Co. v. Pima County*, 44 Ariz. 440, 445, 38 P.2d 643, 645 (1934); *State Tax Comm'n v. Shattuck*, 44 Ariz. 379, 394, 38 P.2d 631, 637 (1934).

<sup>100</sup> 106 Ariz. at 360, 476 P.2d at 661.

percent of full cash value when used in a mine or at 18 percent when used on a farm.

It seems unlikely, therefore, that constitutional challenges to the Arizona classification statutes will be forthcoming from the mining industry.

## CLASSIFICATION OF MINE PROPERTY TAXES BY VALUATION METHODS

### FAIR MARKET VALUE

#### *Market Data*

Under the fair market value method used in Pennsylvania, the basis of valuation is actual value,<sup>101</sup> which has been construed to be synonymous with market value,<sup>102</sup> and has been defined as "the price which a purchaser, willing but not obliged to buy, would pay an owner, willing but not obliged to sell, taking into consideration all uses to which the property is adapted and might in reason be applied."<sup>103</sup> Tangible personal property is not subject to property taxation in Pennsylvania and there is no state tax on real estate. All real estate is subject to local taxation, however, except where exempted by law,<sup>104</sup> for all local purposes. The major mineral product of Pennsylvania is coal<sup>105</sup> which is taxed as real estate.<sup>106</sup>

If there have been recent bona fide sales of the tracts in question, or of tracts similarly situated in the same area and of like quality, the general selling price thus established would be the market value. If such information is not available, the market value may be established by the testimony of persons acquainted with the property, and whose knowledge and experience qualify them to form an intelligent judgment as to its proper valuation.<sup>107</sup> The prices paid in sales of similar property constitute the most easily applied standard for valuation. But when such information is not available, all other relevant factors must be considered,<sup>108</sup>

<sup>101</sup> PA. STAT. ANN. tit. 72, § 5020-402 (1968): "It shall be the duty of the . . . assessors . . . to assess . . . all objects of taxation . . . according to the actual value thereof, and at such rates and prices for which the same would bona fide sell." This is the general county assessment law valuation statute. Other similar statutes refer to particular taxing districts. *See, e.g., id.* § 5341.13 (assessments in counties of the first class).

<sup>102</sup> *United States Steel Corp. v. Board of Assessment & Revision of Taxes*, 422 Pa. 463, 465, 223 A.2d 92, 94 (1966).

<sup>103</sup> *Id.*

<sup>104</sup> PA. STAT. ANN. tit. 72, § 5020-201(a) (1968). Machinery, tools, appliances and other equipment used in mines, mills and factories are specifically exempted from taxation by this law.

<sup>105</sup> U.S. BUREAU OF MINES, DEPT. OF INTERIOR, MINERALS YEARBOOK, vol. 3, at 630 (1968).

<sup>106</sup> *Appeals of Mathies Coal Co.*, 435 Pa. 129, 133, 255 A.2d 906, 908 (1969).

<sup>107</sup> *Glen Alden Coal Co. v. Schuylkill County Comm'rs*, 345 Pa. 159, 167, 27 A.2d 239, 243 (1942).

<sup>108</sup> *Appeal of Lehigh Nav. Coal Co.*, 327 Pa. 327, 333, 193 A. 50, 53 (1937); *In re Hudson Coal Co.*, 327 Pa. 247, 251-52, 193 A. 8, 10-11 (1937). Factors

except that "scientific formulas" are accorded little weight.<sup>100</sup>

The validity of this valuation method is dependent upon the regular sale of typical mining properties. In the absence of such sales the method becomes wholly arbitrary and discretionary. It would have little useful application in Arizona where large copper mines rarely change hands,<sup>110</sup> and, when one does, the resulting financial transaction defies any attempt to relate it to the value of an individual mine.<sup>111</sup>

### *Capitalization of Future Net Proceeds*

In the absence of sufficient market data the value of a mine may be calculated by the capitalization of the present worth of the future net proceeds of the mine during its life. First, the annual net proceeds must be ascertained for each year of the life of the mine; this may be a uniform, or nonuniform, terminable annual series. Second, because a sum of money received now is worth more than the same sum received one year from now, the future net proceeds must be reduced to present worth by apply-

---

which must be considered in determining the market value of coal lands include: prices paid in sales of similar lands; physical features of the property; location and formation of coal strata; number, depth, thickness, pitch, basins, and proximity to outcrop of veins; character of separating rock formations; quality of the coal; whether the coal is gaseous or nongaseous; kind of overlying surface; availability and difficulty of mining coal; quantity of merchantable coal in the ground, allowing for mining losses; state of development of the property; demand for the product; and all the elements which a prudent purchaser would take into consideration. *Philadelphia & Reading Coal & Iron Co. v. Commissioners of Northumberland County*, 323 Pa. 185, 189, 186 A. 105, 108 (1936).

<sup>100</sup> *Appeal of Susquehanna Collieries Co.*, 338 Pa. 366, 369, 12 A.2d 99, 101 (1940); *In re Lehigh & Wilkes-Barre Coal Co.*, 298 Pa. 294, 300, 148 A. 301, 303 (1929).

<sup>110</sup> In 1945, the Supreme Court of Arizona took judicial notice that "seven-million-dollar mining properties" seldom change hands. *State Tax Comm'n v. Phelps Dodge Corp.*, 62 Ariz. 320, 329, 157 P.2d 693, 696 (1945). In 1970, there were nine mining properties in Arizona valued at more than \$25 million each. One of these, Morenci, was valued at \$168,848,000. See *Arizona Legislative Review*, *supra* note 1.

<sup>111</sup> A good illustration of such complexity is the merger of Magma Copper Company into Newmont Mining Corporation in May 1969. At that time, Magma, in addition to operating mines at San Manuel, and Superior, Arizona, was operating the San Manuel Arizona Railroad Company, and the Magma Arizona Railroad Company. The following is an extract from a letter to the Magma shareholders from the Magma board of directors:

The merger of Magma Copper Company into Newmont Mining Corporation, which owns 80.6% of Magma, was approved by the Boards of Directors of both companies on December 18, 1968, upon the terms publicly announced November 14, 1968, subject to the approval of the stockholders of both companies. Under the proposed merger terms, the owner of each share of Magma (other than Newmont) will receive 85/100ths of one share of a new \$4.50 cumulative convertible preferred stock of Newmont. Each share of the preferred stock will be convertible into 1.25 shares of Newmont common stock, and will be redeemable by Newmont after January 1, 1974 at \$104.50, declining by 50 cents per share annually thereafter to \$100. As a result of the merger, the effective annual yield in dividends with respect to each presently existing Magma share will increase to \$3.825 from the present dividend level of \$3.60 per share. MAGMA COPPER COMPANY, ANNUAL REPORT at 5 (1968).

ing a discount factor. The discount rate depends on a number of variables including the cost of borrowed capital, the risk of failure in operating the mine, and the desired profit level.

The simplest and most practical method of finding the present worth of an annual series is by the straight discount or compound interest method. This is a single rate formula which works equally well for a uniform or non-uniform annual series.<sup>112</sup>

The Hoskold formula, developed by H. D. Hoskold, a British coal mining engineer, is a two-rate formula which makes provision for a return on invested capital at one rate of interest and reinvests the balance of the annual net proceeds in a sinking fund at a second rate of interest.<sup>113</sup> The sinking fund is intended to return the original invested capital at the end of the life of the mine. The first rate of interest is known as the speculative or risk rate and the second rate, which is generally much lower, is known as the safe rate. The formula is based on the theory that the mining company will have accumulated all of its original capital in the sinking fund by the end of the life of the mine and may perpetuate the company's life by investing in another property.<sup>114</sup> Although the Hoskold formula is predicated on uniform annual net proceeds, it can also be used for non-uniform net proceeds,<sup>115</sup> but the calculations are cumbersome.<sup>116</sup>

<sup>112</sup> Uniform annual series:

$$P = A \left[ \frac{(1+i)^n - 1}{i(1+i)^n} \right]$$

where P = present sum of money  
A = uniform series of annual net proceeds  
i = interest or discount rate per year  
n = number of years

Non-uniform annual series:

the present worth of each annual amount must be found separately by the following formula and the sum of the amounts so found is the present worth of the series:

$$P = F \left[ \frac{1}{(1+i)^n} \right]$$

where F = non-uniform annual proceeds for one year.

E. GRANT & W. IRESON, *PRINCIPLES OF ENGINEERING ECONOMY* 33-34 (5th ed. 1970).

<sup>113</sup> H. HOSKOLD, *THE ENGINEER'S VALUING ASSISTANT* (1877).

<sup>114</sup> See C. BAXTER & R. PARKS, *EXAMINATION AND VALUATION OF MINERAL PROPERTY* 190-91 (4th ed. 1957).

The Hoskold formula may be expressed as:

$$V_p = \frac{A}{\frac{r}{R^n - 1} + r'}$$

where

V<sub>p</sub> = present worth  
r' = speculative rate to purchaser on his capital investment  
r = practicable safe rate on redemption of capital  
R = 1 + r  
A = uniform series of annual net proceeds  
n = number of years

*Id.* at 191-93.

<sup>115</sup> *Id.* at 208-13.

<sup>116</sup> Raymond, *Valuation of Mineral Property*, in A.I.M.E., SEELEY W. MUDD SERIES, *ECONOMICS OF THE MINERAL INDUSTRIES* 131, 132 (1964).

Other formulas have been developed from the Hoskold formula.<sup>117</sup> One of these, the Morkill formula, follows Hoskold's premise of separating the annual net proceeds into two parts and paying part as a return on capital and reinvesting the other part in a sinking fund to redeem capital, but differs on the apportionment of the two parts.<sup>118</sup> The same rate of interest is used for both parts of the Morkill formula,<sup>119</sup> and the net effect for a uniform annual series is the same as the single-rate straight discount or compound interest method.<sup>120</sup>

In Arizona, all taxable property must be valued at market value<sup>121</sup> which is synonymous with full cash value.<sup>122</sup> The legislature has given no guidance as to the valuation methods to be used other than approving the use of standard appraisal methods and techniques.<sup>123</sup> The Department of Property Valuation is charged with finding the full cash value of all patented and unpatented producing mines, including personal property, improvements, mills and smelters operated in conjunction with the mines.<sup>124</sup>

In 1931, the Supreme Court of Arizona implied its approval of a formula based on the capitalization of future net proceeds as a valuation method for producing mines,<sup>125</sup> and in 1932 expressly approved it.<sup>126</sup> In the latter case the court said:

The trial court in fixing the value of the mine in question followed the usual and correct rule of estimating the probable gross revenue to be received from the ore presumably contained in the mine; deducting therefrom the probable cost of extraction, reduction, and selling the product of the ore, including therein all factors of cost, and reducing the difference, which would be the net value of the product, to its present worth, based upon such net value and the length of time it would probably take to produce it. It is conceded as it must be, that this formula is the proper one to be used in determining the actual cash value for taxation of a producing mine at any particular time.<sup>127</sup>

<sup>117</sup> The O'Donahue, Morkill and Grimes-Craig formulas are explained in C. BAXTER & R. PARKS, *supra* note 114, at 345-56.

<sup>118</sup> *Id.* at 350.

<sup>119</sup> *Id.* at 352.

<sup>120</sup> *Id.* at 353. The Morkill formula, *id.* at 351, may be expressed in the same form as the single-rate compound interest formula. See note 112 *supra*. See S. TRUSCOTT, *MINE ECONOMICS* 238 (3d rev. ed. J. Russell, 1962).

<sup>121</sup> ARIZ. REV. STAT. ANN. § 42-227(A) (Supp. 1970-71).

<sup>122</sup> *Id.* § 42-201(7). The two terms are defined by this statute as the estimate of value that is derived annually by the use of standard appraisal methods and techniques.

<sup>123</sup> *Id.* § 42-201(7).

<sup>124</sup> *Id.* § 42-124(A).

<sup>125</sup> State Tax Comm'n v. United Verde Extension Mining Co., 39 Ariz. 136, 142-43, 4 P.2d 395, 397, *aff'd on rehearing*, 39 Ariz. 331, 6 P.2d 889 (1931).

<sup>126</sup> State Tax Comm'n v. Magma Copper Co., 41 Ariz. 97, 99, 15 P.2d 961, 962 (1932).

<sup>127</sup> *Id.* The court adopted this formula in the face of the statutory definition of "full cash value" which was in effect at that time: "Full cash value" means the price at which property would sell if voluntarily offered for sale by the owner upon such terms as property is usually sold, and not the price which might be realized if the property were sold at forced sale." Ch. 35, §§ 9-11 [1913] Ariz.

The court has stressed that "[i]t is the present worth of the future profits and not the past profits which determines the value of a producing mine."<sup>128</sup> Although only the Hoskold formula has been approved by name,<sup>129</sup> under the court's ruling, any one of the previously described formulas may be used for valuing mines.

The State Tax Commission until 1963, and now the Department of Property Valuation, have had complete discretion within these bounds to formulate valuation methods for the mines. The Hoskold formula was used for a number of years after 1931<sup>130</sup> but there gradually evolved a process of negotiation between the State Tax Commission and the taxpaying mine.<sup>131</sup>

At the present time the Department of Property Valuation considers both the Hoskold and Morkill formulas in arriving at the present value of the annual net proceeds of a producing mine.<sup>132</sup> The department determines the annual net proceeds by sending out a complex set of forms for the mine officials to complete and submit to the department.<sup>133</sup> The information requested includes total ore reserves, average grade, annual rate of production, projected life of the mine, percentage of copper recovered, values of all products and by-products, detailed production costs, and a list of all depreciable assets. Depletion of ore and depreciation of plant and equipment figures are requested but these are not allowed as cost deductions.<sup>134</sup> Explanatory cover letters which accompany the forms state the metal prices which are to be used in calculating gross proceeds.<sup>135</sup>

---

Laws 3d Spec. Sess. — (text of statute may be found in ARIZ. REV. STAT. ANN. § 42-227 (1956)). The reason for apparently ignoring the statutory definition of full cash value was clarified in *State Tax Comm'n v. Phelps Dodge Corp.*, 62 Ariz. 320, 329, 157 P.2d 693, 696 (1945), where the court explained that the rule was difficult to apply to the valuation of large producing mines because such properties seldom change hands.

<sup>128</sup> *State Tax Comm'n v. Phelps Dodge Corp.*, 62 Ariz. 320, 332, 157 P.2d 693, 698 (1945).

<sup>129</sup> *State Tax Comm'n v. Eagle Picher Mining & Smelting Co.*, 73 Ariz. 372, 374, 241 P.2d 804, 806 (1952).

<sup>130</sup> D. O'Neil, *supra* note 39, at 3.

<sup>131</sup> GRIFFENHAGEN & ASSOC., *supra* note 45, at 56.

<sup>132</sup> Headington, *Mine Tax Valuation Techniques*, in UNIV. OF ARIZ., SYMPOSIUM ON MINE TAXATION 6-1, at 6-4 (1969).

<sup>133</sup> Department of Property Valuation Forms # 12 Min. (1-70), # 12A Min. (1-70), # 11 Min. (1-68), # 11 Min. Supp. I (1-70), and # 11 Min. Supp. II (Rev. 1-70). These forms were used for the 1970 valuations.

<sup>134</sup> Discount formulas such as the Hoskold formula allow for the recovery of capital by sinking funds. To allow the deduction of depletion and depreciation allowances would, in effect, give a double deduction for these items. See C. BAXTER & R. PARKS, *supra* note 114, at 291; First Hugh Exton McKinstry Memorial Lectures by Dr. John K. Gustafson, President, Homestake Mining Company, at Harvard University, Department of Geological Sciences, May 19-20, 1965, reprint at 11.

<sup>135</sup> Copper: "weighted average of the Arizona selling prices for 1964 to 1968 inclusive, which is 39.14 cents per pound."

Molybdenum: "the average of the E & MJ Domestic molybdenum concentrate prices of 1960 to 1969 inclusive, which for the contained Mo in MoS<sub>2</sub> is 1.502 dol-

Another instruction states that in estimating costs for future years, no allowance is to be made for inflation with respect to the costs of labor, supplies or services.<sup>136</sup> Only factors, such as labor contracts, existing at the time of filing the forms may be considered.<sup>137</sup> The director of the Department of Property Valuation has the statutory power to examine the records of the property owner to verify the submitted facts.<sup>138</sup> In the Hoskold formula, a safe rate of 6 percent, and a risk rate of 10 percent for open pit mines and 12 percent for underground mines is used in Arizona.<sup>139</sup>

The Hoskold method of capitalizing future net proceeds has been criticized as being economically unsound.<sup>140</sup> This should not be a major problem of property taxation in Arizona, however, since these deficiencies can be overcome by using the single-rate straight discount formula. The Department of Property Valuation professes to use the latter formula in the form of the Morkill formula in conjunction with the Hoskold formula.<sup>141</sup> It is fully within the established judicial standards for the department to rely solely on the straight discount formula and thus eliminate any problems which could arise through the use of Hoskold's method. The single-rate formula is in much wider use in the mining industry than the other formulas.<sup>142</sup>

A much greater problem, which is less easily resolved, arises through the use of any one of these capitalization formulas. Although the formulas will precisely discount any given annual net proceeds to present

lars per pound and for MoO<sub>3</sub> is 1.686 dollars per pound."

Silver: "the average of the E & MJ, New York (H & H) silver prices for 1965 to 1969 inclusive, which is 161.417 cents per troy ounce." Cover letter from Arlo Woolery, Director of the Department of Property Valuation, which accompanied Form #12 Min. (1-70) when the forms were sent out for 1970.

<sup>136</sup> *Id.* New forms are sent out each year thus affording an opportunity to update costs as they change from year to year.

<sup>137</sup> *Id.*

<sup>138</sup> ARIZ. REV. STAT. ANN. § 42-125(A)(1) (Supp. 1970-71).

<sup>139</sup> [A]fter reviewing engineering opinion, statistics of interest rates and reports by financial analysts, the Director selects the risk rate and the safe rate; since 1968, the former has been ten percent for open-pit mines and twelve percent for underground mines—the safe rate continues to be six percent compounded annually.

Letter from Robert C. Headington, Economist, Utilities and Mines Division, Arizona Department of Property Valuation, to the author, Oct. 5, 1970.

<sup>140</sup> See, e.g., E. GRANT & W. IRESON, *supra* note 114, at 125; H. GUTHMAN, ANALYSIS OF FINANCIAL STATEMENTS 450 n.12 (4th ed. 1953); L. PRESTON, EXPLORATION FOR NON-FERROUS METALS, AN ECONOMIC ANALYSIS 54-58 (1960); Church, *Discount Formulas in Valuation of Wasting Assets*, 121 ENGINEERING & MINING JOURNAL-PRESS No. 1, 8-12 (Jan. 2, 1926); Eldridge, *Is Use of the Hoskold Formula Justified?*, 150 ENGINEERING & MINING J. No. 8, 72-74 (Aug. 1949); Jones, *Economic Analysis for Mining Ventures and Projects*, in A.I.M.E., SEELEY W. MUDD SERIES, SURFACE MINING 997, at 1006 (1968). *But see* Pardee, *The Hoskold Formula Is Justified*, 151 ENGINEERING & MINING J. No. 1, 76-77 (Jan. 1950) (a reply to Eldridge's article).

<sup>141</sup> See note 132 *supra*.

<sup>142</sup> S. TRUSCOTT, *supra* note 120, at 243; Raymond, *supra* note 116, at 132; First Hugh Exton McKinstry Memorial Lectures, *supra* note 134, at 5.

value, the resultant valuation is only as accurate as the input information. It depends on how successfully the mine life, the discount rates and the future annual net proceeds have been estimated.<sup>143</sup> Some of the variables which make prediction of these factors difficult are: inflation;<sup>144</sup> changing labor contracts; fluctuating interest rates; fluctuating metals prices; competition from foreign producers and substitute metals if the price of copper goes too high;<sup>145</sup> ore reserves which may change with fluctuating prices and costs; unforeseen geological conditions such as lower grade ore than expected; adverse ground conditions such as an unstable pit slope in an open pit mine or a collapsed shaft in an underground mine; amenability to metallurgical treatment; and technological change in metallurgy or equipment.

In order to put this problem in perspective, it will be helpful to examine what effect a variation in any one of these factors will have on the valuation of a mine and consequently on the tax liability of that mine.<sup>146</sup> The effects can be seen most readily by the use of a simple model: an open pit copper mine producing 25,000 tons of ore per day, copper ore grade of 0.6 percent, producing 100 million pounds of copper per year, and no other significant metal values present. This could be a typical, low-grade, Arizona copper mine.<sup>147</sup> Assume further that the mine is located in a taxing district where the total annual state and local tax rate is \$7 per \$100 of assessed valuation.

1. *Life of the Mine.* The life of the mine in years is calculated by dividing the proposed annual rate of ore production in tons into the total known ore reserves in tons. The life of the mine will change if the annual rate of production is increased or decreased, or if the total known ore reserves increase or decrease. These changes could be attributable to a successful exploration program or a change in copper prices which transforms former waste into ore or vice versa. Table III demonstrates that a change in the length of life will have a major effect on the present value of

---

<sup>143</sup> S. TRUSCOTT, *supra* note 120, at 237.

<sup>144</sup> The Department of Property Valuation eliminates the thorny problem of inflation by forbidding its consideration. See note 136 *supra*. This may be a simple way of eliminating the problem, but it is not realistic.

<sup>145</sup> It is a mistaken notion that all copper mining companies welcome high copper prices. When the difference in prices between copper and aluminum increases beyond an accepted range, consumers start looking to aluminum as a substitute for copper, and, once having switched, that consumer is usually lost permanently. Then, as demand falls for high-priced copper, the price falls again, but the copper producers are left with a permanently reduced market for that use. Thus, some copper miners prefer a steadier copper price, not overly higher than the accepted range above that of aluminum. Interview with Arthur Hall, in Tucson, March 9, 1971. Mr. Hall is a former Vice President of Southern Peru Copper Corporation, and was long associated with American Smelting and Refining Company in various capacities.

<sup>146</sup> The following analysis was suggested by the treatment of this subject in S. TRUSCOTT, *supra* note 120, at 244-46.

<sup>147</sup> The model is not intended to resemble any existing mine, but is purely hypothetical.

TABLE III: EFFECT ON PRESENT WORTH OF VARYING THE LIFE OF THE MODEL MINE

Life of mine in years n	Annual net proceeds <sup>a</sup> A	Discount factor <sup>b</sup> at 10 percent discount $\frac{(1+i)^{n-1}}{i(1+i)^n}$	Present worth of mine (full cash value) $P=A \left[ \frac{(1+i)^{n-1}}{i(1+i)^n} \right]$	Assessed value (60 percent of full cash value)	Annual tax at \$7 per \$100 of assessed valuation
3	\$4,000,000	2.487	\$ 9,948,000	\$ 5,968,800	\$ 417,816
5	4,000,000	3.791	15,164,000	9,098,400	636,888
10	4,000,000	6.144	24,745,000	14,745,600	1,032,192
15	4,000,000	7.606	30,424,000	18,254,400	1,277,808
20	4,000,000	8.514	34,056,000	20,433,600	1,430,352
25	4,000,000	9.007	36,308,000	21,784,800	1,524,936
30	4,000,000	9.427	37,708,000	22,624,800	1,583,736
35	4,000,000	9.644	38,576,000	23,145,600	1,620,192
40	4,000,000	9.779	39,116,000	23,469,600	1,642,872
45	4,000,000	9.863	39,452,000	23,671,200	1,656,984
50	4,000,000	9.915	39,660,000	23,796,000	1,665,720
infinite life	4,000,000	10.000	40,000,000	24,000,000	1,680,000

<sup>a</sup> Price of copper was assumed to be 40 cents per pound to simplify calculations. Department of Property Valuation used 39.14 cents per pound in 1970. See note 135 *supra*. Based on annual gross proceeds of \$40 million (100,000,000 pounds of copper at 40 cents per pound) and production costs of \$36 million, annual net proceeds would be \$4 million. Annual net proceeds are assumed to be uniform for the life of the mine.

<sup>b</sup> The discount factor is taken from E. GRANT & W. IRASON, *supra* note 112, at 610, col. 6.

<sup>c</sup> Annual net proceeds are discounted to present worth by a single-rate straight discount formula (see note 112 *supra*), using a discount rate of 10 percent since this is the figure in current use by the Department of Property Valuation. See note 139 *supra*.

a mine with a short life but a rapidly decreasing effect as the life of the mine increases.

Ore reserves can be delineated fairly accurately by drilling in large, low-grade, relatively uniform porphyry copper ore bodies such as those in Arizona. The ore reserves and the annual rate of production are established and calculated by the mining company, subject to auditing by the Department of Property Valuation. Hence the calculation of the mine life is entirely in the hands of the taxpayer. There is no discretion allowed the Department of Property Valuation in setting this figure.

Most of the large copper mines in Arizona have long lives ahead of them, many in excess of 30 years. As shown in Table III, a miscalculation or change in the length of life of a mine with a long future life, from 30 to 35 years for example, will have only a modest effect on the mine's valuation and its property tax liability. A mine with only a short remaining life, such as the Lavender mine, however, will be acutely affected by a 5-year change in life. This method of valuation substantially discourages the owners of a mine with a short prospective life from searching for further extensions of the ore body. At that stage in the life cycle of the mine, ore will be mined from the deepest levels at the highest cost. The extra tax burden which would be incurred by finding more ore, which would be taxed in the ground, may be sufficient to render the mine unprofitable and thus deter the owners from further exploration. Thus the mine may be forced to close prematurely, because the tax system penalized exploration. Ironically, the community will lose not only employment, but also those tax revenues which the mine would have generated during an extended life if the property tax had been levied under a different system. By prematurely closing the mine, corporation income tax, transaction privilege tax and the individual income taxes of the workers will be lost. This argument of course does not apply to mines with long prospective lives. There is little deterrent to further exploration since any ore discovered will be so highly discounted that it will have little present worth. Even mines which have had a long life, however, will be affected at the time they approach depletion and their closure may be hastened by a few years.

2. *Discount Rates.* The discount rates are set by the director of the Department of Property Valuation,<sup>148</sup> and are wholly discretionary. Since 1968 the risk rate has been 10 percent for open pit and 12 percent for underground mines, and the safe rate has been 6 percent compounded annually.<sup>149</sup> Tables IV and V were calculated for the model mine using the Hoskold formula to show the effect of varying either the risk rate,

---

<sup>148</sup> See note 139 *supra*.

<sup>149</sup> *Id.*

TABLE IV: EFFECT ON PRESENT WORTH OF VARYING THE RISK RATE IN THE HOSKOLD FORMULA

Safe rate $r$	Risk rate $r^1$	Hoskold formula discount factor <sup>a</sup> $\frac{1}{\frac{r}{R^{n-1}} + r^1}$	Annual net proceeds <sup>b</sup> A	Present worth of mine (full cash value) $P = A \left[ \frac{1}{\frac{r}{R^{n-1}} + r^1} \right]$	Assessed value (60 percent of full cash value)	Annual tax at \$7 per \$100 of assessed valuation
6%	6%	11.4699	\$4,000,000	\$45,879,600	\$27,527,760	\$1,926,943
6%	8%	9.3297	4,000,000	37,318,800	22,391,280	1,567,389
6%	9%	8.5335	4,000,000	34,134,000	20,480,400	1,433,628
6%	10%	7.8626	4,000,000	31,450,400	18,870,240	1,320,916
6%	11%	7.2894	4,000,000	29,157,600	17,494,560	1,224,619
6%	12%	6.7942	4,000,000	27,176,800	16,306,080	1,141,425

<sup>a</sup> Discount factor is taken from C. BAXTER & R. PARKS, *supra* note 114, at 402. Annual net proceeds are discounted to present worth by the two-rate Hoskold formula (see note 114 *supra*) keeping the safe rate constant at 6 percent, which is the figure in current use by the Department of Property Valuation (see note 139 *supra*) and varying the risk rate.

<sup>b</sup> Price of copper was assumed to be 40 cents per pound to simplify calculations. Department of Property Valuation used 39.14 cents per pound in 1970, see note 135 *supra*. Based on annual gross proceeds of \$40 million (100,000,000 pounds of copper at 40 cents per pound), and production costs of \$36 million, annual net proceeds would be \$4 million. Annual net proceeds are assumed to be uniform for the life of the mine, which is assumed to be 20 years.

Table IV, or the safe rate, Table V, while holding all other factors constant. It will be seen from Table IV that the present worth of the mine, and consequently the mine's tax liability, increases as the risk rate is decreased. A decrease of 1 percent in the risk rate would cause an increase of more than 8 percent in the mine's tax burden, and an increase of 1 percent would decrease the tax burden by more than 7 percent. These are substantial changes.

If the risk rate is made equal to the safe rate, as indicated on line 1 of Table IV, the net effect is to convert the Hoskold formula into a single-rate straight discount formula.<sup>150</sup> Normally the Hoskold formula will give lower valuations than the single-rate straight discount method,<sup>151</sup> and for that reason is preferred by mining companies for the computation of property tax valuations. When the risk rate is made equal to the safe rate there is no difference between the two methods.

Table V shows that a decrease in the safe rate will cause a decrease in the mine valuation (this is the opposite effect of a change in the risk rate), and an increase in the safe rate will increase the valuation. A one percent change in the safe rate will cause less than a 2½ percent change in the tax liability, however. Thus it is clear that a change in the risk rate is of much greater moment than a change in the safe rate.<sup>152</sup>

Mining ventures vary in the degree of risk of failure. The discount rates should reflect the degree of risk, the less the mine is worth. The higher the risk, therefore, the higher should be the risk rate and the lower the safe rate. The uniform discount rates used in Arizona do not reflect this variation in risk from mine to mine.

It is perhaps an even greater weakness of this system of mine valuation that the director of the Department of Property Valuation has so much discretion in establishing discount rates. In the current inflationary economy, interest rates have fluctuated wildly during the last few years, making the task of choosing discount rates for mine valuation formulas a formidable one.<sup>153</sup> The director is exposed unnecessarily to pressure from mining and non-mining groups to lower or raise the mine valuations by changing the discount rates. Furthermore, a change in personnel in the department could result in a change in interest rates. A one percent change of the discount rate would cause a substantial change in valuation,

---

<sup>150</sup> First Hugh Exton McKinstry Memorial Lectures, *supra* note 134, at Slide III.

<sup>151</sup> This assumes that the same risk rate is used in both formulas. The difference in valuations produced by the two formulas is well illustrated by a graph in First Hugh Exton McKinstry Memorial Lectures, *supra* note 134, at Slide IV.

<sup>152</sup> See C. BAXTER & R. PARKS, *supra* note 114, at 226.

<sup>153</sup> Debates have always raged over the proper discount rates to use. See the discussions of this problem in C. BAXTER & R. PARKS, *supra* note 114, at 222-26; W. ROBERTS, *supra* note 39, at 16-22.

TABLE V: EFFECT ON PRESENT WORTH OF VARYING  
THE SAFE RATE IN THE HOSKOLD FORMULA<sup>a</sup>

Safe rate $r$	Risk rate $r^1$	Hoskold formula discount factor <sup>a</sup> $\frac{1}{\frac{r}{Rn-1} + r^1}$	Annual net proceeds <sup>b</sup> $A$	Present worth of mine (full cash value) $P=A \left[ \frac{1}{\frac{r}{Rn-1} + r^1} \right]$	Assessed value (60 percent of full cash value)	Annual tax at \$7 per \$100 of assessed valuation
4%	10%	7.4861	\$4,000,000	\$29,944,400	\$17,966,640	\$1,257,664
5%	10%	7.6780	4,000,000	30,712,000	18,427,200	1,289,904
6%	10%	7.8626	4,000,000	31,450,400	18,870,240	1,320,916

<sup>a</sup> The same conditions apply to this table as to Table IV (see notes to Table IV *supra*) with one exception. In Table V the risk rate is kept constant at 10 percent, which is the figure in current use by the Department of Property Valuation (see note 139 *supra*) and the safe rate is varied.

TABLE VI: AVERAGE ANNUAL COPPER PRICE<sup>a</sup>

Year	Price (cents per pound)	Year	Price (cents per pound)	Year	Price (cents per pound)
1950	21.325	1957	29.576	1964	31.960
1951	24.200	1958	25.764	1965	35.017
1952	24.200	1959	31.182	1966	36.170
1953	28.798	1960	32.053	1967	38.226
1954	29.694	1961	29.921	1968	41.847
1955	37.491	1962	30.600	1969	47.534
1956	41.818	1963	30.600	1970	57.7

<sup>a</sup> The prices through 1969 are taken from 171 *ENGINEERING & MINING J. No. 3* at 84 (March 1970). The 1967 figure represents only the first 8 months of 1967 and the 1968 figure represents only the last 9 months of 1968. Trading was suspended during the intervening seven months owing to the copper strike. *Id.* The 1970 average was computed from the monthly figure published in the *Engineering and Mining Journal*.

The prices quoted are U.S. producer delivered because:

COPPER prices, domestic, in the trade are quoted on a delivered basis, that is, delivered at consumers' plants. Delivery costs vary with the destination. For the f.o.b. refinery quotation, the average shipment cost is deducted. Beginning Jan. 2, 1970, the average differential between delivered and f.o.b. prices is taken at 0.500 cents per pound. 172 *ENGINEERING & MINING J. No. 2*, at 20 (Feb. 1971).

but would be difficult to challenge as an abuse of discretion since honest and skilled men could differ by that amount in a fluid economy.

3. *Annual Net Proceeds.* The annual net proceeds are the difference between the annual gross proceeds of the mine realized from the sale of metal, and the cost of producing that metal. An increase or decrease in annual net proceeds can result from a change in any one of a number of unrelated factors. Some of these factors are: a change in metal prices; major equipment breakdowns; encountering lower grade ore than anticipated; metallurgical problems, for example where the nature of the ore changes so that the ore does not respond as well to metallurgical treatment and the percentage recovery of metal falls; the development of unstable pit slopes; and encountering adverse rock conditions under ground which require more expensive stope support.

The most volatile of these factors in the copper industry is the price of copper. Table VI shows the average annual price of copper in cents per pound since 1950. It should be noted that the annual average price peaked in 1956 at almost 42 cents per pound, followed the next year by a drop to less than 30 cents. The price then fluctuated for several years and soared to a new annual average high of almost 58 cents in 1970.<sup>154</sup>

<sup>154</sup> Even so there still didn't seem to be enough copper and as we entered 1970, the administration in Washington appointed a special subcommittee of the Cabinet Committee on Economic Policy to investigate (sic) copper marketing.

Chief questions: Why the big discrepancy between United States and

TABLE VII: AVERAGE MONTHLY COPPER PRICE<sup>a</sup>

<i>Month</i>	<i>Price</i> <i>(cents per pound)</i>	<i>Month</i>	<i>Price</i> <i>(cents per pound)</i>
Dec. 1969	52.893	Sept. 1970	60.1
Jan. 1970	56.253	Oct. 1970	59.0
Feb. 1970	suspended	Nov. 1970	56.1
Mar. 1970	56.5	Dec. 1970	53.1
Apr. 1970	59.8	Jan. 1971	51.525
May 1970	60.2	Feb. 1971	50.35
June 1970	60.2	Mar. 1971	50.55
July 1970	60.1	Apr. 1971	52.83
Aug. 1970	60.1		

<sup>a</sup> See note to Table VI.

Table VII should be consulted in order to preclude the impression that the copper price is irreversibly rising. This table shows that the price fluctuates considerably within each 12-month span, and that after having peaked at a monthly average of 60 cents per pound for several months the price is now considerably lower.<sup>155</sup>

As an example of the exaggerated effect on the present worth of a mine and the consequent tax liability of a small change in annual net proceeds, Table VIII demonstrates the effect on present worth of varying the price of copper within the limits traced by the copper price in the last 6 years, while keeping all other factors constant.<sup>156</sup> The Department of Property Valuation used a copper price of 39.14 cents per pound in 1970.<sup>157</sup> Table VIII shows that an increase in price of 1 cent, or 2 1/2 percent, would cause an increase of more than 33 percent in the present worth and tax liability of the model mine. A decrease in price of 1 cent per pound would have an equally exaggerated but downward effect on the present worth and tax liability of the mine.

The director of the Department of Property Valuation has wide discretion in selecting the copper price. In 1970 he chose the price by taking a weighted average of the Arizona selling prices for 1964 to 1968, inclusive, which gave 39.14 cents per pound.<sup>158</sup> This was a 5-year average.

---

foreign prices (London Metal Exchange prices were about 75 1/2 cents at the time)? Why aren't the high prices bringing out more copper? 171 ENGINEERING & MINING J. No. 3, at 69 (March 1970).

There are no simple answers to these questions.

<sup>155</sup> A brief commentary on these monthly price changes may be found in 171 ENGINEERING & MINING J. No. 1, at 33 (Jan.); No. 2, at 33 (Feb.); No. 3, at 34 (March); No. 4, at 33 (April); No. 5, at 33 (May); No. 6, at 33 (June); No. 7, at 33 (July); No. 8, at 34 (Aug.); No. 9, at 33 (Sept.); No. 10, at 33 (Oct.); No. 11, at 17 (Nov.); No. 12, at 17 (Dec. 1970); 172 ENGINEERING & MINING J. No. 1, at 13 (Jan.); No. 2, at 17 (Feb.); No. 3, at 21 (March); No. 4, at 13 (April); No. 5, at 13 (May 1971).

<sup>156</sup> See Table VI for the range of copper prices during the last 6 years.

<sup>157</sup> See note 135 *supra*.

<sup>158</sup> *Id.*

TABLE VIII: EFFECT ON PRESENT WORTH OF VARYING  
THE COPPER PRICE

Copper Price (cents per pound)	Annual gross proceeds <sup>a</sup> (in millions)	Annual production costs (in millions)	Annual net proceeds (in millions) A	Discount factor <sup>b</sup> at 10 percent discount $\frac{1}{i(1+i)^n} - 1$	Present worth of mine (full cash value) $P = A \left[ \frac{(1+i)^n - 1}{i(1+i)^n} \right]$	Assessed value (60 percent of full cash value)	Annual tax at \$7 per \$100 of assessed valuation
36	\$36	\$36	0	8.514	0	0	0
37	37	36	\$ 1	8.514	\$ 8,514,000	\$ 5,108,400	\$ 357,588
38	38	36	2	8.514	17,028,000	10,216,800	715,176
39	39	36	3	8.514	25,542,000	15,325,200	1,072,764
40	40	36	4	8.514	34,056,000	20,433,600	1,430,352
41	41	36	5	8.514	42,570,000	25,542,000	1,787,940
42	42	36	6	8.514	51,084,000	30,650,400	2,145,528
43	43	36	7	8.514	59,598,000	35,758,800	2,503,116
44	44	36	8	8.514	68,112,000	40,867,200	2,860,704
45	45	36	9	8.514	76,626,000	45,975,600	3,218,292
46	46	36	10	8.514	85,140,000	51,084,000	3,575,880
47	47	36	11	8.514	93,654,000	56,192,400	3,933,468
48	48	36	12	8.514	102,168,000	61,300,800	4,291,056
49	49	36	13	8.514	110,682,000	66,409,200	4,648,644
50	50	36	14	8.514	119,196,000	71,517,600	5,006,232

<sup>a</sup> Assumes production of 100 million pounds of copper.

<sup>b</sup> The discount factor is taken from E. GRANT & W. IRESON, *supra* note 112, at 610, col. 6.

<sup>c</sup> The mine life is assumed to be 20 years. Annual net proceeds are discounted to present worth by a single-rate straight discount formula (see note 112 *supra*) using a discount rate of 10 percent since this is the figure in current use by the Department of Property Valuation. See note 139 *supra*.

He could have chosen a 4-year average which would have given a higher price, or a 6-year average which would have given a lower price. Similarly, he could have selected a 5-year average of the United States domestic producer delivered copper price, which is quoted in the *Engineering and Mining Journal*, and is the price quoted in the trade.<sup>160</sup> This too would have given a lower price. Considering the wide fluctuations that occur in copper prices, it would be possible for the director to justify almost any price without abusing his discretion.<sup>160</sup>

No matter how accurately other factors are measured, the director has wide discretion in choosing the copper price, and though he may make his choice honestly and conscientiously, there is such a breadth of discretion that the resulting mine valuations and tax liabilities are completely arbitrary, and his choice may not reflect the price actually received by a mine. Once again, as in the case of setting the discount rates, the director is unnecessarily exposed to possible pressure from mining and non-mining groups to manipulate the selection of the appropriate copper price to give the desired lower or higher valuations.

The range of mine valuations which can be reached by honest and able men using the capitalization of future net proceeds method<sup>161</sup> is well illustrated by several Arizona mine valuation cases. In *State Tax Commission v. Phelps Dodge Corp.*,<sup>162</sup> three mining and valuation engineers, called as expert witnesses by the mine, valued the same property at amounts from \$5.19 to \$7.09 million.<sup>163</sup> The highest value is almost 37 percent more than the lowest. Again, in *State Tax Commission v. United Verde Extension Mining Co.*,<sup>164</sup> the mining company called six expert witnesses whose opinions on the value of the mine varied from \$7.2 to \$8.45 million.<sup>165</sup> The substantial differences in these valuations were attribut-

<sup>159</sup> See Table VI and accompanying notes.

<sup>160</sup> In *Morris v. Woolery*, 103 Ariz. 392, 442 P.2d 839 (1968), a private citizen brought a mandamus action in the Supreme Court of Arizona to compel the director of the Department of Property Valuation to use a copper price of not less than 42.009 cents per pound in the valuation of producing copper mines. Some of the mines intervened and asserted, *inter alia*, that "a moving arithmetic mean average of the previous ten year average price of copper per pound best predicted the future selling price." *Id.* at 393, 442 P.2d at 840. The court dismissed the suit on the ground that the petitioner had failed to exhaust his administrative remedies before the State Board of Property Tax Appeals. The court further held that:

The moving arithmetic average in a rapidly inflating economy over a ten-year period is manifestly arbitrary as being projected too far in the past to properly reflect valuations based upon current and probable future prices. The consideration of other factors without weighing them into a proper moving arithmetic mean average does not save the assessment from arbitrariness. *Id.*

This is the extent of judicial guidance on pricing.

<sup>161</sup> "[The Hoskold] method of valuation involves a number of possible errors in estimating, which cannot be eliminated and lacks any certainty as to real value." J. SLY & W. MILLER, *TAX POLICIES IN UTAH, REPORT TO THE GOVERNOR, STATE TAX COMMISSION AND LEGISLATIVE COUNCIL OF UTAH 90* (1954).

<sup>162</sup> 62 Ariz. 320, 157 P.2d 693 (1945).

<sup>163</sup> *Id.* at 325, 157 P.2d at 695.

<sup>164</sup> 39 Ariz. 136, 4 P.2d 395, *aff'd on rehearing*, 39 Ariz. 331, 6 P.2d 889 (1931).

<sup>165</sup> 39 Ariz. at 143, 4 P.2d at 397.

able to "the various witnesses [using] differing estimates as to the ore which could reasonably be anticipated to be existing as of the date of the assessment, the cost of extraction and sale, and the probable future price of copper."<sup>166</sup>

Mine valuation by capitalization of future annual net proceeds is a unit valuation, that is, the valuation includes the ore body, surface values of real property, buildings, improvements, equipment and personal property. To find the valuation of the ore body alone it is necessary to subtract the value of all other assets from the unit valuation.<sup>167</sup> When the operation of a mine becomes financially marginal,<sup>168</sup> valuation based on capitalization of earnings does not adequately reflect the value of the physical plant and equipment. When this occurs, the physical assets are individually appraised and valued according to their original construction or purchase prices with an allowance for depreciation.<sup>169</sup>

Nonproducing mines are valued by the county assessor of the counties in which they are located. All of the physical assets are valued on an item-by-item basis. Each mine completes forms<sup>170</sup> sent out by the Department of Property Valuation each year and returns them to the department with a listing of all physical assets complete with construction or purchase price, date of purchase or construction, and the degree of completion.<sup>171</sup> If the department determines that the mine is non-producing,<sup>172</sup> the list of physical assets is sent to the respective county assessor who assigns a value to each asset in accordance with the listed value and standard depreciation tables furnished by the department. No value is assigned to unpatented mining claims or state leased land, but an arbitrary value, for example \$80 per acre in Pima County, is assigned to patented mining claims. No attempt is made to value the ore. The sum of the values of the physical assets is the full cash value of the property,<sup>173</sup> and 25 percent of the full cash value is the assessed value. If the property is not used for any mining or other commercial use then it is assessed at 18 percent of full cash value.<sup>174</sup>

None of the problems which arise in valuing producing mines in Arizona arises in valuing non-producing mines since all the physical as-

---

<sup>166</sup> *Id.* at 144, 4 P.2d at 398.

<sup>167</sup> *State Tax Comm'n v. Phelps Dodge Corp.*, 62 Ariz. 320, 324, 157 P.2d 693, 694-95 (1945); *accord*, *State Tax Comm'n v. Eagle Picher Mining & Smelting Co.*, 73 Ariz. 372, 375, 241 P.2d 804, 806-07 (1952).

<sup>168</sup> For example, see Table VIII, line 1.

<sup>169</sup> Headington, *supra* note 132, at 6-3; Letter from Robert C. Headington, *supra* note 139.

<sup>170</sup> See note 133 *supra*.

<sup>171</sup> Department of Property Valuation Form # 11 (1-68).

<sup>172</sup> Producing mine is defined in ARIZ. REV. STAT. ANN. § 42-201(9) (Supp. 1970-71).

<sup>173</sup> The method of valuing nonproducing mines was explained by Mr. W. Hanne-man, Mine Assessment Engineer, County Assessor's Office, Pima County.

<sup>174</sup> ARIZ. REV. STAT. ANN. §§ 42-136,-227(B)(4) (Supp. 1970-71).

sets of a mine can be appraised as accurately as any other physical property and no attempt is made to value the ore deposit other than by assigning an arbitrary value of \$80 per acre to patented mining claims.

### PROXY

#### *Gross Proceeds*

Mine valuation by a gross proceeds formula is a statutory method in which the legislature designates a fraction or multiple of the annual gross proceeds of the mining operation as the assessed value of the mine. The property tax liability is determined by applying the appropriate state and local property tax rates to this assessed value.

Colorado uses a gross proceeds valuation method which classifies mines in two groups.<sup>175</sup> The first includes those which are worked primarily for coal, asphaltum, rock, limestone, dolomite, or other stone products, sand, gravel, clay, or earths. The second group, including all other mines, is further divided into producing and nonproducing mines.<sup>176</sup> Nonproducing mines and those in the first group are valued in the same manner as other real property.<sup>177</sup> Owners or operators of producing mines must file, with the assessor of the county in which their mine is located, an annual statement of, *inter alia*, their production in tons, gross value of the products, costs of extraction, treatment, transportation and sales, gross proceeds, and net proceeds.<sup>178</sup>

There were problems in the past with regard to the definitions of gross value and gross proceeds but, after interim judicial resolution,<sup>179</sup> in 1965 the legislature statutorily defined these terms.<sup>180</sup> On the basis of the in-

<sup>175</sup> COLO. REV. STAT. ANN. § 137-6-3 (Supp. 1965). This classification was upheld in *Foster v. Hart Consol. Mining Co.*, 52 Colo. 459, 122 P. 48 (1912).

<sup>176</sup> COLO. REV. STAT. ANN. § 137-6-3 (Supp. 1965). Producing mines are defined as those whose gross proceeds during the preceding year exceeded \$5,000. *Id.* § 137-6-4. This classification was upheld in *People ex rel. Iron Silver Mining Co. v. Henderson*, 12 Colo. 369, 21 P. 144 (1889).

<sup>177</sup> COLO. REV. STAT. ANN. § 137-6-10 (Supp. 1965). The statute provides that in valuing nonproducing mines the assessor shall take into consideration location, proximity to other mines or mining claims, and any other factors which may enable him to arrive at a fair and equitable valuation for assessment.

<sup>178</sup> *Id.* § 137-6-5.

<sup>179</sup> *Standard Chem. Co. v. Curtis*, 77 Colo. 10, 233 P. 1112 (1925) (gross value); *Tallon v. Vindicator Consol. Gold Mining Co.*, 59 Colo. 316, 149 P. 108 (1915) (gross proceeds); *Paxson v. Cresson Consol. Gold Mining & Mill Co.*, 56 Colo. 206, 139 P. 531 (1914) (gross proceeds).

<sup>180</sup> COLO. REV. STAT. ANN. § 137-6-5(1)(f), (i) (Supp. 1965):

(f) The gross value from production of the ore extracted during said calendar year, which means and includes the amount for which ore or any products derived therefrom were or could be sold by the owner or operator of a mine.

(i) The gross proceeds from production of such ore, which means and includes the value of the ore immediately after extraction, which value may be determined by deducting from gross value all costs of treatment, reduction, transportation, and sale of such ore or any products derived therefrom.

formation provided in the annual statement, the assessor values the mine for assessment (assessed value not necessarily full value), at an amount equal to 25 percent of the gross proceeds, or at an amount equal to the total net proceeds, whichever is larger.<sup>181</sup> The second alternative would apply to a highly profitable mine such as one working in a high-grade deposit, and would permit the taxing jurisdiction to take a larger share of the profits than would be possible under the gross proceeds formula. Unpatented mining claims and other mining lands not held in fee are included in the assessment of a producing mine.<sup>182</sup> Machinery, equipment, personal property and improvements other than mining improvements are valued separately for assessment<sup>183</sup> at 30 percent of actual value.<sup>184</sup>

Gross proceeds valuation places a wholly arbitrary valuation on the mine which does not represent its true value but is a purely political decision as to the burden of property taxation which the mining industry should bear. It is a simple and inexpensive system to administer for it eliminates the need for mining and valuation engineers, and it is precise. Definitional problems with respect to gross proceeds can be prevented by unambiguous legislation.

One major problem is that gross proceeds valuation makes no distinction between profitable and unprofitable mines. Thus, a rich deposit which is being mined at a high profit would not find a gross proceeds valuation method burdensome, but a mine working a low grade deposit with high production costs and little profit may be obliged to cease operations or raise the cutoff grade of the ore being mined in order to pay the tax. If the mine ceases operation, employment and tax revenues will be lost. If the mine raises the cutoff grade, ore may be transposed into waste and, because of economics or the geometry of the ore body which may preclude later mining, be lost forever to the mine and to the state.

Gross proceeds valuation fails to reach nonproducing mines or properties held for speculative purposes. Its use, therefore, would violate the Arizona constitutional provision which subjects all property to taxation absent a specific constitutional exemption.<sup>185</sup> This problem can be solved easily by subjecting nonproducing mines to valuation by physical appraisal of assets. During periods of temporary shutdown, such as those caused by

---

<sup>181</sup> *Id.* § 137-6-5(2). Net proceeds are defined as "the amount determined by deducting from the gross proceeds all costs of extracting such ore." *Id.* § 137-6-5 (l)(j). The county assessor has authority to audit any books, accounts or records of the mining company in order to verify the truth of the statement and safeguard against tax evasion. *Id.* § 137-6-8.

<sup>182</sup> *See id.* § 137-6-1(1)(a), (b), -2(3), -5(4). It is the possessory interest which is taxed. *Id.* § 137-6-5(4). The taxation of the possessory interests in unpatented mining claims in Colorado was upheld in *Elder v. Wood*, 208 U.S. 226 (1908).

<sup>183</sup> COLO. REV. STAT. ANN. § 137-6-6 (Supp. 1965).

<sup>184</sup> *Id.* § 137-1-4(1)(a). Thirty percent assessment also applies to nonproducing mines and those mines excepted in section 137-6-3.

<sup>185</sup> ARIZ. CONST. art. 9, § 2; *accord*, COLO. CONST. art. 10, § 6.

labor disputes, there are no gross proceeds upon which to value and tax the mine. This is advantageous to the mine since valuation and taxation would be limited to appraisal of physical assets providing, a lower tax liability at a time when the mine can least afford to pay high taxes.

Gross proceeds property taxation can play havoc with local governmental budgets because revenue would be somewhat unpredictable with changing production costs, changing metals prices, and temporary shut-downs. The latter two items would be of particular concern in Arizona. The principal metal produced is copper, the price of which fluctuates considerably during each year<sup>186</sup> and from year to year;<sup>187</sup> and Arizona copper mines may be closed for 8 or 9 months at a time, as they were during a labor dispute in 1967-68.<sup>188</sup> The effect of this disadvantage can be minimized by using a gross proceeds figure in the formula which is the average gross proceeds of several previous years. In this way sharp fluctuations in annual gross proceeds, and consequent tax liabilities, would be smoothed by averaging to provide a steady source of revenue.

### *Net Proceeds*

Under the net proceeds system which is used in Utah the assessed valuation of a mine is determined by a statutory formula which designates a fraction or multiple of the annual net proceeds of the mining operation as the assessed valuation. The property tax liability is determined by applying the appropriate state and local property tax rates to this valuation.

In Utah all tangible property which is not exempt under federal law or the state constitution is subject to taxation.<sup>189</sup> For assessment purposes the Utah Constitution classifies mines into two groups. The first group, comprised of metalliferous mines, are subject to assessment as the legislature shall provide. All other mines fall into the second group and they, together with all machinery used in mining, and property and improvements placed on mines, are subject to assessment in the same manner as other tangible property,<sup>190</sup> which is at 30 percent of their reasonable fair cash value.<sup>191</sup>

---

<sup>186</sup> See Table VII for average monthly copper prices.

<sup>187</sup> See Table VI for average yearly copper prices.

<sup>188</sup> Copper industry labor contracts are usually negotiated every 3 years. Many of the present contracts expire June 30, 1971. Tucson Daily Citizen, March 23, 1971, at 25, col. 1-2.

<sup>189</sup> UTAH CONST. art. 13, § 2.

<sup>190</sup> *Id.* § 4:

All metalliferous mines or mining claims, both placer and rock in place, shall be assessed as the Legislature shall provide . . . . All other mines or mining claims and other valuable mineral deposits, including lands containing coal or hydrocarbons and all machinery used in mining and all property or surface improvements upon or appurtenant to mines or mining claims, and the value of any surface use made of mining claims, or mining property for other than mining purposes, shall be assessed as other tangible property.

<sup>191</sup> UTAH CODE ANN. § 59-5-1 (1953). This is specifically applied to mining property in *id.* § 59-5-57 (Supp. 1969), quoted in note 193 *infra*.

Metalliferous mines are assessed at \$5 per acre of patented<sup>192</sup> mining claims and at an amount equal to twice the average net annual proceeds of the mine for the 3 calendar years next preceding the assessment year, or for as many years next preceding as the mine has been operating, whichever is less.<sup>193</sup> The net proceeds valuation is waived if there were no gross proceeds during the next preceding year.<sup>194</sup> The machinery, personal property and improvements of metalliferous mines are assessed at 30 percent of their reasonable fair cash value.<sup>195</sup>

Net annual proceeds are defined by statute as the gross proceeds realized during the preceding calendar year from the sale, or its equivalent, of all products of the mine, less certain statutory deductions such as operating costs and the purchase price of equipment in the year in which the purchase is made.<sup>196</sup> Other costs are specifically excluded from allowable deductions.<sup>197</sup> The statutes safeguard against abuses in reporting of gross pro-

<sup>192</sup> Only patented mining claims are assessed at \$5 per acre. Letter from Robert H. Cooper, Assistant Director, Property Tax Division, Utah State Tax Commission, to the author, Oct. 8, 1970. Although UTAH CODE ANN. § 59-5-57 (Supp. 1969) authorizes the imposition of the acreage assessment on "mines and mining claims," to impose this assessment on unpatented mining claims may constitute a forbidden tax on federal land. See Consolidated Uranium Mines, Inc. v. Moffitt, 257 F.2d 396, 397 (1958).

<sup>193</sup> UTAH CODE ANN. § 59-5-57 (Supp. 1969):

All metalliferous mines and mining claims, both placer and rock in place, shall be assessed \$5.00 per acre and in addition thereto at a value equal to two times the average net annual proceeds thereof for the three calendar years next preceding or for as many years next preceding as the mine has been operating, whichever is less; provided, however, there shall be no valuation based upon net annual proceeds for the purpose of assessment of any such mine or mining claim for any one year in which there were no gross proceeds realized in the year next preceding the year of assessment. All other mines or mining claims and other valuable mineral deposits, including lands containing coal or hydrocarbons, shall be assessed at thirty percent of their reasonable fair cash value. All machinery used in mining and all property or surface improvements upon or appurtenant to mines or mining claims and the value of any surface use made of mining claims or mining property for other than mining purposes shall be assessed at thirty percent of their reasonable fair cash value. In all cases where the surface of lands is owned by one person and the mineral underlying such lands is owned by another, such property rights shall be separately assessed to the respective owners. In such cases the value of the surface if it is used for other than mining purposes shall be assessed by the assessor of the county in which the property is situated.

The net proceeds assessment is imposed on the proceeds from both patented and unpatented claims. This does not constitute a forbidden tax on federal land since it is a tax on the possessory interest in the claims rather than a tax on the land whose fee is in the United States. Consolidated Uranium Mines, Inc. v. Moffitt, 257 F.2d 396, 397 (1958).

<sup>194</sup> UTAH CODE ANN. § 59-5-57 (Supp. 1969), quoted in note 193 *supra*.

<sup>195</sup> *Id.*

<sup>196</sup> UTAH CODE ANN. § 59-5-58 (1953).

<sup>197</sup> *Id.* § 59-5-59:

No deduction shall be allowed for:

- (1) Money expended during any year except the year immediately preceding such statement.
- (2) Salaries . . . of any corporate officer . . . .
- (3) Legal expenses.
- (4) Federal taxes accruing from operations outside of this state, and taxes paid in other states.

ceeds, which may occur when ore sales take place between companies with bonds of common ownership or other affiliations, by allowing the tax commission to value ore which has been sold for less than its reasonable fair cash value.<sup>198</sup> Gross proceeds have been defined by the Supreme Court of Utah as the money or its equivalent which is received in return for the sale of ore. Products of the ore which have readily determinable prices and ready markets so that they can be quickly converted into money are considered by the court to be equivalent to money and as such are includable in the computation of gross proceeds.<sup>199</sup>

Each year the owners or operators of metalliferous<sup>200</sup> and non-metalliferous<sup>201</sup> mines in Utah must complete and submit to the State Tax Commission a sworn statement giving all the details necessary for the tax commissioner to calculate the assessed value of the mine.

With a few exceptions, the advantages and disadvantages of net proceeds valuation are the same as for gross proceeds valuation and only the differences will be described here.<sup>202</sup> The costs which may be deducted from gross proceeds to give net proceeds must be clearly defined by statute. More auditing of company records is required under a net proceeds formula to ensure that deductions are properly calculated and reported, but this is the same problem presented by an income tax.

The major advantage that net proceeds valuation holds over gross proceeds is that it recognizes the concept of ability to pay and taxes property according to profitability so that a highly profitable mine will pay greater taxes than a less profitable mine. Under this system a mine pays its highest taxes when it can most easily afford them and pays less during high cost periods, such as the start-up and development of a new mine. Thus a mine that is making little or no profit will not be obliged to cease operations, with a resultant loss of employment and other taxes to the state, or raise the cut-off grade with an accompanying (perhaps permanent) loss of ore reserves and a rise in production costs because of the higher cost of selective mining.<sup>203</sup>

The latter advantage may encourage mining companies to explore in a state that utilizes net proceeds valuation. But this same feature can re-

(5) Any payment for the construction of boarding houses, bunk-houses, mess houses or dwellings.

(6) Any payment for any improvement or structure from which a revenue might be derived . . . .

<sup>198</sup> *Id.* § 59-5-58.

<sup>199</sup> *United States Smelting, Refining & Mining Co. v. Haynes*, 111 Utah 172, 176 P.2d 622, 625 (1947).

<sup>200</sup> UTAH CODE ANN. § 59-5-60 (1953).

<sup>201</sup> *Id.* § 59-5-61 (Supp. 1969).

<sup>202</sup> See notes 179-188 and accompanying text, *supra*, for the other advantages and disadvantages.

<sup>203</sup> For a discussion of the effect of taxes on cut-off grades, see Lacy, *Taxation, Assessments and Ore Deposits*, in UNIV. OF ARIZ., SYMPOSIUM ON MINE TAXATION 2-1 (1969).

sult in a disadvantage to the state in the situation where a mine is making little or no profit for a prolonged period yet obviously has a value greater than zero. This can be overcome by combining the net proceeds formula with the physical appraisal of buildings, improvements, land, and equipment, as is done in Utah. Similarly, net proceeds valuation does not reach nonproducing properties but these can be taxed by physical appraisal of tangible assets.

## CONCLUSIONS AND RECOMMENDATIONS

As applied to Arizona mines, all of the valuation methods yield results which bear little relation to true value. Gross and net proceeds methods are simple and inexpensive to administer, and do not require mining and valuation engineers to check ore reserves and grades. Importantly, they necessitate only a minimum of administrative discretion, and are precise and certain in result. The capitalization method as applied in Arizona has the opposite characteristics, and is subject to great uncertainty because it allows much administrative discretion. Even assuming that it is well administered, a substantial weakness inheres in the system in that a mere change in personnel could change the administrative practices and the tax liability. Since the market data method of establishing fair market value has no useful application in Arizona owing to the absence of sales of large mines, it will be given no further consideration here.

The capitalization method provides a steady source of revenue during fluctuations in metals prices, production rates, or even temporary shutdowns. The potential disruption in the flow of revenue that can be caused by fluctuations in metals prices or shutdowns under the proceeds formulas can be minimized by combining the proceeds formulas with physical appraisal of tangible assets and by using an average of several years' proceeds. In this manner, tax revenue would be relatively stable and the mines would be compensated for paying high taxes in a low production year by paying correspondingly lower taxes in succeeding high production years.

Because ore reserves are taxed in the ground under the capitalization method, owners of mines with short prospective lives will be discouraged from exploring for further ore reserves, the discovery of which would prolong the life of the mine but also effect an immediate and substantial increase in the mine's assessment and taxes. Under the proceeds methods there is no discouragement to explore because the ore reserves are not taxed in the ground but are taxed only when they are actually mined.

Another consequence of the taxation of ore reserves in the ground is that the total tax bill during the life of the mine can be reduced by mining out the ore as fast as possible. This can have an adverse effect on conservation because the mine owner may be tempted to mine the richest ore

quickly, leaving the lower grade ore so that it may never be mined because of physical or economic considerations. Valuation by the proceeds methods does not penalize the ore reserves and offers no incentive to speed up mining operations of rich ore. Thus conservation is aided by proceeds valuation.

It may be reasonably concluded from this comparison that proceeds valuation methods are more advantageous to Arizona mine taxation than the capitalization method. Net proceeds valuation is a more equitable system than gross proceeds valuation because it recognizes the concept of ability to pay so that mines are taxed more when their profits are high. This would be a disincentive to profitable operation only if the level of taxation were confiscatory. If the tax is a reasonable percentage of net proceeds, however, the mining industry will be encouraged to explore and mine in Arizona. Gross proceeds valuation, on the other hand, may discourage the operation of marginally profitable mines.

In the light of this analysis it is recommended that a statutory net proceeds system of mine valuation should be introduced in Arizona in place of the present capitalization method. Nonproducing mines should continue to be assessed by standard physical appraisal of land, buildings, improvements and equipment. No assessment should be made for potential ore on nonproducing properties. Producing mines should be assessed by a fraction or multiple of the average annual net proceeds for the preceding 5 years, together with a percentage of full cash value of the tangible assets of the mine, including buildings, improvements and equipment, as appraised by standard physical appraisal methods.

A simple and inexpensive way of administering such a scheme in Arizona would be to equate net proceeds with net taxable income as established under the Arizona state income tax law.<sup>204</sup> This would have three principal advantages. First, Arizona lawyers and accountants are already familiar with the income tax law. Second, there are established interpretations of the income tax law by the courts and the State Tax Commission. Finally, since all mines are subject to the state income tax law, the State Tax Commission could audit company accounts simultaneous for both taxes. To facilitate this assessment method, the administration of the property tax laws with respect to the mining industry should pass from the Department of Property Valuation back to the State Tax Commission.

The problems of mine property taxation in Arizona are formidable and, unfortunately, there is no simple solution. The recommendations offered here are not a panacea but they are a step forward which may relieve us from some administrative discretion and the "pain of choosing."<sup>205</sup>

---

<sup>204</sup> ARIZ. REV. STAT. ANN. §§ 43-101 *et seq.* (1956), as amended (Supp. 1970-71).

<sup>205</sup> B. CARDOZO, *supra* note 6, at 67.