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# 0214 Committee on Mineral Taxation

Colorado Legislative Council

# 0214 Committee on Mineral Taxation

Report to the Colorado General Assembly:

RECOMMENDATIONS FOR 1976
COMMITTEE ON:

# MINERAL TAXATION




COLORADO LEGISLATIVE COUNCIL

RESEARCH PUBLICATION NO. 214
November, 1975

COLORADO LEGISLATIVE COUNCIL

COMMITTEE ON MINERAL TAXATION

Legislative Council

Report to the

Colorado General Assembly

Research Publication No. 214
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November 25, 1975

To Members of the Fiftieth Colorado General Assembly:

In accordance with the provisions of House Joint Resolution No. 1046, 1975 session, the Legislative Council transmits the accompanying report relating to the taxation of mineral resources.

The report of the Committee on Mineral Taxation was accepted by the Legislative Council for transmission to Governor Lamm and to the second regular session of the Fiftieth Colorado General Assembly.

Respectfully submitted,

/s/ Representative Phillip Massari
Chairman
Legislative Council

PM/pm

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November 25, 1975

Representative Phillip Massari
Chairman
Colorado Legislative Council
Denver, Colorado 80203

Dear Mr. Chairman:

Submitted herewith is the final report of the Committee on Mineral Taxation. Although the committee could not agree on any legislation to recommend to the General Assembly, a significant amount of useful information was gathered and a summary of the findings is included in this report. In addition, all of the proposed legislation reviewed by the committee is appended. These proposed bills relate both to severance taxation and to special aid for local governments impacted by the development of minerals in the state.

Members of the committee pledged to continue to work as individuals on legislation for an increase in mineral taxation. Accordingly, the information contained in this report should serve as a useful tool for these individuals and others concerned with the subject of mineral taxation.

Very truly yours,

/s/ Senator Tilman Bishop
/s/ Representative Morgan Smith
Co-Chairmen
Committee on Mineral Taxation

TB & MS/pm

# FOREWORD

House Joint Resolution No. 1046, 1975 session, directed the Legislative Council to appoint a committee to study the taxation of mineral resources in Colorado and special aid for localities impacted by the development of such resources.

This report contains the findings of the committee. It was accepted by the Legislative Council on November 25 for submission to the Governor and the General Assembly.

The committee and the Legislative Council express appreciation to the many persons who provided information on the mineral resources industry and the needs of local governments for impact assistance.

Lyle C. Kyle
Director
Legislative Council

November, 1975

TABLE OF CONTENTS

LIST OF TABLES

# LEGISLATIVE COUNCIL

# COMMITTEE ON MINERAL TAXATION

## Members of the Committee

Sen. Tilman Bishop,
Co-Chairman
Rep. Morgan Smith,
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Sen. Fred Anderson
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# I. INTRODUCTION

The interim Committee on Mineral Taxation was directed to undertake an in-depth study of the taxation of mineral resources in the state, including "the propriety of such revenue sources as severance taxes." House Joint Resolution 1046 proposed that the study include the justification for the imposition of severance taxes and the amount of revenue that could be generated from such taxes. In addition, the committee was instructed to consider the impact of mineral production upon local governments and the proper portion, if any, of severance tax revenues which should be granted to local governments. Information examined by the committee early in the interim included a review of the existing taxation system on minerals in the state and the theoretical approaches for the imposition of a severance tax. In addition, the committee received in-depth analyses of the methods used by ten states to determine the tax base for imposition of a severance tax and a listing of the minerals taxed, and rates employed, by all states.

Recognizing the need for information relating to the various segments of industry prior to any decision concerning the appropriateness of new or revised taxation, the co-chairmen established a list of priorities for committee study covering all natural resources extracted in Colorado. The resources prioritized were, in order, coal, oil shale, molybdenum, precious and base metals, oil and gas, uranium, sand and gravel, and timber.

The committee received testimony from members of each segment of the extractive industry about their methods of operation, taxation, ability to pass-on additional taxes, and production prospects. In addition, the committee formally toured the Climax mill and open pit mine (molybdenum), the Idarado mine (gold, silver, copper, and lead), the Seneca mine (strip coal) and air-toured the Uravan mineral belt (uranium), Rangely oil field, and the Piceance basin (oil shale and coal). Several members of the committee made additional informal tours including the Eagle mine (underground steam coal), the Mid Continent Coal and Coke mine (underground metallurgical coal), the Henderson mine (molybdenum), small gold and silver mines in Central City - Idaho Springs - Georgetown area, and a small independent precious metals mill south of Idaho Springs. Staff memoranda covering such aspects of natural resource extraction as resources, deposits, reserves, ownership, production, and projected production supplement this information.

Upon the completion of the first segment of committee inquiry, Co-Chairman Smith proposed a bill that would impose a severance tax on oil and gas, coal, oil shale, and metals at a rate of 5 percent of gross proceeds with exemptions for small operators. This bill was distributed to members of the committee, representatives of the industry, and other interested persons for comment. Several meetings were held for the express purpose of receiving reaction to the proposal. These meetings also provided the committee members an opportunity to

question industry members concerning their attitudes towards severance taxation and more specific questions involving the difference in costs between different mining operations and appropriate levels of credits and exemptions. During this period, spokespersons for several operators proposed amendments to the Smith proposal. The most significant was a change in the tax base from gross proceeds to net proceeds advanced by Colorado Fuel and Iron Corporation. An analysis of each amendment, including the committee's vote and a fiscal estimate, is included in the text of the report. Copies of the Smith bill and proposed amendments are appended.

At the committee's final meeting, the Smith bill was placed on the table for amendment. The CF&I amendment, notably, failed on a tie vote, while some others were adopted. Accordingly, Representative Smith moved adoption of his bill. Senator Strickland offered a substitute motion that the committee report that it was unable to achieve concensus for a severance tax based either on gross proceeds or net proceeds and that, therefore, no bill be recommended. Instead, the committee would report the progress made, work still to be accomplished, and the pledge of individual members to continue working on legislation for an increase in mineral taxation. The staff was instructed to include in the committee's final report to the General Assembly the pros and cons of severance taxation and approaches thereto. The Strickland motion was adopted by a vote of 8 yes, 2 no.

With regard to aid for local governments experiencing growth due to the development of the minerals industry, the committee reviewed legislation in several states and received a proposal for impact aid from Club 20. The committee agreed that legislation implementing the Club 20 proposals should be included in the final report, but offers no recommendations.

The committee's report is organized to reflect the motion adopted by the committee. In general, the report covers topics in the same chronological order considered by the committee. Initial consideration is given to the structure of the Colorado tax laws on the extractive industry, followed by a theoretical consideration of severance taxation, other states laws, and a review of the industry in Colorado. An explanation of the bill proposed to the committee by Representative Smith and the amendments that were offered to it is included, with revenue estimates for each. A discussion of the pros and cons of severance taxation, as reported to the committee in testimony in general and specifically relating to the Smith bill, and a discussion of the pros and cons of a gross proceeds versus net proceeds approach to severance taxation follows. It is the committee's intent that its final report serve as an effective background document for any consideration of severance taxation in Colorado and help to define both the issues and the directions that might be pursued.

## II. TAXATION OF MINERAL RESOURCES IN COLORADO

Part II explains the existing Colorado state tax structure for mineral resources and is divided into two sections. The first deals exclusively with ad valorem taxation and the second describes other state taxes that relate particularly to the industry, e.g., taxes or fees that have provisions that in some way specifically or exclusively affect mineral resource production. Each section is introduced by a summary report on provisions of the relevant taxes as they apply generally to all subject taxpayers, including mineral resource concerns, followed by the specifics for various segments of the minerals industry.

Tables II and III summarize the information in this part and provide data on production values.

### Ad Valorem Taxation

#### Generally

All tangible real property is subject to assessment and property taxation unless specifically exempted by law or the constitution. Most taxable property is assessed at 30 percent of actual value based upon the assessors' determination of actual value through the use of the following six statutory criteria ("six factors"):

(1) Location and desirability;

(2) Functional use;

(3) Current replacement cost, new, less depreciation;

(4) Comparison with other properties of known or recognized value;

(5) Market value in the ordinary course of trade; and

(6) Earning or productive capacity.

It should be noted that these six factors are established by law but, because the Property Tax Administrator does not have enforcement or supervisory powers, the factors are not necessarily used by the assessors. It might also be observed that in the case of mineral resource lands, these factors may have little relation to the actual value of a piece of property, with the exception of "earning or productive capacity" for producing properties. The interim Committee on Property Tax Assessment Practices and School Finance recommended that factors (1) and (2) be eliminated because they are unnecessary and are included in the other four. In addition, that committee recommended that the Property Tax Administrator assess all mineral production, rather than the county assessors.

Reports. The production of mineral resources is required by law or regulation to be reported to the county assessors along with other pertinent information.

Surface rights. Surface rights are assessed separately and are in addition to any assessment for minerals when used for another purpose besides mining (if the mineral interest is severed).

Leaseholds. Possessory interests are required to be assessed under Senate Bill 86 (1975 session).

Severed interests. Severed mineral interests are required by law to be assessed at 30 percent of actual value or at a minimum of $1 per acre if no market activity exists to aid in the determination of actual value.

Undeveloped minerals. Undeveloped mineral resources are assessed on the same basis as other real property, through the application of the six factors listed above.

Improvements. Surface improvements on mineral bearing lands are assessed separately and are in addition to any assessment for mineral values present or produced. Underground improvements are included in the assessment of the mine.

Equipment, stockpiles, and supplies are assessed separately and in addition to any assessments for mineral resources. For example the drag lines for a strip coal mine are assessed separately and in addition to the coal produced from the mine.

## Oil and Gas

Oil and gas leaseholds and lands are valued for assessment at "...an amount equal to eighty-seven and one-half percent of the gross value or selling price of the oil and gas produced, saved, or sold..." from the lease or land during the preceeding calendar year.

"Gross value or selling price" applies at the wellhead. "Produced, saved, or sold" includes any oil and gas pumped back into the ground.

Reports. Reports are required by law to contain production and gross value or selling price information.

Producing leaseholds are specifically required by law to be assessed in the same manner as production owned outright.

Severed interests. In 1975, the average assessed value of severed oil and gas mineral interests was $1.23 per acre.

Nonproducing. Oil and gas lands which are not producing are assessed at 30 percent using the six factors for other real property to determine actual value.

Subsurface equipment. Present law is silent as to the assessment of down-hole oil and gas equipment. Prior to 1975, such equipment was included in the production formula and thus, in effect, exempt from specific assessment. Under guidelines issued by the Property Tax Administrator for 1975, subsurface equipment was to be separately assessed as other equipment. Presently, some of the counties assess subsurface equipment while others continue to include it in the production formula. This subject was addressed by the interim Committee on Property Tax Assessment Practices and School Finance which recommended that down hole equipment be separately assessed.

Assessed value. For 1974, Colorado production of oil was 37,508,079 Bbl and production of gas was 149,521,352 Mcf. The Division of Mines valued the production at $8.20 per Bbl and $0.20 per mcf on the basis of industry contacts. The 1975 assessed value on producing oil and gas leaseholds and lands was $274,390,380 and associated improvements $2,466,980.

Nonproducing oil and gas lands in 1975 were assessed at $78,740 and associated improvements at $22,560. Surface equipment was assessed at $26,449,240, furniture and equipment at $1,333,800, stockpiles at $61,060 and supplies at $3,408,490. Total assessed value of this industry's operating properties was $308,211,250 or about 91 percent of the reported value of oil and gas produced.

The high assessment level on oil and gas production has substantial impact on those localities with major oil and gas production. The outstanding example is Rio Blanco County. The total average 1975 county levy in Rio Blanco was 40.95 mills, substantially lower than any other county and less than one-half of the state average. The total assessed valuation of that county has increased from $66,872,020 for 1973, to $97,448,200 for 1974, to $171,458,030 for 1975 primarily because of the increased assessed value of oil and gas. The per capita assessed valuation in Rio Blanco County has more than doubled from some $14,000 in 1973 to $35,000 in 1975. In contrast, the per capita assessed valuation in Denver is approximately $3,500, Jefferson County $3,200, Pueblo County $1,000, and statewide $3,400. The county mill levy in Rio Blanco for 1976 will be 7.96 mills and the Rangely School District levy general fund levy will be 6.45 mills, less than one-sixth of the state average. It should be noted that the Rio Blanco County example is exceptional because oil and gas accounts for approximately 80 percent of that county's total assessed valuation.

## Coal

Assessment. Statutorily, coal mines are assessed at 30 percent of actual value, using the six factor formula. In the past, most assessors have used a formula based on a specific value per acre-foot of seam. At a meeting of the assessor's Mineral Taxation Committee in late 1974, it was agreed that coal would be assessed on a capitalization of royalty formula and a similar approach was recommended by the State Board of Equalization. The assessor's formula was utilized

for 1975 by most assessors in counties with substantial coal production. Under the new formula, the 1975 assessed value of coal production increased by 96 percent in Gunnison County, 64 percent in Pitkin County, and 64 percent in Moffat County. A portion of the increase can also be attributed to increased production.

Reports. Reports describing the amount and value of reserves, stockpiles, and prior year production are required by regulation.

Severed interests. The 1975 average assessment was $1.21 per acre of coal.

Undeveloped. Coal lands which did not produce coal during the previous year are assessed at 30 percent of actual value on the basis of the six factors previously listed.

Assessed value. 1974 Colorado coal production was 6,960,686 tons which would be worth $68,562,757 at the United States average price of $9.85 per ton for underground and surface mines, according to the Division of Mines. For 1975, producing coal lands were assessed at $2,677,890 and improvements thereon at $1,118,390. Nonproducing lands added $296,920 and corresponding improvements $13,480 in assessed values. Developed coal lands had a value of $155,630 whereas undeveloped added $312,840 to the assessment abstracts. Equipment, $4,529,110, stockpiles, $43,430, and supplies, $297,140, were other reported assessed values. Total assessed value for the industry was, accordingly, $9,444,830 in 1975 or approximately 14 percent of reported product value and $1.36 per ton of production.

## Metals

Assessment. This class of property includes all mines whose gross proceeds exceeded $5,000 in the preceding year from production of molybdenum, vanadium, uranium, zinc, cadmium, tin, pyrite, beryllium, or other minerals not specifically excluded. These lands are assessed at 25 percent of gross proceeds or 100 percent of net proceeds for the previous year, whichever is greater.

"Gross proceeds" is equal to the gross value of the ore immediately after extraction and may be determined by using the "gross value" less treatment, transportation, and sales costs. "Gross value" is the amount the ore or its products were or could have been sold for. "Net proceeds" equals gross proceeds less all extractive costs.

(NOTE: The distinction between producing and non-producing mines is not precisely the metalliferous v. non-metalliferous quality of the product. Rather, the difference is between those minerals which may be used in substantially the raw condition as opposed to those which must undergo some sort of processing, e.g. milling and smelting, before being in condition for use. Examples of each would be coal, non-producing, which may be burned in its raw state for fuel, and molybdenum which must be concentrated from the raw ore into a nearly pure product before its use as a steel alloy.)

Reports. Reports required by law must include production, gross values, and costs for the mine for the previous year.

Leaseholds are specifically required by law to be assessed.

Severed mineral interests were assessed at an average of $1.11 per acre in 1975.

Undeveloped lands which produce less than $5,000 worth of ore the preceeding year (or none at all) are assessed at 30 percent of actual value as determined through the use of the six factors.

Assessed value. Total production in 1974 was placed at $218,267,845 by the Division of Mines while the 1975 assessed value on that production equaled $40,752,570 on land and $1,086,910 on improvements. Nonproducing metaliferous lands were assessed at $9,358,060 and improvements at $26,596,020. Equipment, stockpiles, and supplies were valued at $8,915,880, $95,560, and $784,980 respectively in 1975. Total assessed value for this industry was $87,589,980, about 40 percent of reported production value.

## Non-metals

Assessment. Non-metals, which include asphaltum, rock, limestone, dolomite, other stone products, sand, gravel, clay, and earths, are assessed at 30 percent of actual value as determined by use of the six factors.

Reports. Production reports are required by regulation to include prior year production, gross sales, costs, and income, and the amount and value of any reserves.

Severed interests in these minerals were assessed at $1.13 per acre average in 1975.

Undeveloped non-metallic mineral resources without production are assessed at 30 percent of actual value, actual value being determined through application of the six factors as for other real property.

Assessed value. Production of non-metallic mineral resources was given a value of $73,692,099 by the State Bureau of Mines for 1974. The land was valued at $1,563,660 and its improvements at $132,590. Nonproducing lands had an assessment of $785,620 and improvements $117,130. Equipment was valued at $799,900, stockpiles at $441,240 and supplies $64,220. The total assessed value accordingly reported by the assessors was $3,904,360, about five percent of production value.

## Oil Shale

Assessment. Mining/retorting operations for the recovery of oil shale are most closely akin to metalliferous mining from a technical point of view, i.e., the need for processing of the raw ore to get a salable product. Under existing law, oil shale would be taxed in this manner as a producing mine, and assessed at 25 percent of gross proceeds or 100 percent of net proceeds, whichever would be greater. Gross proceeds would generally correspond to the value of the oil shale as removed from the ground but before crushing, retorting, or upgrading. Because oil shale is not specifically excluded from the producing mines assessment procedure, it can be argued that it would come under this formula. Occidental's in situ operation is substantially a mining/processing arrangement and would likely be consistent with assessment as a producing mine.

Leaseholds are required by law to be assessed. The federal Oil Shale Lease, Section 20, specifically requires the lessee to pay property taxes lawfully assessed.

Severed interests. In 1975, severed mineral interests containing oil shale were assessed at $3.12 per acre.

Undeveloped. Under state law, non-producing oil shale lands and mines are assessed at an amount not greater than the assessment of the land's surface use, an average of less than $2.00 per acre in 1975. The interim Committee on Property Tax Assessment Practices and School Finance recommended that this provision be stricken, thus non-producing oil shale lands would be assessed as other non-producing mineral lands.

Assessed value. Oil shale produced in 1974 was valued at $1,337,266 and producing lands assessed at $2,160 and associated improvements at $34,200. Nonproducing oil shale lands and improvements were assessed at $586,060 and $832,430, respectively. Assessment for equipment was $510,870, stockpiles, $247,500, and supplies, $2,700.

## Limitations of the Data on Assessed Value

It should be noted that the assessed values reported in this section are based on the abstracts of assessment. Accordingly, the values are accurate to the extent that assessors have placed assessments in the proper categories instead of under other classifications. Rather than assume that some of this property was not assessed, it is probable that its assessed value is reported in another classification. Accordingly, the assessed values reported, particularly in the area of coal and nonmetals, may be significantly understated within a particular category.

It should be emphasized that the production value figures used are not adequate for a true tax analysis. They are, however, the only

such data available. Production values are prepared by the Colorado Division of Mines primarily to show the mineral industry's contribution to the state and may reflect this bias. Production values are likely exaggerated because they are based on the prices of refined products, such as molybdenum and gold, rather than molybdenum and gold concentrates -- the form in which these metals leave the state. Also, for ad valorem tax purposes, the value of the mineral as it leaves the ground is assessed whereas substantial values are subsequently added to the mineral by processing to place it in a marketable condition corresponding to reported production values.

Nevertheless, because coal and nonmetals are generally subject to less value added by processing than metals, it can be argued that the relative tax picture of these minerals can be compared due to the likely understatement of coal and nonmetal values versus the relative overstatement of metal and oil and gas values. Therefore, it could be concluded that while oil and gas and metals are assessed at somewhat over 40 percent of reported value and consistent with statutorily prescribed levels, coal and nonmetals are assessed at less than one-fourth that rate.

## Other Taxes

### Generally

Income. Any individual or corporation engaged in mineral extraction in the state is liable for Colorado income taxes. This tax is based on the federal taxable income with specified adjustments. The rate of the corporate tax is five percent, the individual tax rates are graduated from two and one-half to eight percent.

Depletion allowance. Because of the state's reliance on federal definitions, depletion allowances granted by the federal government and allowed as deductions in the computation of federal taxable income are also effectively allowed at the state level. There are two methods of computing a depletion allowance and, by federal law, the taxpayer must use the one which results in the largest deduction. The two are:

- Cost depletion, computed as follows:

  1. The number of mineral units remaining as of the close of the taxable year is estimated.

  2. Cost of the property allocable to the mineral units, less amounts previously deducted for depletion, is computed.

  3. This cost is divided by the total to give cost depletion per unit, e.g., ton or Bbl.

4. Cost per unit is multiplied times the total units sold during the tax year which gives the cost depletion deduction.

- Percentage depletion, computed as follows:

1. Gross income from the property is computed for the year (excluding rents and royalties).

2. Gross income is multiplied times a statutorily set percent which results in the percentage depletion deduction.

(NOTE: Percentage depletion deductions cannot exceed 50 percent of the net taxable income as computed without application of the deduction. Percentage depletion deductions are generally larger than cost depletion deductions.)

Local property taxes. Under federal law, and hence state law, payments by the taxpayer for local property taxes are deductible in the computation of taxable income, as are other legitimate operating expenses of doing business.

Inspection fees. All mining activities and some construction activities are liable for a state inspection fee for safety inspections performed by the Division of Mines. Rates are graduated downward from $15 per employee as the size of the work force increases.

## Oil and Gas

Income. Oil and gas production subject to Colorado's income tax is on the basis of cost depletion in most instances. Only a few small operators remain eligible after the 1975 federal law change for the percentage depletion allowance deduction computed at 22 percent.

Production. Oil and gas production in Colorado is presently subject to what is in effect a severance tax, although provision for the tax is included under the income tax statutes. The tax is imposed on gross income which is defined to mean "the entire amount realized from the sale or other disposition of all crude oil and natural gas produced or extracted during any taxable year from petroleum deposits located within this state." (39-22-505 (1) (b), C.R.S. 1973). The rate of the tax is as follows:

| | |
|---|---|
| under $25,000 | 2% |
| $25,000 and under $100,000 | 3% |
| $100,000 and under $300,000 | 4% |
| $300,000 and over | 5% |

Revenue from the oil and gas production tax has fluctuated sharply in accordance with production levels and prices. The following table indicates the revenue to the state from the tax since 1966 and the increase or decrease.

TABLE I

PRODUCTION (SEVERANCE) TAX REVENUE FROM OIL AND GAS

| Fiscal Year | Revenue | Percent Increase (Decrease) |
|---|---|---|
| 1966 | $1,015,859 | |
| 1967 | 952,212 | (6.27) |
| 1968 | 971,758 | 2.05 |
| 1969 | 862,523 | (11.24) |
| 1970 | 789,877 | (8.42) |
| 1971 | 490,385 | (37.92) |
| 1972 | 300,267 | (38.77) |
| 1973 | 693,777 | 131.05 |
| 1974 | 1,201,375 | 73.16 |
| 1975 | 3,657,888 | 204.48 |

Credited against the tax is an amount equivalent to the sum of all ad valorem taxes levied, assessed, and paid during the taxable year on the production of oil and gas. This credit is particularly important because of the 87.5 percent assessment level of oil and gas. According to the industry, ad valorem taxes paid on production in 1975 exceeded $12 million. As the great portion of these taxes served as a credit against the state tax, were there no credit for ad valorem taxes, state revenue would have been substantially increased.

Drilling permits. A permit to drill an oil or gas well costs $75. Total revenues for fiscal year 1975 to the state were $88,650.

Conservation tax. Oil and gas production is subject to a conservation tax of one mill per dollar market value at the wellhead. Fiscal 1975 revenues from this source were $333,194.

Inspection fees. Drill rig operators are assessed $75 per rig annually to cover safety inspection costs by the Division of Mines.

## Coal

Income. Production of coal in this state subject to income taxation is entitled to a deduction based on a ten percent rate for percentage depletion.

Tonnage tax. Coal produced in Colorado is subject to a tonnage tax of 7/10 of 1 cent per ton for deposit to the Coal Mine Inspection Fund. Fiscal year 1975 revenue from this source was $45,561.

License fees. Coal mines must pay a license fee annually, depending on production, as follows:

| Annual Production | Fee |
|---|---|
| Less than 500 tons | $10 |
| 500 - 1,000 tons | 25 |
| over 1,000 tons | 50 |

Fiscal year 1975 revenues from these fees were $2,035.

Reclamation permit fees. Surface mining operations are subject to annual permit fees of $50 plus $15 per acre. Total fiscal year 1975 revenue was $77,195 from these fees. (NOTE: This total includes revenues not only from coal but also from limestone and sand and gravel quaries. Coal would likely represent around one-half of the total.)

Inspection fees. Coal mine operators are assessed inspection fees on the basis of the full-time employees during the previous year's operations. Total collections from this source were $61,905 in fiscal year 1975. (NOTE: This sum includes fees from all inspected activities. Since coal mines account for some 15 percent of the mining industry's employees, it can be projected that they would account for approximately $9,000 of the revenue.)

## Metals

Income. These minerals benefit from percentage depletion deductions at the following rates:

| Mineral | Percentage Depletion Rate |
|---|---|
| Uranium | 22 percent |
| Beryllium | " |
| Cadmium | " |
| Lead | " |
| Molybdenum | " |
| Tin | " |
| Vanadium | " |
| Zinc | " |

| Mineral | Percentage Depletion Rate |
|---|---|
| Gold | 15 percent |
| Silver | " |
| Copper | " |

Inspection fees. Operators of metal mines are also subject to inspection fees based on the number of full-time employees. The maximum rate would be $15 per employee.

Non-metals

Income. Non-metallic mineral production in the state subject to income taxation benefit from depletion allowances at the following rates:

| Mineral | Percentage Depletion Rate |
|---|---|
| Clay | 22 percent |
| Fluorspar | " |
| Asphalt | 14 percent* |
| Dolomite | " |
| Feldspar | " |
| Limestone | " |
| Rare Earths | " |
| Perlite | 10 percent |
| Sand | 5 percent |
| Gravel | " |
| Scoria | " |
| Some stone | " |

* If used for rip rap, ballast, roads, rubble, or concrete aggregate, the rate is reduced to 5 percent.

Reclamation permits. Reclamation permits at $50 plus $15 per acre annually are required from surface mines producing construction limestone, sand, gravel, and quarry aggregate.

Inspection fees. Annual inspection fees are required of mine operators. The maximum rate is $15 per employee and graduated downward as word force size increases.

## Oil Shale

Income. Oil shale production subject to income taxation is allowed a depletion deduction. Colorado law sets the rate for percentage depletion at 27.5 percent whereas federal law is 15 percent.

Inspection fees. Inspection fees for safety inspections by the state Division of Mines would be assessed at a maximum rate of $15 per employee. For a 1,000 worker plant, approximately the size work force contemplated for a 50,000 Bbl per day plant, the fees would come to $5,975.

TABLE II

AD VALOREM TAXATION OF MINERAL RESOURCES

| Mineral | 1974 Production Value | Producing Lands | | | Other AV 1975 |
|---|---|---|---|---|---|
| | | How Assessed | Total AV 1975 | % AV of Production | |
| Oil and Gas | $337,470,519 | 87.5% Well-head Value | $274,390,380 | 81.31% | $31,353,890 |
| Coal | 68,562,757 | 30% Actual Value as other Real Property | 2,677,890 | 3.91 | 5,648,550 |
| Metals | 218,267,845 | 25% Gross or 100% Net, Whichever is Larger | 40,752,570 | 18.67 | 45,750,500 |
| Non-Metals | 72,354,833 | 30% Actual Value as Other Real Property | 1,563,660 | 2.16 | 2,214,860 |
| Oil Shale | 1,337,266 | 25% Gross or 100% Net, Whichever is Larger | 2,160 | 0.16 | 2,179,560 |
| Total | $697,993,220 | | $319,386,660 | | $87,147,360 |

SOURCES: "Summary of Mineral Industry Activities in Colorado", 1974, Division of Mines; Compilation of assessor's abstracts, 1975, Colorado Division of Property Taxation.

TABLE III

OTHER TAXES ON MINERAL RESOURCES

| Mineral | 1974 Production Value | Income Tax % Depletion Allowance | Production Taxes | | | License, Permit, and Other Fees | |
|---|---|---|---|---|---|---|---|
| | | | Type | Rate | FY 1975 Yield | Type | FY 1974 Yield |
| Oil and Gas | $337,470,519 | None, with exceptions | Production | 2-5% well-head value | $3,657,888 | Drilling | $ 82,875.00 |
| | | | Conservation | 1/10% well-head value | 333,194 | Safety Inspection ($75/rig) | N.A. |
| Coal | 68,562,757 | 10% | Tonnage | 0.7¢/ton | 45,561 | License | 7,152.00 |
| | | | | | | Reclamation Permit | N.A. |
| | | | | | | Inspection | 9,000.00 |
| Metals | 218,267,845 | Gold, Silver, Copper - 15% Other - 22% | None | | | Inspection | N.A. |
| Non-Metals | 72,354,833 | Clay, Fluorspar - 22% Asphalt, Dolomite, Feldspar, Limestone - 14% Perlite - 10% Sand, Gravel, Scoria - 5% | None | | | Sand, Gravel, Limestone: Reclamation | N.A. |
| | | | | | | All: Inspection | N.A. |
| Oil Shale | 1,337,266 | 27.5% | None | | | Inspection | N.A. |
| Total | $697,993,220 | | | | $4,036,643 | Drilling Permits | $ 82,875.00 |
| | | | | | | Inspection Fees | 60,040.00 |
| | | | | | | License Fees | 5,630.88 |
| | | | | | | Reclamation Permits | 37,140.00 |
| | | | | | | | $185,685.88 |

## III. APPROACHES TO SEVERANCE TAXATION

The differing approaches, alternatives, and options for the imposition of a severance tax are described in this Part III. Particular emphasis is given to the complex and controversial alternatives for severance tax bases, that is, what portion of the mineral or its value is subject to taxation. As an example of the concepts, the introduced and engrossed versions of H.B. 1196 (1975 session) are analyzed. Table IV provides a diagram comparing the value of various minerals produced to possible points for taxation.

Severance taxes are not always called severance taxes, but may be defined as excise, privilege, production, mining, minerals, license or occupation taxes. The methods of imposing severance taxes may vary as much as their titles, ranging from actual excise taxes to net income taxes and surtaxes. The necessary components of a severance tax are: (1) a defined tax base with some connection to mineral (or timber) production; and (2) a rate. Multiplication of the base times the rate, less any specified credits or modifications, results in the severance tax obligation. A coal severance tax of 50 cents (rate) per ton (base) on coal is an example of a basic approach to severance taxation.

### Applicability

In other states, those resources that are subject to severance taxation appear to be influenced by three factors. First, states usually tax those minerals on which severance taxes are generally accepted and imposed, e.g., oil and gas production. Second, minerals that are or were at some time important in a state's economy are also often subject to severance taxation, such as coal and trona in Wyoming, coal in Montana, copper in Arizona, Utah, and Montana, and iron ore in Minnesota and Alabama. Third, the imposition of a severance tax is relatively common on minerals that are potentially important to the state. Examples would be Wyoming's severance tax on oil shale, and North Dakota's and South Dakota's new severance taxes on coal.

As taxes are normally imposed for the purpose of raising revenue, it is not surprising that few states tax minerals that typically are extracted by small operations or have low production or value. The rationale for this course of action is probably that the revenues from such taxes do not justify the administrative expense. It is interesting to note that states that do tax these sort of minerals often utilize a very simple tax with small administrative expenses and easy enforcement, such as Montana's five cent per ton tax on cement and gypsum.

Another consideration in applicability of a severance tax is whether different minerals should be treated in the same statute, the

same statute with special provisions for particular minerals, different statutes with common provisions were appropriate, such as reporting procedures, or entirely different and separate statutes. Examples of each approach can be found in other states, although it is most common to treat at least oil and gas separately.

## Tax Rates

### Unit

The simple rate is a set dollar amount per unit of production, such as North Dakota's coal tax of 50 cents per ton. A variation of this approach is to adjust the rate according to changes in price or the Wholesale Price Index, in order to pace the tax with changes in the economy and value of the product. Both Alaska and North Dakota utilize this sort of adjustment to set rates.

### Value

A rate that is a percentage of some defined taxable value is more widely employed than the unit approach. Such a rate automatically adjusts the tax to changes in price and value of the resource. Some states combine the two approaches by imposing a tax at a set rate or a percentage, requiring that the greater is due. This combination sets a floor and protects state revenues from price decreases.

A few states, including Colorado on oil and gas, graduate rates, production value, or quantity to place more of the burden on larger operations. H.B. 1196, as introduced and as engrossed, would have employed this approach. Montana also provides a method whereby a graduation is based on the quality (Btu content) of the mineral (coal).

## Tax Bases

### Unit

One type of tax base is per unit, imposing the rate on a specific unit of production, e.g., per ton. This approach is utilized by a number of states for some minerals, although seldom for all minerals taxed. The unit base approach has two principle advantages: certainty and simplicity. All like minerals are treated similarly for tax purposes although no accounting can be made for differences in profitability or costs except, perhaps, through a graduated rate structure, specified credits, or exclusions.

Value

The other primary form of severance tax base utilizes the value of the mineral extracted. Under this approach, a percentage rate is applied at a specific point of extraction (e.g., point of severance or market) and at a value (e.g., net or gross) in order to compute tax liability.

Point of taxation. If the tax is to be imposed on the severance of the mineral, the value of the mineral at the point of severance would seem to be the appropriate base. If the tax is to be imposed on the occupation of severing and processing the mineral for private gain, the taxable base may more appropriately be set at some point after severance, such as when the mineral is sold after benefication. If the tax is to be imposed on the private profits of the operation realized from the extraction of resources, the appropriate base would likely be net value. In the former instance, such a base would correspond to the "national heritage" concept of a severance tax, i.e., a tax on the severance of the mineral to compensate for the depletion of the state's resources. In the second approach, the base goes beyond a severance tax and includes a tax on processing and manufacturing, commonly called a "value added" tax. If the base is defined as net proceeds, the third approach, the tax would assume the character of an income tax or income surtax with the tax levied on profits rather than severed value. There are almost infinite possibilities for defining the point of taxation between these examples, or even beyond them.

The definition of tax base is especially controversial because the value of a mineral increases consistantly from the time it is discovered through pre-development, development, severance, extraction, beneficiation, loading, and transportation to the point of sale. There can be large differences in the taxable value of a mineral, and therefore tax liability, depending on the point in this process that is defined to be the tax base. In addition, there may be disparity in the tax base between an operator who severs and processes a mineral and one who severs and sells to another for beneficiation.

The question of where to impose the tax is further compounded by the fact that different minerals are subject to different processes and expenditures in their development. For example, a significant portion of oil and gas production expenditures is in exploration. Once found, the fuels can be produced relatively cheaply. Coal, in contrast, occurs in relatively well known deposits and the major expenditures are in mining and transportation, with lesser expenses incurred in processing. Metals are still another case. They are not as abundant as coal and therefore substantial exploration expenditures may be incurred as is the case with oil and gas. Once located, metallic ores must be mined, and the low proportion of mineral contained therein separated; subsequently, the natural mineral must be converted to a commercially usable form, by additional expensive processes.

For oil and gas, the controversy on taxable value is slight as there are not significant changes in value following severance until refining which, if taxed, would require a manufacturing tax and seldom occurs in the same jurisdiction as production. Almost universally, the wellhead value or price of the oil and gas is the base for severance taxation. This base is further facilitated by the posting of field prices and conservation regulation, giving ready access to value and production data. A few states tax gross income from oil and gas. Although a somewhat different concept, the taxable value is not substantially different.

Similarly, the value of coal and many nonmetals is not significantly enhanced by processing after severance, although relatively more so than for oil and gas. For other nonmetals, oil shale, and metal production, expenditures after extraction for beneficiation add substantially to the value of the product and the determination of the point at which the tax would be imposed becomes even more important and controversial.

Basis of taxable value. Once a decision has been made concerning what point in the process of mineral extraction, beneficiation, transportation, and sale upon which the severance tax is to be imposed, it is necessary to determine the corresponding taxable value of the mineral. Commonly, the only readily known independent measure of mineral value is sales price or market value. If the imposition of the tax does not coincide with the sale of the mineral (or, at least, a point at which the mineral is in a salable form with a readily discernible market) the taxable value must be imputed from the point of known value, sale or market price. In order to determine the taxable value in such an instance, deductions are usually made from the sales price of the mineral. Such deductions are often actual business costs incurred in the extraction and processing of the mineral between the point of imposition of the tax and the point of sale. The costs that are so deducted from the sales price to determine the taxable value are very important in terms of ultimate tax liability, and they can also become quite complex and contentious. Accordingly, most states which utilize this approach to define taxable value are very explicit about which costs can be deducted. In Wyoming, the Department of Revenue calculates the tax base and liability of each taxable concern in order to minimize confusion and disagreement over such calculations. In Montana, New Mexico, and Utah, the revenue departments are empowered to compute taxable values if there is a question or lack of a clear or reasonable sale.

In general, there are two directions that can be pursued to statutorily define the tax base: gross or net. Gross would imply a tax base including total production or income whereas net would indicate a more limited base with deductions from gross used in its determination. For each of these two primary options, there is the possibility of imposing the tax on production or on income. On one hand, there is a severance tax on gross production, such as Wyoming's coal production tax, and on the other, a severance tax on net income, such as South Dakota's coal tax on net profits. In between there are

infinite variations which depend on the definition of tax base and what sort of deductions or credits are allowed.

As noted, the most common starting point in calculating taxable value is the sales price. The sales of many minerals are not concluded on-site, but at delivery to the purchaser, in some instances after additional off-site processing. Consequently, some states allow the deduction of transportation costs from the mine to the sale in an attempt to equalize taxable values between mines. New Mexico, South Dakota, and Utah have all adopted this approach to some extent.

Alternatively, Arkansas and Wyoming specify the taxable value to be the value of the mineral as it leaves the mineral producing unit and use sales price as a base only if it coincides with that point.

Processing costs are allowed as deductions from sales price by Idaho, New Mexico, South Dakota, Utah, and Wyoming in an attempt to tax the value of the mineral as severed and not tax the value added by processing, which is argued to be discriminatory in some instances. New Mexico employs an overall limitation on deductions of 50 percent of value in order to better control their tax base.

In addition to deductions from sales value subtracted from a known point back to a value at a desirable point for the imposition of the tax, some states provide other deductions that seem primarily designed to encourage a goal perceived by the legislature. Exclusions from severance taxes are provided by Montana, South Dakota, and Utah, apparently in an effort to exempt smaller operations. Idaho, Minnesota, Montana, and South Dakota permit deductions of taxes paid, perhaps to avoid accusations of double taxation. Other notable deductions allowed in determining taxable value are royalties by New Mexico, and interest, research and development, and all extractive costs by Minnesota and South Dakota. Minnesota also allows several other deductions including credits for low grade ore recovery, costs exceeding ore value, and sales of ore at discount.

A question that inevitably arises regarding the imposition of severance taxes is whether all minerals should be taxed alike and, if so, whether this is fair and equitable. Attempts to do so are rare. Idaho, South Dakota, and Wyoming use similar tax bases for metals, coal, and other minerals. But both Idaho and South Dakota impose what are essentially income taxes which may allow for differing costs and profitabilities between resources whereas Wyoming taxes coal, subject to little beneficiation, at a higher rate. An alternative is to tax all minerals at the same rate, such as attempted in the engrossed version of H.B. 1196, but on different tax bases. Printed H.B. 1196 attempted to utilize like bases and rates for all minerals. For states taxing more than one resource, it is most common to have separate tax bases for different minerals, although the grouping of similar minerals (e.g., metals) is common.

## House Bill 1196 (1975 Session)

The introduced version of the bill was largely rewritten before adoption by the House. A comparison of the two versions illustrates two alternative approaches to severance taxation.

### Applicability

The printed bill would have applied to all metals, nonmetals, and mineral fuels. With an inclusive definition of nonmetals, there were apparently no minerals exempt from the proposed tax. The engrossed version would have taxed metals, mineral fuels, and coal, but not asphaltum, rock, limestone, dolomite or other stone products, sand, gravel, or earths. The printed bill thus provided for a severance tax on all minerals whereas the engrossed version pursued a more common approach with application to a specified, limited group of minerals.

### Tax Rates

Both the printed and engrossed versions of H.B. 1196 would have employed a value (percentage) rather than a unit (fixed) rate. Under the printed bill, the rates for all minerals were on a graduated scale, based on gross proceeds, as follows:

| | |
|---|---|
| under $ 25,000 | 2 percent |
| at least $ 25,000 but under $100,000 | 3 percent |
| at least $100,000 but under $300,000 | 5 percent |
| $300,000 and over | 6 percent |

Under the engrossed bill two sets of rates were proposed, along with a different definition of gross proceeds. For those minerals specified to be taxed, other than oil and gas, the rates were:

| | |
|---|---|
| under $100,000 | no tax |
| from $100,000 to $300,000 | 3 percent |
| $300,000 and over | $6,000 plus 6 percent of excess over $300,000 |

For oil and gas, the rates were:

| | |
|---|---|
| Under $300,000 | 3 percent |
| $300,000 and over | 6 percent |

### Tax Base

It was in the definition of tax base that the difference between the printed and engrossed versions of H.B. 1196 was most pronounced. Both did propose the value rather than the unit approach,

but the definitions of point of extraction and basis of taxable value differed substantially.

The bill as introduced would have taxed minerals on the basis of their value at the point of severance. This would have been achieved by deducting from the value of the mineral at the point of first sale those costs incurred between the point of severance and the point of first sale. The amended bill would have taxed minerals on the basis of value at the point of severance and the additional costs of certain processing. This would have been achieved by adding to the sales value of the severed mineral the costs of those processes for which depletion is allowed under federal and state law.

Specifically excluded from the tax base under the printed bill were the costs of pyrolysis, refinement, royalty payments, reclamation, revegetation, environmental costs, recapture of investment, and a reasonable rate of return thereon.

Specifically included in the tax base under the engrossed bill were: (1) costs of transportation from point of extraction to facility for processing; (2) extraction of ores or minerals from waste or residue; and (3) "treatment processes". "Treatment processes" would have included all those processes with respect to which the person was entitled to a deduction for depletion under federal law on January 1, 1975.

The tax base of the printed bill was thus substantially smaller than that of the engrossed bill. The printed bill essentially would have taxed a mineral at the point of severance whereas the engrossed bill would have been levied beyond that point and would have included most upgrading and refinement processes.

Modifications to the tax. Under the bill as passed by the House, oil shale facilities were exempt from the tax in two circumstances: facilities designed for production of under 8,000 barrels per day; or for research and development. For oil shale facilities designed for a capacity of over 8,000 barrels per day, no tax would have been imposed until the second calendar year after initial production when one-third of the tax would have been imposed. In the third year, two-thirds of the tax would have been due, and in the fourth and succeeding years, the entire tax would have been imposed. The introduced bill would have exempted oil shale facilities until the year after the plant reached 80 percent of design capacity, then the rate would have been one-sixth of the regular severance tax rate, with such rate increased by annual one-sixth increments until the sixth year when the full tax would have been imposed. Oil shale produced from underground in situ methods was allowed no credit by the amendment The credit in the printed bill was one-half.

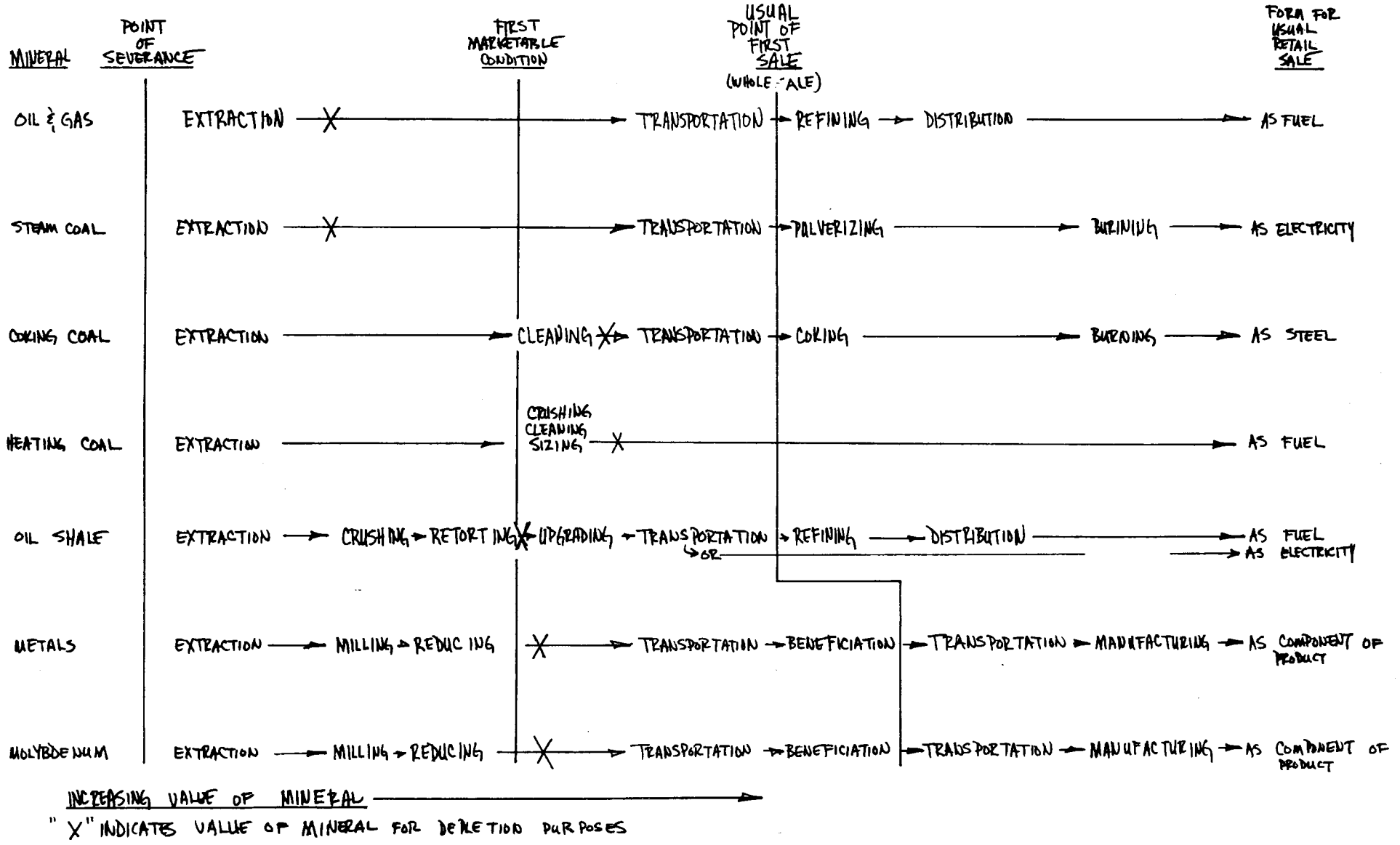
Minerals extracted from underground mines were allowed a credit of 20 percent of the tax due by the amendment whereas the credit in the printed bill was two-thirds for underground coal only.

For oil and gas, the engrossed bill provided credit for 50 percent of the ad valorem taxes paid, limited to 50 percent of the severance tax due. Existing law allows a total credit whereas the printed bill provided a 50 percent credit but did not set an overall limit on such deductions.

The following table (Table IV) indicates, for various minerals, the points of severance, first marketable condition, usual point of first sale, depletion value, and usual retail sale.

TABLE IV

STEPS IN THE PROCESSING OF MINERALS AND MINERAL FUELS
BETWEEN SEVERANCE AND USE OF CONSUMER GOOD



## IV. SEVERANCE TAXATION IN OTHER STATES

A number of states' severance tax statutes were examined for purposes of exemplifying differing approaches to severance taxation. These states are Alabama, Arkansas, Idaho, Minnesota, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming. In addition, the severance tax rates and minerals taxed in all states are summarized in Tables V through VIII.

The states' statutes on severance taxation were analyzed in detail regarding their taxable bases and the methods used to determine that value. It can be noted that three states, Alabama, Arkansas, and North Dakota, primarily use a per unit base for their severance taxes whereas seven use some sort of value base. Four states, Montana, New Mexico, Utah, and Wyoming, utilize sales price to determine taxable value. In Montana, the base conforms closely with sales value except for the deduction of off-site transportation costs when incurred. New Mexico and Utah both provide for substantial processing deductions in most instances in their determination of taxable value. Idaho and South Dakota impose what are essentially an income surtax and an income tax respectively, however both use gross receipts as the starting point in taxable value computations. The in-place value is used by Minnesota for its tax base.

Below is a more detailed explanation of these ten states' tax bases, with primary emphasis given to coal, metals, and non-metals. Oil and gas has been cursorily examined due to the similarity of tax base (wellhead value) among states, including Colorado. Similarly, timber taxation has not been given extensive coverage because of the small size of the industry in the state and the low priority given its consideration by the co-chairmen.

### Alabama

Alabama utilizes the unit base in its severance taxes on coal, iron ore, and timber. Iron ore is taxed at three cents per ton based on the number of tons mined, according to the run of the mine. Railroad weights are used if the ore is loaded for shipment. The coal tax is 13.5 cents per ton and is temporary in nature -- designed to pay for state bonds issued to construct port facilities.

The timber tax is 20 cents per 1,000 board feet for pine sold as boards, or, if sold as logs, the tax is 30 cents per 1,000 feet log scale. Other timber and timber products taxed by the state are hardwood, cyprus, other species, pulpwood, chemical wood, bolts, cross ties, switch ties, mine ties, and coal mine props, pine ore mine props, hardwood ore mine props, piling, turpentine, stumpwood, and pulpwood chips. In addition to the forest products severance tax, the state imposes a privilege tax equal to 50 percent of the severance tax on processors of forest products or manufacturers using forest products, including those located out-of-state, and utilizing Alabama timber.

The state's oil and gas tax is four percent of the gross wellhead value. An unusually high conservation tax of two percent of gross value is also imposed.

## Arkansas

Arkansas is a state with a broad severance tax imposed on most resources extracted from the state, including fossil fuels, timber, and minerals. In almost all cases, its tax is on a unit basis, and the rates of the tax are a set amount per unit. Zinc and lead are taxed, for example, at 15 cents per ton, whereas coal is taxed at two cents per ton. In addition, Arkansas has specific tax rates for various timber products and percentage rates on the wellhead value of crude oil production.

Diamonds, fuller's earth, ochre, natural asphalt, native sulphur, salt, pearls, other precious stones, novaculite, and all other natural resources except gypsum, are taxed at a rate of five percent. The tax base for these minerals is defined to be their value at the time and point of severance. The point of severance is further defined to mean the place at which transportation of the resource has been or is about to be made to the point of use or processing.

## Minnesota

Taxation of the minerals industry in Minnesota is probably the most complex of any state. Because the taxes are imposed in lieu of other taxes, i.e., corporate income and property, it can be questioned whether such taxes are actual severance taxes. The taxes are examined as they do illustrate certain possible approaches to severance taxation.

Occupation taxes. In lieu of the state's corporate income tax, the state imposes a specific "occupation tax" at a rate of 15.5 percent of ore value, except iron ore, taconite, and semi-taconite which are taxed at 15 percent. Copper and nickel are taxed under a separate statute at one percent of ore value. The tax base of the occupation tax generally corresponds to the value of the in-place resource, accomplished by deducting costs from the value of the ore as brought to the surface.

For determining the taxable value, the following are subtracted from the surface value of the ore:

- reasonable costs of supplies and labor performed at the mine to separate the ore from the ore body;
- for open pit mines, an amount equal to the cost of removing the overburden during the year divided by the number of tons of ore exposed;

- for underground mines, an amount equal to the cost of drifts, shafts, and adits divided by the number of tons of ore that such construction allows to advantageously be extracted;

- royalties;

- an amount equal to that percent of property taxes paid which would be proportionate to the yearly production as compared to the total ore tonnage in the mine;

- for taconite, semi-taconite, and iron sulphides, the additional per ton taxes imposed by the state and specific taxes for school and other governmental purposes;

- deductions for interest not to exceed four percent of book value or, if actual payments for interest are used, not to exceed six percent of book value; and

- for iron ore, shrinkage not to exceed 0.25 percent of the ore value.

Once the tax is determined on the basis of the above taxable value, certain credits against the tax are allowed. For the purpose of encouraging recovery of low grade ores and providing employment, a low grade ore credit is allowed, as follows:

- for underground mines, or open pit mines whose ore is beneficiated in-state, 10 percent of the cost of labor, employed in the mine or beneficiation of the entire production for the year, in excess of 70 cents per ton but less than 90 cents per ton; 15 percent of such labor cost if greater than 90 cents per ton;

- Other mines, or other tonnage produced at the same mines but not covered above, 10 percent of the average cost of labor if greater than 80 cents per ton but less than $1.05 per ton; 15 percent of such cost if greater than $1.05 per ton; up to 100,000 tons per year, reduced by the number of tons of credit provided under the first formula.

The credit may not exceed 8.25 percent of the ore value for underground, taconite, and semi-taconite operations and 6.6 percent for other operations. Total statewide credits for low grade ore may not exceed 6.2 percent of the aggregate amount of occupation taxes due the state for the taxable year provided that such credits for taconite and semi-taconite shall not be subject to the limit and the taxes and credits on such production excluded from the computation of the 6.2 percent maximum limitation. The tax commission uniformly and proportionately reduces the credits to each affected operation to bring to the aggregate limit if necessary. An alternate credit for labor costs equals 0.66 percent of the amount of tax due on each one percent of the total taxpayer's production of iron ore which is converted to pig, sponge, or powdered iron in-state.

Additional credits are provided for research, experimentation, pilot plant tests, and exploration expenditures in-state for the purpose of furthering the development of in-state ores. The credit is computed by multiplying the net effective tax rate for all mineral occupation taxes for the year times eligible expenditures. Another credit allows for deducting production costs in excess of ore value and is computed by applying the tax rates to eligible costs. The deduction may not, however, exceed 53.68 percent of the credit so computed for open pit iron mines or 42.10 percent of the credit for underground mines. Taconite and semi-taconite mines are not eligible. Another credit is allowed for sales of ore at discount, defined as being more than 50 cents per ton below the average actual selling price of the taxpayer's ore that was sold at open and competitive sales. The credit equals the number of tons discounted times the discount, not to exceed one percent of the taxes due for the year. Again taconite and semi-taconite mines are not eligible, nor are mines producing more than seven percent of all net marketable tonnage of iron ore in the state or if the taxpayer is engaged in steel production or owned in any way or to any extent by a company engaged in steel production.

Production Tax I. In addition to the above occupation tax, and in lieu of normal property taxes, a tax is imposed on taconite, semi-taconite, and iron sulphides of 11.5 cents per ton, plus 0.1 cents per ton for each percent of iron content exceeding 55 percent. The tax is increased if the Wholesale Price Index exceeds 110 (1957-1959 base) by an amount equal to 0.1 cent per one point rise in the index over 110. Through 1978, operations subject to local school bond taxes receive a two cent per ton credit. As noted previously, the tax serves as a credit against the 15 percent occupation tax.

Production Tax II. An additional tax on taconite, semi-taconite, and iron sulphides is imposed at the rate of 10 cents per ton for 1975 and 1976, 12 cents per ton for 1977 and 1978, and 14 cents per ton for 1979 and subsequent years. The tax rises 0.1 cent per ton for each one point rise in the Wholesale Price Index over 119 (1957-1959 base). This tax is also considered to be in lieu of normal property taxes that might otherwise be imposed.

Production Tax III. An additional in lieu of property tax was enacted in 1975. This tax is a per unit tax like other of the state's production taxes and is imposed on taconite and iron sulphides at a rate of 39 cents per gross ton of merchantable ore.

In addition to the tax structure on minerals, disposition of the revenues from the taxes is likewise complex. Occupation taxes are retained by the state and constitutionally distributed between the general fund, the public school fund, and a higher education fund. Production taxes, unlike the occupation taxes and in keeping with their imposition as in lieu of property taxes, are distributed almost entirely to local governments. A portion of production taxes II and III is uniquely distributed to homeowners in property tax relief.

The state's copper and nickel taxes are similar, but at a rate of one percent of ore value. Credit of 0.66 percent for each one percent of production processed in-state is allowed against the tax.

## Montana

Montana extensively revised its coal severance tax during the 1975 legislative session. The tax was previously based exclusively on a per unit base, with adjustments for Btu quality and differing rates for surface and underground production. The new act retains these features while adopting a percentage tax rate -- tax liability is whichever rate results in the greater tax. The base of the tax is the "contract sales price" of the coal which is defined to be the price of the coal extracted and prepared for shipment, f.o.b. mine, excluding all production taxes due (severance, ad valorem, and reclamation). Surface mined coal is taxed at 20 to 30 percent of sales price, or 12 to 40 cents per ton. An annual exclusion of 20,000 tons is provided.

Montana also has a severance tax on metals and precious and semiprecious gems and stones extracted from the state. The tax is based on the "gross value of the product" which is equal to the market value of such merchantable minerals. If the ores require smelting, reduction, or treatment in order to determine mineral content, then the gross value equals the market value of such merchantable minerals as shown by the gross smelter returns based upon average quotations of price for such metals in New York City, as evidenced by the "Engineering and Mining Journal of New York City" or other standard publication giving market reports. The tax rates are graduated from 0.15 percent to 1.438 percent.

In addition, the state levies a mining tax of $25 plus 0.5 percent of gross value if production exceeds $5,000 annually.

The state's severance tax on oil and gas is conventional, being based on gross value but with a lower rate for the first 450 barrels of production from each producing unit.

The Montana tax base for coal is broader and represents a higher value than in most states. The rate is the highest of any state. Also, the metals tax uses a processed base which is larger than most states. The metals rates are, however, lower than in many states.

## New Mexico

New Mexico has two taxes on mineral production. The first tax is called a severance tax and is a flat percentage rate applied to the gross value of severed minerals. The gross value, or tax base, is defined to mean the sales value at the first marketable point, with exceptions. If there is a posted field price or market price, then the gross value equals that amount. From gross value, however, may be

deducted the expenses of hoisting, crushing, and loading necessary to place the product in a marketable form and at a marketable location. Such deductions cannot exceed 50 percent of gross value.

The gross value of potash is equal to 33 1/3 percent of the sales proceeds, less 50 percent of such "reported price" for hoisting, loading, crushing, processing, and beneficiation. For uranium and other fissionable materials, the gross value equals the value of the U-308 contained in the ore or solution as determined on the basis of 50 percent content uranium sold by the taxpayer during the preceeding year as yellowcake. If none was sold by the taxpayer, the basis is representative sales of yellowcake during the preceeding year. Deductions are allowed of 50 percent of such amount to cover post-severance costs. For molybdenum, the gross value equals the value of the molybdenum contained in the concentrates shipped or sold from the mine-site, but not less than the value at a bona fide sale at current market prices. Again, a 50 percent deduction is allowed for processing and other expenses.

For all taxed minerals, royalties due the United States or the state are deducted from taxes due. Rates are 2 1/2 percent for potash, one percent for uranium, 1/2 percent for copper, and 1/8 percent for other materials and timber, including molybdenum. It would seem that the difference in rates may be at least partially an attempt to equalize tax liability between different minerals arising from the modifications to the tax base.

The second New Mexico tax is called a privilege tax and applies to all ores, coal, and timber produced or processed in-state. The tax takes three forms: a "resource tax" on the severing of resources; a "processors tax" on the processing of resources; and a "service tax" if the severing is done by other than the owner. The resources tax is not imposed on resources processed in-state on which the processing tax is paid. All three taxes have the same rate: 3/4 percent of taxable value for all resources except potash, 1/2 percent, and molybdenum, 1/8 percent.

The taxable value of the resource for the purposes of the tax is equal to the value of the resource after severing or processing without deductions. Such value is presumed to be the total amount of money or reasonable value of other consideration received for the resource. If the amount received is determined not to be reasonable, then the taxable value equals what would be a reasonable value of the resource. If the resource is shipped out-of-state without sale, taxable value is the reasonable value of the resource in the condition in which it left the state. Only two deductions are allowed: royalties and other interests, and service charges if the service tax is due.

In summary, New Mexico has a two tier system of taxation for natural resources. Initially, there is a severance tax on all mineral and timber production in the state. Then a resource tax is imposed on severers of such products for export, or a service tax if the severance is done by other than the resource owner. In lieu of the

resource tax, a processor's tax is due on products processed in-state. For the severance tax, it would seem that the tax base generally corresponds to the severed value whereas the subsequent taxes are primarily levied against sales values.

North Dakota

A new severance tax law on coal was enacted by the 1975 North Dakota legislature. The act utilizes the unit approach in imposing a tax of 50 cents per ton. The tax is temporary and applies only from July 1, 1975 to June 30, 1977.

The tax has adjustments based on the Wholesale Price Index for all commodities of the United States Department of Commerce, Bureau of Labor Statistics. The index serves as a guide for making automatic adjustments in the rate to pace the tax with overall price changes in the economy. The act provides for each three point rise in the index, the tax is to increase one cent per ton. January, 1975, is used as the base month for determining changes which are computed through the last month of the quarter preceeding the quarter for which taxes are due. The rate is not reduced with decreases in the index, but remains at whatever level last computed until the index passes the old mark and results in a tax increase.

The all commodities index of the WPI was 171.8 in January of 1975. Therefore, a three point rise in the index would correspond to a 1.75 percent price increase. The tax is in a form that is relatively simple to administer while the price adjustment feature addresses the primary disadvantage of the unit base approach.

South Dakota

A new comprehensive severance tax was adopted in South Dakota in 1975, covering gold, silver, precious metals, soda, saline, coal, trona, uranium, bentonite, petroleum, or other crude minerals, oil and natural gas. The tax is not in a form that would normally be associated with the concept of a severance tax, it is more of an income tax. As such, South Dakota's new tax represents a different approach to the question of appropriate taxable bases and addresses the question of tax liability on unprofitable operations.

The tax rate is four percent of net profits. Net profits are defined to be the gross yield of the business from mineral or mineral product extraction during the preceding calendar year, less specified deductions. The deductions from gross yield are as follows:

(1) The cost of extracting the mineral or mineral products from the mine;

(2) The cost of transporting the mineral or mineral products from the mine to the place or places of reduction, refining and sale;

(3) The cost of reduction, refining and sale;

(4) The cost of marketing and delivering the products and the conversion of the same into money;

(5) The cost of maintenance and repairs of all mine machinery, equipment, apparatus and facilities; all milling, smelting, and reduction works, plants and facilities; all transportation facilities and equipment; and general administrative buildings and facilities within the state of South Dakota;

(6) All interest costs and all insurance costs paid or accrued on the machinery, equipment, apparatus, works, plants and facilities, including moneys expended for industrial insurance or workmen's compensation, the actual cost of hospital and medical attention, accident benefits, group insurance, pensions, recreation, and payments into pension and profit sharing trusts and employee welfare;

(7) Depreciation on the cost of machinery, equipment, apparatus, works, plants and facilities listed in paragraph (5) at the same rates allowable for federal income tax purposes;

(8) The cost of development and exploration work in or about the mine or upon a group of mines when operated as a unit;

(9) All state and local taxes;

10) General administrative expense in connection with mining or extracting and milling operations, incurred within the state of South Dakota.

The tax excludes those operations which produce minerals or mineral products with a market value of less than $100,000 annually, apparently an allowance for small operators.

This approach utilizes an easily defined starting point for the computation of taxable value, i.e., gross receipts. The deductions used in determining net profits from mining are similar to business deductions found on federal corporate income taxes and generally correspond to the costs of doing business. Notably, South Dakota does not have a general income tax.

Utah

Utah imposes severance taxes on all ores of gold, silver, copper, lead, iron, zinc, tungsten, uranium, or other valuable metals and oil, gas, and other hydrocarbons from wells (not including coal). The tax is an occupation tax of one percent on the "gross amount received for or the gross value of the ore or metals sold" and two percent of the wellhead value of oil and gas.

The tax base is tied to the sale of the resource and equals the amount of money or equivalent actually received during the year for minerals sold. In the event that sales contracts call for completion of the sale at a place other than the mine, "reasonable costs" of transportation to the point of transfer may be deducted from the sales amount to determine gross value for tax purposes. If the resource is sold within a company, the state tax commission may determine the taxable value of the minerals unless they determine that the sales contract is proportionate to "reasonable fair cash value". If the mineral is milled, smelted or reduced before sale by the producing company, the amount that would be charged for the treating of similar ores from independent sources can be deducted from the sales price to determine gross value. If the mill is operated exclusively for the mineral production of a single company, the costs of operating the reduction works are considered to be mining costs and are not deductible; however, the costs of assaying, sampling, smelting, refining, and transportation may be deducted in the determination of the gross taxable value. The effect of these provisions is to ensure that all resources are taxed at the same point in the value, i.e., the first point at which a salable form is reached.

The tax has an annual exclusion of $50,000 of gross value, which is pro-rated when ownership or interests are held by more than one party.

Wyoming

Wyoming expanded and revised its severance tax laws during 1975, enacting a three-tiered tax. The basic tax is levied on the extraction of gold, silver, or other precious metals, soda, saline, uranium, bentonite, or other valuable deposit, trona, coal, petroleum, natural gas, oil shale, or other fossil fuel. All mineral production is treated alike and the tax rate is two percent of the value of the gross product extracted.

Under Wyoming law, the Department of Revenue and Taxation computes the value of the gross product extracted and the amount of tax due and notifies the taxpayer. This determination is made on the basis of information filed by the taxpayer with the department for ad valorem tax purposes. The value of the gross product is defined to be the fair cash market value of the product at the mine where produced, after completion of mining and production processes. Such processes are deemed completed for purposes of the tax when the product is removed from the earth and, prior to beneficiation, is placed in bins or similar storage facilities prior to transportation to market. If actually sold at the mine, the fair cash market value is equal to such sales price.

An additional tax of two percent of gross product value is levied on the extraction of trona, coal, petroleum, natural gas, oil shale, or other fossil fuel. This additional tax has a low-producer feature and excludes oil wells producing an annual average of less than 10 barrels per day.

An additional coal tax was also enacted by the 1975 legislature, similarly based on the value of coal produced. The tax is to be phased-in, apparently to minimize the impact on existing operations and shift the liability to new coal mines. The tax is imposed at a rate of 0.4 percent for coal produced in 1974 (taxes due in 1975), and increased by 0.4 percent annual increments until reaching two percent for 1978 and later coal production. The tax expires when total revenues to a special impact fund reach a specified level.

Thus, Wyoming has a three-tier severance tax on mineral resources, utilizing a tax base that should approximate the severed value for metals and generally corresponding to sales price for other minerals. All mineral production is taxed at two percent, fossil fuels are liable for an additional two percent, and coal an additional 0.4 to two percent for a total of 4.4 to six percent. The base utilizes known quantities and computation of the tax by the state is a method to minimize enforcement problems.

## Comparing State Severance Taxes

It should be emphasized that comparisons of state severance taxes can be quite misleading for three major reasons. First, although it is convenient and tempting to compare severance tax rates among the states, rates are meaningful only in terms of the base or value to which the rate is applied. Thus, a three percent tax on gross value in one state might effectively be a higher tax than a six percent rate in another state, depending on the definition of the base. Any definition of taxable value is a matter for legislative determination and, as noted, variances among the states are substantial.

Second, a severance tax is one of several which may be levied against a mining operator. This, of course, is in keeping with the concept of a severance tax as a special tax. For the operator it is the total tax burden, not solely the severance tax, which is of importance. Thus, a state which a low severance tax and high property and income taxes may impose a larger total tax burden than another with a high severance tax and lower property and income taxes. In addition, other taxes may directly affect a severance tax. In Colorado, for example, the ad valorem credit against the state severance tax on oil and gas production serves as a substantial modification.

Third, credits against the tax may be more significant in one state than another. Arkansas, for example, allows as a credit against its oil severance tax an amount equal to the allowance for depreciation plus the cost of maintaining salt water disposal systems.

## Oil and Gas Production Taxes

Twenty-one states, including Colorado, impose an oil and gas production tax. Generally, the tax is imposed at the wellhead or

first point of sale and assessed as a percentage of the gross value. The lowest rates of these states are found in Georgia and Idaho, their rates being five mills per barrel, or less than one-tenth of one percent of the gross value. The highest rate is in Louisiana which levies a twelve and one-half percent tax on the value of most oil and gas produced in the state, although low-yield producers are granted lower rates. Colorado rates are graduated from two to five percent and based upon gross income derived from oil and gas production, with local property taxes serving as a credit against these taxes. Oil and gas lands are assessed at 87.5 percent of gross value of the oil and gas produced during the preceding year in Colorado, in contrast to most other lands which are assessed at 30 percent. Most states which impose a severance tax on oil and gas also levy a conservation tax. Designed to defray state regulatory expenses, several states without severance taxes also utilize the conservation tax. Typically, rates are less than 0.5 percent of value. Table V is a listing of the oil and gas severance tax rates for the 21 states with such a tax.

## Coal Severance Taxes

Twelve states have severance taxes on the production of coal, including Colorado if it can be so considered. The rates range from a low of seven-tenths of one cent per ton, in Colorado, to a high of thirty percent of value in Montana. The Colorado tax is more akin to a fee, and serves to defray coal mine safety inspection costs. Table VI contains a listing of coal severance tax rates by state.

## Timber Severance Taxes

Seven states apply some kind of severance tax on timber harvested in their state. Most of these states have fairly complete taxation of all timber and timber products which include turpentine, particle board, railroad ties, and firewood. Colorado does not impose a severance tax on timber harvested within its boundaries. Table VII provides the states' tax rates on timber.

## Ore Severance Taxes

Seventeen states have a tax on the severance of ores. The taxes range from a single tax rate on iron ore only, to a flat-rate tax on all ores, and, finally, to graduated tax rates on ores that depend on the kind or value of the ore mined. These rates range from one cent to over one dollar per ton of ore, and less than one percent to over fifteen percent of the gross value of the ore. Colorado does not tax the severance of ores. The complete list of the states' rates is attached as Table VIII.

Table V

Oil and Gas Severance Tax Rates

| State | Oil Rate | Gas Rate (if different) |
|---|---|---|
| Alabama | 4% + 2% | |
| Alaska[1] | 5% first 300 bbls<br>6% next 700 bbls<br>8% over 1,000 bbls or, if greater,<br>$0.2329/bbl first 300 bbls<br>0.2795/bbl next 700 bbls<br>0.3726/bbl over 1,000 bbls | 4% |
| Arkansas | 4% stripper wells<br>5% other wells | .3¢/mcf |
| Colorado | Rate: Gross Income:<br>2% under $25,000<br>3% $25,000 to $100,000<br>4% $100,000 to $300,000<br>5% $300,000 and over | |
| Florida | 5% | |
| Indiana | 1% | |
| Kentucky[2] | .5% | |
| Louisiana[3] | 12.5% | 4-7¢/mcf |
| Michigan | 2% | |
| Mississippi | Greater of 6¢/bbl, or 6% value | Greater of .03¢/mcf or 6% value |

1/ Rates adjusted by Department of Revenue to reflect changes in Wholesale Price Index and gravity of oil.

2/ Counties can also impose a tax of up to 1% of market value, over one-third do so.

3/ Modifications for low production, high salt content.

| State | Oil Rate | Gas Rate |
|---|---|---|
| Montana[4/] | 2.1% on first 450 bbls<br>2.65% on excess | 2.65% |
| Nebraska | 2% | |
| New Mexico | 3.75% | |
| North Dakota | 5% | |
| Ohio | 3¢/bbl | 1¢/mcf |
| Oklahoma | 7%, ($150/mo of production exempt) | |
| South Dakota | 4% of net profits ($100,000 exclusion) | |
| Tennessee | 50¢/50 gal. bbl | 5% |
| Texas | 4.6¢/bbl if price below $1/bbl<br>4.6% If price exceeds $1/bbl | 7½%, (min. rate of .0807¢/mcf) |
| Utah | 2% | |
| Wyoming[4/5/] | 4% | |

4/ Rate increased by 1975 legislature.
5/ Low production allowance; includes oil shale.

Notes: Barrel (bbl) equals 42 gallons unless otherwise noted; mcf equals 1,000 cubic feet; stripper wells produce an average of less than 10 bbl/day.

Table VI

Coal Severance Tax Rates

| | | | |
|---|---|---|---|
| Alabama | 13.5¢/ton | | |
| Arkansas | 2¢/ton | | |
| Colorado | .7¢/Ton | | |
| Kentucky | 4% of gross value | | |
| Louisiana | 10¢/ton | | |
| Montana 1/ | Heating Quality (BTU/Lb.) | | Tax Rates (Greater of) Surface Mined / Underground Mined |
| | Under 7,000 | 12¢ or 20% of value | 5¢ or 3% of value |
| | 7,000 to 8,000 | 22¢ or 30% of value | 8¢ or 4% of value |
| | 8,000 to 9,000 | 34¢ or 30% of value | 10¢ or 4% of value |
| | Over 9,000 | 40¢ or 30% of value | 12¢ or 4% of value |
| | (The first 20,000 tons of coal produced/year are exempt.) | | |
| New Mexico | 1.25% of gross value | | |
| North Dakota 1/ 2/ | 50¢/ton | | |
| Ohio | 4¢/ton | | |
| South Dakota 1/ | 4% of net profits | ($100,000 exclusion) | |
| Tennessee | 20¢/ton | | |
| Utah | 2% of gross value | | |
| Wyoming 1/ | 4.8% of gross value (annual .4% increases until 1978, then constant 6%) | | |

1/ Rate increased by 1975 legislature.

2/ Tax effective July 1, 1975, expires June 30, 1977, adjusted 1¢/ton for each 3 point rise in Wholesale Price Index.

Table VII

Timber Severance Tax Rates

Most states imposing special taxes on timber also tax various other specific timber products, such as railroad ties, turpentine, pulp, logs, stumpwood, and chips in addition to the brief listing here.

| State | Rate | Notes |
|---|---|---|
| Alabama | 20¢/1,000 board feet | Pine |
| | 12¢/1,000 board feet | Other woods |
| Arkansas | 50¢/1,000 board feet | Pine |
| | 25¢/1,000 board feet | Other woods |
| Louisiana | 6% av. stumpage mkt. val. | Reforest contract timber |
| | 5% av. stumpage mkt. val. | Pulpwood |
| | 2.25% av. stumpage mkt. val. | Other woods |
| Mississippi | 80¢/1,000 ft. log scale | Soft woods |
| | 60¢/1,000 ft. log scale | Hard woods |
| New Mexico | .375-.75% of taxable value | Lesser rate if processed in-state |
| Oregon1/ | 5¢/1,000 board feet | All |
| Virginia | 65¢/1,000 board feet | Pine |
| | 15¢/1,000 board feet | Cedar |

1/ Annual exclusion of first 25,000 board feet harvested.

Table VIII

Ore Severance Tax Rates

| State | | Rate | Notes |
|---|---|---|---|
| Alabama | | 3¢/ton | Iron ore only |
| Arizona | | 2.5% | Copper |
| Arkansas | (1) | 1¢/ton | Crushed stone, including limestone, construction sand, gravel, clay, chalk, and shale |
| | (2) | 1.5¢/ton | Gypsum |
| | (3) | 2¢/ton | Iron ore |
| | (4) | 15¢/ton | Other ores |
| | (5) | 5% of market value | Precious stones |
| Florida | | 5% | Solid minerals |
| Idaho | | 2% | All ores |
| Louisiana | (1) | 3¢/ton | Sand, gravel, and stone |
| | (2) | 4¢/ton | Shells |
| | (3) | 10¢/ton | Ores |
| | (4) | 20¢/ton | Marble |
| | (5) | $1.03/long ton | Sulphur |
| Minnesota | (1) | 15.5% | Ores except (2) |
| | (2) | 15% plus tonage tax:[1/] | |
| | | (a) 11.5¢/ton + 10¢/ton | Taconite and iron sulphides |
| | | (b) 10¢/ton | Semi-taconite |
| | (3) | 1% | Copper and nickel |
| Mississippi | | 3% | Salt |

| Montana | | Rate | Gross Value | |
|---|---|---|---|---|
| | (1) | 0.15% | first $1,000,000 | Metals, and precious or semi-previous gems and stones |
| | | 0.575% | next $150,000 | |
| | | 0.86% | next $150,000 | |
| | | 1.15% | next $100,000 | |
| | | 1.438% | over $500,000 | |

1/ Adjustments for iron content and changes in the Wholesale Price Index.

| State | | Rate | Notes |
|---|---|---|---|
| Montana (Cont.) | (2) | 5¢/ton | Micaceous minerals |
| | (3) | $25 plus .5% over $5,000 | All minerals |
| | (4) | 5¢/ton | Cement, gypsum |
| New Mexico | (1) | 1.75% | Uranium |
| | (2) | 1.25% | Copper |
| | (3) | 0.25% | Molybdenum |
| | (4) | 3.00% | Potash |
| | | 2.625% | Potash processed in-state |
| | (5) | 0.875% | Gold, lead, silver, zinc, manganese, fluorspar, pumice, clay, gravel, gypsum, sand, and other metals and nonmetals. |
| Ohio | (1) | 1¢/ton | Sand, gravel, limestone, dolomite |
| | (2) | 4¢/ton | Salt |
| Oklahoma | | 0.75% | Asphalt, lead, zinc, jack, gold, silver, and copper |
| South Dakota 2/ | | 4% of net profits ($100,000 exclusion) | All minerals and mineral products |
| Texas | (1) | $1.03/long ton | Sulfur |
| | (2) | $2.75/100 lbs. | Cement |
| Utah | | 1% | Gold, silver, copper, lead, iron, zinc, tungsten, uranium, or other valuable metal |
| Wisconsin | | 1.5% | Copper |
| Wyoming 2/ | (1) | 2% | Gold, silver, or other precious metals, and soda, saline, uranium, bentonite, or other valuable deposits |
| | (2) | 4% | Trona |

2/ Rate increased by 1975 legislature.

# V. THE MINERALS INDUSTRY IN COLORADO

This part provides general background information on the minerals-extractive industry in Colorado. A discussion of the characteristics, deposits, method of mining, types of processing, and normal marketing methods is included for the mettallic minerals and mineral fuels produced in the state. In addition, a review of the current status of each segment of the industry has been undertaken including factors that may affect future production levels. Industry employment has been noted where data are available.

## Coal

This section describes coal deposits in Colorado, coal uses, the condition of the industry, possible developments in the future, and a ranking of the largest coal producing states. Much of the information was taken from or prepared by the Colorado Geological Survey.

### Origin, Types, and Uses of Coal

Coal is the compressed and altered residue of vegetation that grew in prehistoric swamps. As the plant remains accumulated they were transformed into peat and subsequent chemical and physical changes produced coal. Coal contains varying amounts of impurities traceable to sediment in the original peat swamps.

Coal is classified by rank according to carbon and heat content (Btu value), in decreasing order from anthracite, to bituminous, to lignite. It is also graded according to the presence of impurities, called ash, noted above, and sulfur.

There are three primary uses for coal at this time. First, steam generation for the production of electricity. Second, some high Btu coal can be converted into coke for use in steel blast furnaces, and third, some coal is burned directly for space heating purposes, both residentially and commercially.

### Colorado Coal

About 28 percent of Colorado, roughly 29,600 square miles in 32 counties, is underlain by coal-bearing rocks. These contain approximately 10 percent of the United States original coal resources at depths to 6,000 feet. Colorado ranks fourth in bituminous coal reserves, most of it low sulfur and much of it coking quality coal for the steel industry. There are 250-300 billion tons of coal in the state minable by underground methods and 25-40 billion tons strip minable. Colorado has more high quality bituminous coal minable by

underground means than Wyoming, Utah, New Mexico, and Montana combined.

Ownership. About 60 billion tons on 8.8 million areas are under federal ownership with about 6.4 billion tons minable by strip methods. There are currently 113 federal coal leases in the state involving 122,155 acres. Seventeen leases were producing in fiscal year 1974 at a rate of 2.5 million tons per year or about 40 percent of the state's production. Applications for 65 more leases are pending which would cover 156,188 acres -- more than all existing leases combined. There is currently a continuing moratorium on new federal leases pending completion of a broad review.

The State of Colorado owns an estimated 19.5 billion tons of coal reserves involving some 831,000 acres. About 20 percent of the total state-owned acreage is minable by strip methods. Currently, about 223,829 acres of state coal land are under lease in 17 counties with 47 leaseholders. Some one-third of the strip minable coal is already under lease.

The amount of coal in the state under private ownership is in the neighborhood of 200-250 billion tons. The huge majority of this is minable by underground rather than surface methods although 15-30 billion tons are likely stripable. Privately owned coal accounts for approximately 60 percent of the state's annual production at this time.

Deposits. Colorado's coals occur in rocks of varying ages. The older coals are the most abundant and wide-spread, and are of higher Btu content than the younger coals. The oldest coals occur in the southwest corner of Colorado. Successively younger coals are found northeastward and eastward in formations deposited in coastal swamplands during the irregular withdrawal of interior seas. The youngest coals were deposited as non-marine sediments in interior basins.

The coal fields occur in broad structurally simple basins which are locally complex, especially at their rims, because of folds, faults, and igneous intrusions. These structural conditions afford only small areas of moderately dipping coals with overburden shallow enough to permit strip mining. About 95 percent of Colorado's coal resources must be mined underground.

In general, the older coals are of higher heat value (rank), ranging from high-volatile B bituminous in the San Juan region to subbituminous C and lignite in the youngest regions. Locally, however, structural deformations and igneous intrusions have caused an increase in rank of some coals to anthracite. About 77 percent of the coal resources are bituminous, 23 percent subbituminous and less than one percent semianthracite or anthracite. Some of the older coals of the San Juan and Raton regions have coking properties. So, also, do some of the upgraded coals in the altered beds at the southeast margins of the Uinta region.

Quality. On an as-received basis, the moisture content of most Colorado coals ranges from 1.0 percent to about 20 percent, an estimated average is about 12 percent. Ash generally ranges between 2.1 percent to about 15 percent. An estimated average is about 6 percent.

Colorado coals are mostly low sulfur; more than 99 percent contain less than 1.0 percent sulfur and more than half contain less than 0.7 percent sulfur. Normal sulfur content varies from 0.2 percent to about 1.1 percent. Nearly all can easily be processed to less than 0.5 percent sulfur. About one-seventh of Colorado coal production was washed in 1974. Most Colorado coals do not require beneficiation other than sizing to meet market demands.

On a dry, ash-free basis the heat values of most Colorado coals range between 14,500 and 13,300 Btu per lb. but some of the subbituminous coals range as low as 11,440 Btu per lb. An estimated average, dry and ash-free, is about 13,950 Btu per lb., or an as-received basis about 11,370 Btu per lb. Some of the altered coals rank as high as 88 percent fixed carbon, a true anthracite, but the quantity is insignificant.

Good metallurgical coking coals occur in the Durango field in the San Juan region, in the Trinidad field of the Raton region, and in the Crested Butte, Somerset, and Carbondale fields in the southeast Uinta region.

## Colorado Mining

Coal is mined under two primary methods. First, strip mining involves the removal of all earth (overburden) lying on top of the coal seam by large drag lines. Following exposure of the coal seam, it is blasted and the broken-up coal loaded with shovels and front end loaders into trucks for transportation to a railroad or nearby steam generating plant. Underground production primarily utilizes the room and pillar method of mining in which large rooms of coal deposits are extracted but large pillars are left to support the roof. This type of mining can be done by hand, although more commonly through the use of blasting and continuous miners to gather up the loose mineral from the coal face. In addition, a technique used in Europe is being tried near Carbondale called the long wall method. This system utilizes hydraulic jacks to support the mine roof while an entire section of seam is mined, leaving no pillars. The long wall miner then proceeds to mine another several feet of coal allowing the roof of the mine to collapse in a controlled manner behind it.

## Colorado Production

Recorded production of coal in Colorado, since 1864, totals about 560 million tons. Annual production reached a million tons in 1882 and two million tons in 1888. The peak of 12 million tons in 1910 dropped to 8 million in 1914, but rose to 12 1/2 million tons

during the period 1917-1920. The low of 5 1/4 million tons in 1934 was followed by a peak of more than 8 million tons in the war years of 1942-44. The irregular low production of 3 to 3 1/2 million tons from 1952 to 1963 yielded to mechanization and was increased to more than 6 million in 1970, was reduced to 5 1/3 million in 1972. In 1974, 7 million tons were produced, and projections for 1975 indicate an increase of 25 percent to nearly 9 million tons.

Only one state lease was in production in December, 1975 with July production of 68,000 tons -- rate in excess of 750,000 tons per year (TPY). Another lease is anticipated to reach production soon and the State Board of Land Commissioners anticipates production of 6 million TPY within three years.

At present, the state board is reviewing past leasing policies, procedures, and royalty rates. A revision is expected before the voluntarily imposed state lease sale moratorium is lifted. The royalty rate has been five percent and the proposed revision would be eight percent, the same as the new federal coal lease rate.

Strip mining started in the early 1950's, and by 1962, seven of Colorado's 117 mines were open pits, producing 556,000 tons or 14 percent of the 3,400,000 tons total. Since 1962, from six to 11 strip mines have been operating, and in 1974, nine of 38 mines operating were open pits, which produced over 30 percent of the coal while employing only 287 or 17 percent of Colorado's 1700 coal miners.

Coal use. Slightly over one-half of 1974 production was used for steam generation, the other half primarily for coke production and space heating. Of the 7 million ton total, about 4.1 million tons were consumed in-state. Public Service Company was the largest user, burning 2.3 million tons for steam production to make electricity while Colorado-Ute Electric Association used over 600,000 tons of steam coal for electric generation. About 500,000 tons of higher-grade metallurgical coal was utilized by Colorado Fuel and Iron. The other 750,000 tons of the production was consumed for a variety of purposes but primarily for steam production for electric generation and for residential space heating.

Two million tons of the 2.9 million tons of coal exported in 1974 went to the Geneva Steel Mills in Salt Lake City -- this was all metallurgical grade coal for conversion to coke and use in steel blast furnaces. Most of the rest of the exported coal also was used for coke production associated with the steel industry, with at least 600,000 tons exported to the U.S. Steel Mill in Provo, Utah.

Imports during 1974 totaled 2.7 million tons, of which 2.4 million tons were from Wyoming and consumed by the Public Service Company in the production of electricity. The remaining quarter million tons was imported primarily from Appalachia and consisted of metallurgical grade coal used by CF & I.

Future Production

Most of the information available about plans for expanding coal production is sketchy and almost invariably incomplete in some respects. Many operations are merely rumored at this point. Of the some 25 potential major coal developments in the state about which something is known, probably less than half can be projected to occur with any degree of certainty. However, if all came to fruition, additional state production of over 25 million tons per year could be projected for the next decade -- approximately three times the level of production in 1975. It is possible that coal's reemergence as a comparatively cheap energy source and the perfection of gasification and liquification processes could accelerate this projection. Conversely, a price drop in the world oil market and emission problems could dampen the expansion.

The amount of resource available for development (private or already leased) will not be a constraint on development. Regulating factors for coal development might be manpower and equipment availability, and transportation requirements.

Although Colorado is a net coal importer at present, this situation will probably reverse in the future due to the availability of coking quality coal, the limited size of Colorado's steel industry, and the demands of eastern markets for low sulfur coal to meet emission standards. The railroad industry may be projected as increasing along with coal production. Another possibility could be the proposed slurry to Texas which could export 9,000,000 tons per year.

Approximately 1,700 miners produced Colorado's seven million tons of coal in 1974. If this ratio were to hold, 30 million annual tons of production in a decade or so would directly employ some 7,250 miners. Using a rough multiplier of 4, this could mean a population of over 29,000 persons. A shift to a greater percentage of underground coal would bring this number up significantly, as might liquification or gasification efforts.

The following table (IX) shows the relative size of Colorado's coal industry compared with the 16 largest producing states.

TABLE IX

1974 COAL PRODUCTION BY STATE

| Rank | State | Thousand Short Tons Bituminous & Lignite | % of Total |
|---|---|---|---|
| 1. | Kentucky | 133,000 | 22.1% |
| 2. | West Virginia | 105,997 | 17.6 |
| 3. | Pennsylvania | 78,879 | 13.1 |
| 4. | Illinois | 58,080 | 9.7 |
| 5. | Ohio | 44,566 | 7.4 |
| 6. | Virginia | 33,249 | 5.5 |
| 7. | Indiana | 25,267 | 4.2 |
| 8. | Wyoming | 20,650 | 3.4 |
| 9. | Alabama | 19,745 | 3.3 |
| 10. | Montana | 14,089 | 2.3 |
| 11. | New Mexico | 9,669 | 1.6 |
| 12. | Texas | 7,684 | 1.3 |
| 13. | Tennessee | 7,681 | 1.3 |
| 14. | North Dakota | 7,400 | 1.2 |
| 15. | Colorado | 6,960 | 1.2 |
| 16. | Arizona | 6,432 | 1.0 |
| 17. | Utah | 6,047 | 1.0 |

TOTAL U.S. PRODUCTION 601,000,000

The following map shows the approximate location of the proposed coal mine openings or expansions in Colorado. Number designations on the map correspond to companies listed in Table X which lists rumored and reported major new coal mine openings or expansions. It was based on information originally compiled by the Colorado Geological Survey in 1974. Other sources include Colorado Division of Mines, U.S. Bureau of Mines, U.S. Bureau of Land Management, and local news articles.

Table X

PLANNED NEW COAL OPERATIONS OR MAJOR EXPANSIONS OF EXISTING OPERATIONS IN COLORADO
(Over 250,000 tons per year, or ±700 tons per day)

| | Company Name Location of Operation (County, Area, Tp. & Rge.) | Stage of Planning/ Start-up Dates | Size of Operation (Tons/Yr.) | Type of Operation (Strip, etc.) | Disposition/ Use of Coal | Est. No. of Employees | Mined Land Reclamation Permit App'n Received? | Size of Leasehold Area | Miscellaneous Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Kerr<br>Jackson Co., North Park<br>T.8N, R.78W | December, 1974 | est. 548,000 to 1,095,000 | strip | ship by UPRR no. into Wyoming | 42 | Yes | 13 ac. | |
| 2. | Empire Energy Corp.<br>Moffat Co., Axial Basin<br>Williams Fork area<br>T.5 & 6 N., R.91W. | stripping begun | ~1 million (~2 million by 1978?) | strip & underground | ship by new D&DGRR to Craig | 160 | Yes | 9,000 ac. total for co. | Possible slurry pipeline.<br>Permit issued for 1627 acres. |
| 3. | Utah International, Inc.<br>Moffat Co., S.W. Craig<br>(Yampa Project of Colo-Ute Electric Assoc'n.)<br>T.5 & 6N., R.90 & 91W. | pre-production activities in 1975; mining in 1977 | ~2.6 million | strip | Colo.-Ute Craig power plant | ~160 | No | ~6,000 ac. | "Mine mouth" use. |
| 4. | W.R. Grace Co.<br>(Colowyo Coal Co.)<br>Moffat Co., Axial Basin | planning, start-up 1976 or 1977 | 300-600,000 1977; 3 million eventually | strip | ship by new D&RGRR to Craig | 160-380 | No | 2,564 | Reactivation of old mines. |
| 5. | Adolph Coors Co.<br>Boulder-Weld field | planning | | underground | Coors plants, Golden | ? | No | ? | No info. released. |
| 6. | Adolph Coors Co.<br>Delta Co., Paonia<br>North Fork area | planning start-up 1977 | 4 million | underground | Coors plants, Golden | 50 | No | 1,600 ac. | No info. released. |
| 7. | Canon Coal<br>Fremont Co.<br>Corley S & A | planning expansion | ~1 million<br>? | strip | Drake Power Plant, Colo. Springs | ? | No | ? | |
| 8. | Houston Natural Gas | start-up 1978-80 | | -- | | | | | Poss. $300 million slurry pipeline, Craig to Houston<br>9 million TPY coal, 4,700 ac-ft wtr (saline ?) per yr.<br>(water req. 240 gal/ton of coal)<br>Has option to buy 80% of Empire Energy Corp. holdings in Craig area |

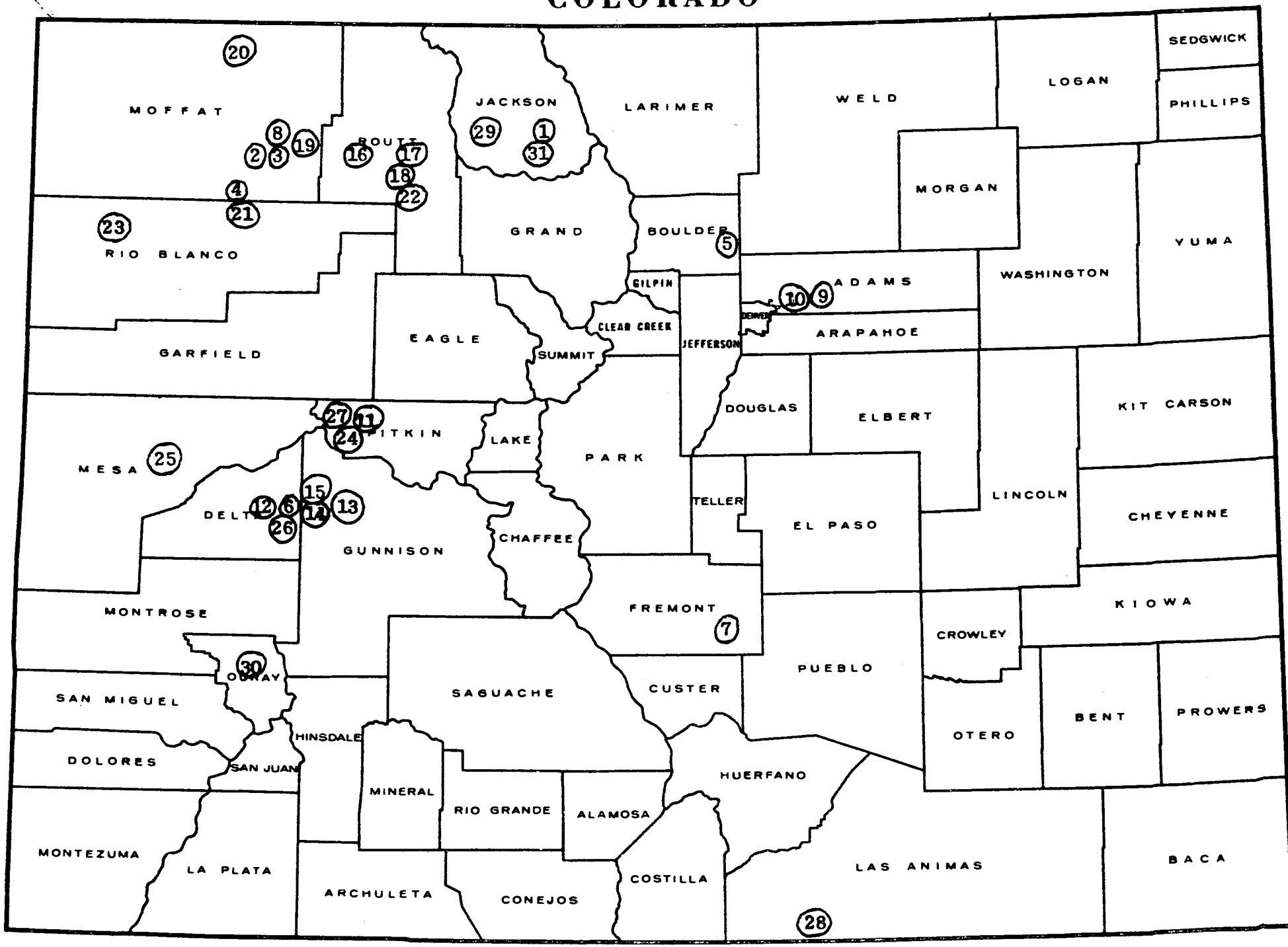
Table X (continued)

| Company Name Location of Operation (County, Area, Tp. & Rge.) | Stage of Planning/ Start-up Dates | Size of Operation (Tons/Yr.) | Type of Operation (Strip, etc.) | Disposition/ Use of Coal | Est. No. of Employees | Mined Land Reclamation Permit App'n Received? | Size of Leasehold Area | Miscellaneous Comments |
|---|---|---|---|---|---|---|---|---|
| 9. Mintech Corp. Adams Co., Atkins Watkins Lignite Project (Cameron Eng. poss. UPPR and Amoco) | start-up 1980 | ± 8 million | strip | Gasification (mine-mouth) | ? | No | 25,314 ac. leases requested | Coal gasification, 250 MMC |
| 10. Kerr-McGee & Arco Adams Co., Watkins | start-up 1980 | ? | strip | Gasification ? | ? | No | 11,823 ac. | |
| 11. Anschutz Coal Corp. Pitkin Co., Carbondale | 1975 | 46,000 | underground | Truck to Carbondale, then by D & RGW RR | ? | N.A. | ? | |
| 12. Columbine Glass Co. Delta Co., Paonia North Fork area | Dec. '74 | up to ± 2 million | underground | D&RGRR | ? | No | ? | Proposed to sell Northern Indiana Public Service Co. 2 million TPY |
| 13. U.S. Steel Corp. Gunnison Co. Somerset area (No. Fork) | In operation Poss. Exp. | | underground | by rail to Geneva Steel Mill, Provo, Utah | | | | |
| 14. Atlantic Richfield Co. Gunnison Co. Somerset | start-up 1980 poss. start const. by '78 | up to ± 2 million | underground | by rail to ? | poss. 600 eventually (400 by 1980) | No | ± 11,000 ac. total | |
| 15. Western Slope Carbon Gunnison Co., Somerset Hawksnest Mine #3 | 1975 expansion | 600,000 | underground | by rail to CF&I, Pueblo NW Pipeline Corp. has opt. | 70 | | 1,248 | Hawksnest Mine #3, expansion, 1974 production 253,549 tons |
| 16. Peabody Coal Co. Routt Co., Hayden Seneca Mine (second mine) | expansion October '75 | 850,000 to 1,000,000 | strip | Hayden #2 power plant (Colo-Ute) | 83 | Yes | 4,942 ac. | |
| 17. Morgan Coal Co. Routt Co. (?) S.W. of Steamboat Springs | ? | ? | strip (?) | ? | ? | No | | |
| 18. Energy Fuels Corp. Routt Co., Oak Creek Energy #3 Mine T.5N, R.86W. (Secs. 1 & 2) | planning expansion | from 1 million to 4 million | strip | by D&RG to Denver | 160 | Yes | ± 200 ac. | Open Mining Permit #24 issued 8/28/74 |

(Table X (continued)

| Company Name Location of Operation (County, Area, Tp. & Rge.) | Stage of Planning/ Start-up Dates | Size of Operation (Tons/Yr.) | Type of Operation (Strip, etc.) | Disposition/ Use of Coal | Est. No. of Employees | Mined Land Reclamation Permit App'n Received? | Size of Leasehold Area | Miscellaneous Comments |
|---|---|---|---|---|---|---|---|---|
| 19. Dravo Corp. Moffat Co. | ? | 1 million | strip ? | ? | 115 | No | ? | |
| 20. Kemmerer Coal Moffat Co., Wyo. Border | planning | ? | ? | ? | ? | ? | ? | Filed application for federal lease |
| 21. Consolidated Coal Rio Blanco., Nine Mile T. 2n, R. 93 E | Exploration early 1975 to 1979 | | underground | | | Estimate 1979 | | Estimate 1980-1985 start-up |
| 22. Pittsburg-Midway Coal Routt Co., Oak Cr. | Planning expansion | | strip | | | | | |
| 23. Moon Lake REA Rio Blanco Co., Rangely | planning | ? | underground/ strip | REA power plant | 225 (underground) | | 2,600 acres | "Mine mouth" use |
| 24. Mid Continent Coal & Coke Pitken Co, Carbondale | Expansion 1975 | .6 million | underground (Longwall) | out state Coke Prod. | 70 | No | ? | will be first use of "longwall" mining method in U.S. |
| 25. Public Service Co. Mesa Co., Cameo | new mine being developed | .75 million | underground | Power Plant ("mine mouth" use) | | | | |
| 26. Pittsburg & Midway Coal Delta Co., Paonia North Fork area | exploration | 1 million | underground | ? | ? | No | None | |
| 27. Thompson Coal Co. Pitken Co., Carbondale | planning | 1 million | underground | ? | 300 | N.A. | ? | Trucked to Carbondale, then D & RGW RR |
| 28. Freeport Coal Co. Las Animas Co. | planning | | | | | | | |
| 29. Sunflower Energy Corp. Jackson Co., Coalmont T.7 N., R. 80 W. | pending | 300,000 | strip | Drake Power Plant, Colo. Springs | 16 | Yes | 16 acres | Trucked to Kremmling, by D & RGW RR |
| 30. H. W. Siddle Quray Co., Ridgway T.47 N., R.6W. | exploration | ? | ? | ? | ? | No | 3,000 acres | |
| 31. Ralph Flesch & Sons Jackson Co., North Park T.8N., R, 78W. | January, 1975 | 500,000 | strip | Ship by UP RR N. to Wyoming | ? | Yes | ? | |

# COLORADO


MOFFAT
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BOULDER
GILPIN
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ARAPAHOE
DENVER
JEFFERSON
CLEAR CREEK
SUMMIT
EAGLE
GARFIELD
DOUGLAS
ELBERT
KIT CARSON
PITKIN
LAKE
PARK
MESA
DELTA
TELLER
EL PASO
LINCOLN
CHEYENNE
GUNNISON
CHAFFEE
FREMONT
KIOWA
MONTROSE
CROWLEY
OURAY
SAGUACHE
CUSTER
PUEBLO
SAN MIGUEL
HINSDALE
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
MINERAL
RIO GRANDE
ALAMOSA
HUERFANO
MONTEZUMA
LA PLATA
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## Oil and Gas

Data on the oil and gas industry is presented in terms of reserves and production in the state, and a comparison of production in Colorado and other states.

### Oil and Gas Reserves in Colorado

According to information submitted by the Colorado Petroleum Association, recoverable Colorado crude oil reserves total approximately 400 million barrels. Of this total, some 320 million barrels are contained in the Rangely oil field and are being subjected to secondary recovery. The association estimates that the Rangely field will be exhausted in ten to 15 years and other fields in five to ten years. Proven gas reserves total approximately 1.7 trillion cubic feet in the Wattenberg gas field in Weld County. The Wattenberg field is the only major gas producer in Colorado at this time. Future oil and gas production will depend primarily on the discovery of new reserves.

### Oil and Gas Production in Colorado

The following table, from the 1974 Oil and Gas Statistics report of the Oil and Gas Conservation Commission, indicates the 1974 production of oil and gas and total cumulative production by county.

The data in Table XI indicate that Rio Blanco County accounted for 57.66 percent of the total state oil production in 1974. Weld County ranked second with 9.90 percent, Adams County third with 6.89 percent, Washington County fourth with 6.49 percent, and Arapahoe County fifth with 5.68 percent. These five counties accounted for 86.62 percent of total state production. Rio Blanco county also ranked first in natural gas production with 18.31 percent of total state production. La Plata County was second with 16.94 percent, Moffat County third with 16.58 percent, Adams County fourth with 12.47 percent, and Weld County fifth with 11.76 percent. These five counties accounted for 76.06 percent of total state production.

According to the Oil and Gas Conservation Commission, there were 55 operators in 1974 with annual production in excess of 50,000 Bbl. Chevron Oil Company, the operator of the Rangely field, was responsible for over 55 percent of the total state production. The next largest producer, Amoco Production Company (Standard Oil Company of Indiana), accounted for less than 7 percent of the total.

TABLE XI

OIL AND GAS PRODUCTION STATISTICS BY COUNTIES

| County | 1974 Production OIL (Bbls.) | 1974 Production GAS (Mcf) | Cumulative Production To 1-1-75 OIL (Bbls.) | Cumulative Production To 1-1-75 GAS (Mcf) |
|---|---|---|---|---|
| Adams | 2,583,501 | 18,649,840 | 22,398,386 | 67,445,448 |
| Arapahoe | 2,131,475 | 9,777,021 | 12,924,613 | 27,463,425 |
| Archuleta | 50,731 | 23,842 | 5,882,254 | 256,230 |
| Baca | 45,072 | 3,962,409 | 1,503,671 | 50,509,556 |
| Bent | 12,384 | 613,963 | 81,548 | 2,225,422 |
| Boulder | 1,321 | -- | 777,001 | -- |
| Cheyenne | 442,370 | 10,998 | 2,873,447 | 78,848 |
| Dolores | 313,054 | 1,932,612 | 862,498 | 3,735,258 |
| Elbert | 61,547 | 353,992 | 398,839 | 1,477,565 |
| Fremont | 19,041 | -- | 14,653,628 | -- |
| Garfield | 0 | 1,655,766 | 564 | 24,756,752 |
| Huerfano | 329 | 638 | 329 | 638 |
| Jackson | 493,984 | 4,871,849 | 10,915,047 | 643,705,398 |
| Jefferson | 0 | 0 | 15,275 | 3,820 |
| Kiowa | 600,899 | 2,301,491 | 7,943,271 | 20,431,257 |
| Kit Carson | 4,675 | -- | 20,446 | -- |
| La Plata | 21,065 | 25,399,910 | 600,735 | 640,644,219 |
| Larimer | 110,403 | 28,173 | 13,522,229 | 22,258,613 |
| Las Animas | 0 | 0 | 0 | 2,390,121 |
| Logan | 1,218,865 | 1,852,643 | 96,482,773 | 185,496,601 |
| Mesa | 3,284 | 1,857,118 | 3,284 | 57,641,654 |
| Moffat | 906,680 | 24,788,242 | 51,520,943 | 420,060,689 |
| Montezuma | 219,041 | 551,037 | 6,021,318 | 18,201,137 |
| Montrose | 0 | 0 | 0 | 58,092 |
| Morgan | 419,494 | 2,424,727 | 82,432,294 | 172,521,138 |
| Phillips | 0 | 0 | 0 | 36,696 |
| Pitkin | 0 | 421,902 | 0 | 11,661,038 |
| Prowers | 1,382 | 34,827 | 32,348 | 49,693 |
| Rio Blanco | 21,627,533 | 27,383,429 | 589,688,035 | 988,873,538 |
| Routt | 59,432 | 1,473 | 4,154,976 | 512,540 |
| San Miguel | 12,518 | 1,811,503 | 75,936 | 15,626,529 |
| Sedgwick | 0 | 304,176 | 0 | 4,875,440 |
| Washington | 2,435,219 | 851,609 | 117,152,580 | 56,636,753 |
| Weld | 3,712,780 | 17,581,833 | 38,013,874 | 71,944,704 |
| Yuma | 0 | 74,329 | 13,109 | 108,287 |
| State Total | 37,508,079 | 149,521,352 | 1,080,965,251 | 3,511,687,099 |

## Colorado Production Compared with Other States

Table XII provides a rank order, total barrels, and percentage of U.S. total of oil production for each state for 1973.

TABLE XII

CRUDE PETROLEUM PRODUCTION RANKING OF STATES

| | | (Thousands of barrels) | (Percent of U.S. Total) |
|---|---|---|---|
| 1. | Texas | 1,294,671 | 38.52% |
| 2. | Louisiana | 831,524 | 24.74 |
| 3. | California | 336,075 | 10.00 |
| 4. | Oklahoma | 191,204 | 5.69 |
| 5. | Wyoming | 141,914 | 4.22 |
| 6. | New Mexico | 100,986 | 3.00 |
| 7. | Alaska | 72,323 | 2.15 |
| 8. | Kansas | 66,227 | 1.97 |
| 9. | Mississippi | 56,102 | 1.67 |
| 10. | Colorado | 36,590 | 1.09 |
| 11. | Montana | 34,620 | 1.03 |
| 12. | Florida | 32,695 | 0.97 |
| 13. | Utah | 32,656 | 0.97 |
| 14. | Illinois | 30,669 | 0.91 |
| 15. | North Dakota | 20,235 | 0.60 |
| 16. | Arkansas | 18,016 | 0.54 |
| 17. | Michigan | 14,614 | 0.43 |
| 18. | Alabama | 11,677 | 0.35 |
| 19. | Ohio | 8,796 | 0.26 |
| 20. | Kentucky | 8,687 | 0.26 |
| 21. | Nebraska | 7,240 | 0.22 |
| 22. | Indiana | 5,312 | 0.16 |
| 23. | Pennsylvania | 3,282 | 0.10 |
| 24. | West Virginia | 2,385 | 0.07 |
| 25. | New York | 967 | 0.03 |
| 26. | Arizona | 804 | 0.02 |
| 27. | South Dakota | 275 | 0.01 |
| 28. | Tennessee | 201 | 0.01 |
| 29. | Nevada | 96 | 0.003 |
| 30. | Missouri | 60 | 0.002 |

Total U.S. Production - 3,360,903

SOURCE: U.S. Bureau of Mines, Mineral Industry Surveys, February, 1975.

Over 80 percent of Colorado's oil production is exported, whereas almost 90 percent of the state's consumption is imported. This is because the major portion of the state's production is from the Rangely field which is on the Utah border with proximity to Utah and Wyoming refining centers by pipeline. Conversely, the major Colorado markets are close by pipeline to Wyoming, Kansas, and Oklahoma production and refining centers. Much of Colorado's exported oil returns as refined products from Casper, Wyoming.

## Oil Shale

This section describes oil shale reserves, ownership, extraction, retort processes, by-products, associated minerals, and industry size projections. A more detailed account of the items discussed in this section is contained in the final report of the 1974 interim Committee on Oil Shale, Coal and Related Minerals. (Colorado Legislative Council Research Publication No. 208).

### Oil Shale Reserves

Oil shale is neither oil nor shale, but a fine grained sedimentary rock (marlstone) containing organic matter derived chiefly from aquatic organisms, waxy spores, or pollen grains which is only slightly soluble in ordinary petroleum solvents. The organic matter, known as "kerogen", can be extracted from the shale in substantial amounts through destructive distillation to yield synthetic petroleum. In a sense, oil shale is a precursor of crude oil and would have become conventional oil if subjected to higher pressures and temperatures.

Oil shale reserves throughout the world are enormous, perhaps totaling 345.5 trillion barrels. Of this potential amount, more than 3 trillion barrels have been identified. The greatest amount of identified oil shale is contained in the United States, 418 billion barrels (61.7 percent of identified world supply) of 25 to 100 gallons per ton yield; 1,600 billion barrels (66.1 percent of identified world supply) of 10 to 25 gallons per ton yield, for a total of 2.02 trillion barrels.

It has been estimated that more than 400 million barrels of oil have been produced from oil shale throughout the world, principally in Scotland, the Soviet Union, and China. Other countries have utilized the resource on a lesser scale. In the United States, experimentation with oil shale production has been conducted since 1850, but until the 1970's and perhaps including them, the cost of extraction was considered prohibitive. As the cost of oil increased and energy shortages occurred, the attractiveness of oil shale as a supplementary or alternative source of energy correspondingly proved enticing to industry, government, and the general public.

Of the identified United States supply, approximately 90 percent of the oil shale is located in the Green River Formation of Colorado, Utah, and Wyoming. Other deposits are located from Appalachia to California and Alaska, but are of a lower grade than those of the Green River Formation. About 1.8 trillion barrels are located in the Green River Formation, perhaps the largest hydrocarbon deposit in the world. It is estimated that 80 billion barrels are recoverable from the formation under present technology.

The oil shale deposits in the area are quite irregular, with the richest beds located in the Piceance Creek Basin of Colorado. Generally, oil shale occurs in zones below the surface of the earth, although in some areas erosion has exposed outcroppings of the shale in cliffs. In the case of the Piceance Creek Basin, the shale beds of major commercial value are located in the Parachute Creek Member with lower grade deposits in the other three areas of the basin. The Parachute Creek area contains three major zones. The upper zone varies in thickness from a few feet to more than 500 feet and contains the richest deposits. It is often referred to as the Mahogany Zone or Ledge. The lower zone ranges from a few feet in thickness near the edge of the basin to more than 1,000 feet near the center. Although the lower zone contains a low grade of oil shale, the more important deposits of the sodium minerals nahcolite and dawsonite are located in it. A third zone, the leached, encompasses several hundred square miles of formerly saline mineral deposits which in places are hundreds of feet thick. The minerals in this zone have been dissolved by ground water, thus the term "leached".

## Ownership of Oil Shale Deposits

Of the more than 11 million acres in the Green River Formation which are suitable for commercial oil shale production, about 72 percent of the lands are under administration of the U.S. Department of the Interior. The Interior lands are estimated to contain 80 percent of the high-grade oil. The federal government has clear title to 290 billion barrels and clouded title to 1,090 billion barrels, which private concerns hold 360 billion barrels of in-place resources. Several major oil companies own Colorado Lands which have potentially commercial resources.

To encourage production of this resource, Interior in January of 1974 offered the lease of six prototype tracts of oil shale -- each approximately 5,120 acres in size -- in Colorado, Utah, and Wyoming. The large size of early bids for these tracts led to concern over the impact on these sparsely populated regions. The $210.4 million bid for the first tract is only slightly lower than the December, 1973, record bid for an offshore oil and gas lease of $212 million.

Extraction and Production of Oil Shale

Mining. Because the kerogen ("oil") does not naturally flow out of oil shale, production of shale oil requires different technology than conventional oil and gas. In order to recover the shale oil from a formation, it is necessary to "process" the rock in a manner that will liberate the oil.

Two approaches are being considered for the production of shale oil: (1) mining of the rock followed by surface processing to extract the oil; and (2) in situ (in-place) processing to liberate the oil which would then be pumped to the surface. In the mining of shale and surface processing to remove the resource, it is necessary to crush the ore to uniform size before processing.

Surface processing. Several surface processes have been investigated in field operations in the United States. All of these are retorting operations and the plants are referred to as "retorts". Retorting is the process of distilling or decomposing a substance by the application of heat. In the situation of an oil shale retort, the oil shale is heated to around 900° F. at which point the shale is decomposed, producing: (1) crude shale oil as a vapor; (2) by-product organic gas; and (3) processed (spent) shale.

Retorting of oil shale is the only known commercially practical method for the recovery of oil from shale deposits. Shale oil cannot be extracted using solvents. It is, at best, only slightly soluable in any known solvent.

In situ. The alternative to mining oil shale and then extracting the oil in a surface retorting plant is to retort the oil shale in place, i.e., in naturally occuring formations. There has not been a commercially viable demonstration of the in situ method to date, although much research has been carried out by the U. S. Bureau of Mines and several private oil companies and is continuing. At present, the only commercial-scale experimentation of oil shale production is the in situ operation by the Occidental Petroleum Company near DeBeque, Colorado.

The product. Generally, crude shale oil that is the product of surface retorts is classified as low-gravity, moderate-sulfur, high-nitrogen oil by conventional petroleum standards. Shale oils have a higher pour point (the temperature at which the oil will flow) and are more viscous (resistant to fluid movement) than many conventional crude oils. Shale oil can be refined into fuel oil, gasoline, kerosine, jet fuel and other petroleum produces to act as direct replacement for conventional oil.

Upgrading of shale oil. Due to the limited market for refined petroleum products in the immediate oil shale area, it is economically advantageous to transport crude oil rather than a multitude of finished products. Major refining centers are normally located in metropolitan areas to minimize the cost of distributing the products to

market. For this reason, it is likely that the refining industry in the area will remain limited to that necessary to provide the region's needs and excess production will be transported to other areas for final refining.

## By-products and Associated Minerals

There are several potentially commercial products that are incident to the production of shale oil and others that may be economically produced in conjunction with the mining and processing of the kerogen.

Incidental products. A large amount of by-product gas is produced from the retorting of oil shale. This is probably the most significant by-product and would likely be of use in the immediate vicinity of the plant for process heat or steam production. Due to the low Btu yield of the gas, it is not believed that it would be economical to transport it long distances for marketing, with the possible exception of by-product gas from The Oil Shale Corporation (TOSCO) retort that might be used to supplement natural gas in the area.

Two other potential uses of TOSCO by-product gas are possible. The gas could be used in an electric power plant close to the site because certain boilers for this conversion of heat to electricity can run on low Btu fuels. Second, the gas may be utilized, after reforming, to provide hydrogen for the upgrading process.

Occidental contends that the burning of their by-product gas will be used to generate electricity and the substantial surplus electricity will be sold in the area. Paraho has also indicated that their process is amenable to on-site electric production and would produce a surplus.

The upgrading of shale oil through removal of sulfur and nitrogen from the oil, provides two commercially valuable by-products. Hydrogen sulfide gas produced during hyrocracking can be converted to elemental sulfur (a solid) for sale. Ammonia is the product that remains after nitrogen removal and once separated from other product gases can be liquified for storage and sale as fertilizer or as a raw material for fertilizer manufacture. Additionally, upgrading will produce coke as a primary product which is salable as a fuel to the steel industry or as a fuel for specially constructed electric generating plants in the area.

Associated minerals. Extensive deposits of sodium minerals, one containing aluminum, exist near the center portion of Colorado's Piceance Creek Basin. Approximately 27 billion tons of alumina in dawsonite beds and an additional 30 billion tons of nacholite are present in or associated with lower zone oil shale. Dawsonite deposits generally occur only in very small concentrations whereas in certain areas, nahcolite is present in massive beds, hundreds of feet thick.

A significant amount of research has been conducted regarding the extraction of these minerals from the shale and, although the processes are still in the experimental stage, recovery may be feasible. Superior Oil Company is contemplating a "three minerals" plant west of Meeker that would produce these minerals as co-products to shale oil. Recovery of these associated minerals would reduce the volume of spent shale enough to allow the return of all of it to the mine for disposal. A substantial amount of pure water could also be a by-product of Superior's process, if not recycled.

It is estimated that the industry could supply 15 percent of the nation's need for soda ash in 1980, and 3 percent of the demand for aluminum. Probably no more than three 50,000 bbl/day plants could produce these minerals unless additional markets develop. It is notable that the United States now imports the large majority of its alumina needs.

Alternative uses for the two minerals are in pollution control. Nahcolite can be used in a raw state for scrubbing flue gas to remove acid gases such as sulfur dioxide and nitrogen oxides. Successful development of this scrubbing technique would allow the use of large quantities of United States high sulfur coal, according to Superior Oil. Similarly, dawsonite may be processed to yield aluminum compounds useful for water treatment rather than metalurgical grade alumina. Realization of these potential uses could substantially change the demand for these associated minerals and the number of plants that could economically enter production.

## Industry Size Projections

Early estimates. In 1972 the Atomic Energy Commission estimated that production of less than 500,000 Bbl per day of oil shale annually would be possible by 1985 while the National Petroleum Council prepared an estimate that would equate with production of 100,000 Bbl per day on private lands in that same period. The Department of the Interior in its evaluation of the oil shale prototype lease program estimated production by 1985 of 400,000 Bbl per day on private lands plus 200,000 Bbl per day on the prototype lease tracts. It also projected an upper limit of one million Bbl per day for 1985 regardless of federal action. In late 1974 the Federal Energy Administration projected for "Project Independence" an oil shale industry of 250,000 Bbl per day in the next decade assuming "business as usual" and a one million Bbl per day industry with an oil price of $11.00 per Bbl (below current levels). In early 1975 the Synfuels Commercialization Task Force recommended an oil shale industry of 100,000 Bbl per day as feasible. As can be noted from these estimates, the federal government has been generally optimistic about oil shale development by 1985, although the trend in the federal estimates has been steadily downward.

Recent estimates. All reports from concerns in the oil shale industry indicate an almost unanimous withdrawal, scale-down, or post-

ponement of plans. The notable exception is Occidental Oil Shale, Inc., which is continuing with their test of a commercial-scale in situ retort and still expects to decide in 1976 whether to proceed to a full size commercial operation of around 30,000 Bbl per day.

The concensus of an industry conference held in December, 1975, in Denver was that oil shale could not develop beyond the demonstration scale stage (less than 10,000 Bbl per day) without some sort of federal participation. A U. S. Senate amendment to the Energy Research and Development Administration appropriation bill would have made $6 billion available for federal loan guarantees for synfuels projects, including oil shale. Although the amendment received wide support from the industry, it was defeated by the House. It is not known when other legislation that would provide for federal participation in the development of oil shale will be considered, but in its absence it seems probable that there will not be commercial development of oil shale before 1985.

It should also be noted that the FEA has concluded that Colorado air quality standards would limit development to 250,000 Bbl per day. The industry fears that adoption of a proposed amendment to the Federal Clean Air Act providing for non-degradation of existing air quality would preclude oil shale development altogether.

Briefly, a review of industry status shows Atlantic Richfield and TOSCO have recently withdrawn from the federal C-b consortium, Colony Development Operation remains suspended, Superior still has not effected its essential land exchange with the federal government, Union Gulf has again delayed plans, and federal leases C-a, U-a, and U-b are all noting the need for federal aid to reach significant production levels. Whereas original oil shale plants were thought to be economical at the 50,000 Bbl per day level, some have recently estimated that the level would need to be 100,000 Bbl per day -- requiring an investment in excess of $1 billion. As a commercial oil shale facility is expected to contain several retort "trains", each processing some 6,000 to 8,000 Bbl per day, recent industry interest seems directed towards building a single train using existing prototype technology and then phasing in additional trains if the demonstration proves economic feasibility.

## The Industry in Other States

As mentioned previously, the only reserves of known commercial potential are located in Colorado, Utah, and Wyoming. At present, the only active development plans outside Colorado are by White River Oil Shale Corporation (Phillips, Sun, and SOHIO) on the two federal tracts in Utah near Rangely, Colorado. The development plans of this group are summarized in the aforementioned 1974 interim report.

## Metals

Colorado produces twelve metals from mines located within the state. With the exception of molybdenum and possible uranium and vanadium, the state's production is probably insignificant in terms of national consumption and production. The production value of these metals as reported by the Division of Mines for the past three years is as follows:

TABLE XIII

COLORADO PRODUCTION OF METALS

| | 1972 | 1973 | 1974 |
|---|---|---|---|
| Molybdenum | $102,911,635 | $ 96,654,249 | $124,015,562 |
| Zinc | 15,338,235 | 15,890,102 | 25,405,074 |
| Uranium | 11,099,551 | 7,508,996 | 12,228,804 |
| Vanadium | 10,143,429 | 4,874,688 | 11,600,362 |
| Silver | 5,540,031 | 8,764,824 | 11,561,032 |
| Lead | 7,935,735 | 7,596,107 | 9,416,993 |
| Tungsten | 7,068,477 | 6,931,270 | 9,129,943 |
| Gold | 3,631,921 | 6,177,731 | 7,685,361 |
| Copper | 3,548,619 | 3,312,705 | 4,876,326 |
| Iron | 923,776 | 1,058,574 | 1,012,538 |
| Tin | 358,385 | 490,131 | 647,770 |
| Cadmium | 426,502 | 396,186 | 634,247 |
| Miscellaneous Metallics | -- | -- | 53,833 |
| Total Metallic Mineral Production | $168,926,296 | $159,655,563 | $218,267,845 |

Mineral production values, it can be noted, fluctuate widely with changes in the price. The values were computed using the average prices for the year as shown in the "Engineering and Mining Journal" and other publications when not from actual mine reports.

The following information dealing with the occurance of metallic minerals was taken primarily from "Mineral and Water Resources of Colorado" which was prepared in 1968 by the United States Geological Survey for the U. S. House Committee on Interior and Insular Affairs. General information is applicable to all metals whereas the discussion of mining and marketing is limited to the metals industry exclusive of molybdenum and uranium-vanadium.

Precious and Base Metals

Most of the metallic wealth of the state has come from the Colorado mineral belt, a long narrow belt that extends diagonally across the mountain province from the edge of the plains in Boulder County to the southwest side of the San Juan Mountains. The only known major metallic deposits outside of this belt are the gold-silver deposits of the Cripple Creek and the Westcliffe-Silver Cliff volcanic centers, and the uranium-vanadium deposits near the western border of the state. Although important discoveries may be made outside the belt in the future, the major metallic resources almost certainly lie principally within the belt, just as the bulk of the past production has come from the belt.

The mineral belt is about 250 miles long and ranges from 15-30 miles wide in its northeastern part to as much as 60 miles wide in its southwestern part. Throughout its length, it is characterized by bodies of intrusive igneous rocks -- called porphyries -- of early and middle Tertiary age, and by related ore deposits. It is located along a belt of much older faults or shear zones of Precambrian age, and it cuts indiscriminately across mountain ranges and intervening valleys, no matter what their geology. In the Front Range, swarms of small faults, many of them mineralized and hence, veins, lie within the mineral belt and generally parallel to it, but elsewhere no such pattern is known. Mineralization is not continuous in the belt but is concentrated in local centers, some of which differ markedly from their neighbors in the character of their ore. Many of the districts, however, have mixed ores, valuable for gold, silver, copper, lead, and zinc in various proportions. Most deposits are located on mining claims that have been patented from the federal government.

The annual rate of mineral production of Colorado increased rather steadily from the 1860's to World War I. It declined slightly in the 1920's and sharply in the early 30's. From its low point in 1932 it increased at a strong rate through the 1940's and then increased spectacularly through the 1950's. Production increased slowly throughout the 1960's and the early part of this decade. During this 115 year history of mineral production in Colorado, several different commodities have successively dominated the output.

Gold, followed closely by silver, dominated Colorado's early mineral production. Gold was discovered near the site of Denver in 1858, precipitating a rush to the territory in 1859 and the early discoveries of placer and lode deposits in the nearby mountains. From this area prospectors spread into the other parts of central and western Colorado, and by 1900 discoveries had been made in all of the major precious and base-metal mining camps in the state. The combined value of gold and silver production reached its peak in the early 1900's and has gradually declined since then.

Significant production of lead began with the discovery of the Leadville deposits in 1877. Significant production of zinc, on the other hand, began about 1900, not with the discovery of new deposits

rich in this metal but rather as a result of the invention of concentrating devices to separate zinc minerals from complex ores. Since 1943 the combined value of lead and zinc produced in Colorado has exceeded that of gold and silver. Because Colorado contains very few deposits worked for copper along, its copper output has come almost entirely from the complex ores. As a result, the production rate of copper since about 1900 has fluctuated with that of lead and zinc.

In 1974, the metals industry, exclusive of molybdenum and uranium, employed some 1,791 persons directly in mining operations. There were a total of 128 metal mining operations in the state that year. Total employment of about 1,800 persons is up about one-half in the past decade from 1,200.

At the current time, production of precious and base metals appears to be relatively static. Significant new deposits are rare as most of the state has been throughly explored and the promising deposits have been brought into production. Whether these deposits are worked or not is primarily a function of price which dictates whether the deposits can be economically mined. As prices are set by world commodities markets and fluctuate dramatically, metal production and employment also fluctuate significantly from year to year.

Mining. Because metals are found in deposits of different characteristics, mining methods likewise vary. While most precious and base metals are found in relatively concentrated deposits, such as veins, some deposits may result from the erosion of veins with the minerals found in gravel bars. Other minerals, including those containing molybdenum, iron, uranium, and vanadium are found in small concentrations in relatively large ore bodies. Accordingly, mining methods vary substantially between minerals, and even between deposits.

Underground mining methods are known as stoping and there are several basic types. In the committee's tour of the Idarado mine, between Ouray and Telluride, one method of vein mining was seen, called shrinkage stoping. This mine recovers ores particularly valuable for gold, silver, lead, copper, and zinc from a vien that averages about 6 feet in width and slopes at about a 70 percent angle from the horizontal.

Shrinkage stoping is done by mining the ore deposit from beneath, allowing broken ore to support the stope walls, but leaving a space above the broken ore sufficient for the miners to stand on and drill overhead. Pneumatic drills are used and the ore broken by loading the holes with explosives and firing. Broken ore is drawn out the bottom of the stope as necessary to maintain this headroom, and because the rock expands upon breaking, about a third of the broken ore is drawn from beneath as stoping progresses from the bottom of the ore block to the top. At the Idarado mine, a stope is approximately 200 feet on a side and six feet wide. After the stope is completed, all broken ore is drawn out the bottom and loaded into muck trains operating in haulage drifts. These trains eventually remove the ore from the mine to the millsite in Telluride.

In addition to basic mining operations, each mine must have provisions for ventillation, electricity to run machinery and provide light, drainage to remove excess water, and transportation for employees and equipment. Transportation utilizes special cars that are pulled by diesel locomotives along tracks laid in drifts. Vertical movement is accomplished by basic elevators, called cages, that are raised and lowered on signal by winches.

Processing. After the ore is removed from the mine it is crushed to the consistency of gravel. It is then introduced into large rotating steel cylinders containing steel balls, where the ore is crushed to the consistency of a fine powder. The material is then mixed with oil and detergents in a frothy flotation cell where mineral particles attach themselves to bubbles and are floated off. This process is repeated and the waste material is the run through spiral gravity separators and shaker tables to recover heavier mineral products such as tin. The residue after milling, known as tailings, is slurried and moved to a pond for deposition where it is decanted and the water recycled. The resulting tailings pile can, when abandoned, be contoured and vegetated. Larger mines in the state have their own mills. There is no operating mill at this time that accepts ores from small mines. As a result, much of the ore currently produced by small mines is stockpiled.

After milling, the product is still not a pure metal. The minerals recovered and separated are in a highly concentrated form, but to be converted into a pure and more usable form, smelting is necessary. In smelting ore, the minerals are melted in intense heat which drives off impurities and separates the various metals from each other. As there is no operating smelter in Colorado at this time, ores must be shipped to either Texas or Arizona for smelting, incurring large transportation costs from production sites. Mines pay a flat fee per unit of ore for smelting. In some instances, smelters retain the metals contained the ore in very small quantities. For example the tin contained silver-copper-lead may be retained in addition to the smelter charges ores.

Marketing. Generally, the only readily available market for metals is the smelter. As metal prices are controlled by world-wide markets and fluctuate widely, smelters do not purchase metals on contract such as coal but rather on the spot market, i.e., at the prevailing price at the time of sale, following smelting and payment of smelting changes.

## Uranium-Vanadium

Uranium is a metallic element that can be used as a source of atomic energy. The U-235 isotope fissions (splits) readily and the U-238 isotope when properly exposed to neutrons can be converted to an isotope of plutonium, Pu-239, which which is fissionable. The fissioning of these heavy isotopes yields a very large amount of energy in relation to a unit weight.

Deposits in continental sedimentary rocks are the principal present sources of uranium. Most of the deposits are in sandstone but some are in limestone and coaly carbonaceous rocks. Veins and related fracture-controlled deposits are also a source of uranium but are less important than deposits in sandstone.

The development of uranium mining in Colorado reflects the varying relative importance of three metals: radium, vanadium, and uranium. Uranium ore was first discovered in the state in 1871 the Central City district. This area was the first source of uranium mined in the United States and, by 1900, veins in the district had yielded about 36 tons of U3O8. Shortly thereafter the center of activity of uranium mining shifted to the are of Mesa, Montrose, and San Miguel counties, now known as the Uravan mineral belt, where uranium was first mined from deposits in sandstone in 1898.

Shortly after 1910 deposits in sandstone had become one of the principal world sources of radium. For about a dozen years they were mined intensively for radium and yielded some byproduct uranium and vanadium; but in 1923, mining practically ceased as the Belgian Congo became a source of radium. Intensive mining of the deposits was resumed in 1937 for vanadium rather than radium and continued until 1944, when the end of urgent demand for vanadium again caused a decline in mining. Events near the end of World War II demonstrated the strategic significance of uranium, and beginning in 1948 the newly created U.S. Atomic Energy Commission established a series of graduated price schedules for uranium ore to encourage mining and search for it in the United States. This stimulus resulted in the discovery and development of many deposits and brought about a steady increase in uranium mining in Colorado until 1961.

The search for uranium proved so successful that the U.S. Atomic Energy Commission, the sole purchaser, announced that purchases of uranium ore after April 1, 1962, would be limited to annual quotas allocated to individual properties. Also from that date until the end of 1966, instead of buying ore at the graduated prices previously in effect, the Commission would pay $8.00 per pound for U-3O8 in concentrates produced mostly from reserves discovered before November 28, 1958. As a result of this change the production of uranium ore in Colorado and in the United States declined in 1962 for the first time since 1947.

In 1974, there were 81 uranium operations extant in the state employing some 1,000 persons in mining. As can be noted from these numbers, uranium mines due to the nature of the deposits are typically small and employ few persons. Since 1962 when the state's uranium production peaked, employment in the industry has fluctuated somewhat but followed a generally downward trend. Total mining employment for the period has decreased almost 80 percent.

Recent interest in lease activity, however, would seem to indicate that this trend will be reversed. While government purchases of uranium has declined recently, commercial customers are increasing

their purchases and have begun to provide a stable market for the uranium mining industry. Commercial requirements of U-308 in concentrate form in the United States are expected to increase dramatically in the next 10 to 15 years. Roughly, the amount of yellowcake required is expected to double about every 5 years. Much of this increased demand will be related to the growing nuclear energy industry, since uranium is a key ingredient in this energy process.

Mining. While some uranium deposits are vein-like and lend themselves to the same sort of underground mining utilized to recover precious and base metals, most deposits are more dissiminated and are found in a more irregular shape. Accordingly, while the mines in Jefferson County utilize mining techniques similar to those discussed for other metal mines, the majority of the production that comes from the small mines and individual deposits of the Uravan mineral belt employ other techniques.

Small ore bodies are often mined completely out, leaving no pillar of ore in place to support the walls of the stope. In some kinds of rock, it is possible to mine out huge stopes which stand open for years. Where some of the ore body is left in place as random pillars to support walls, the material is low-grade whereever possible because it may never be removed from the mine. Sometimes, after open stoping a mine, the pillars are "robbed" just before abandoning that portion of the mine, and the collapse of the stope walls is of no concern to the operation. Room and pillar mining is commonly done in flat lying or gently dipping bedded ores. Pillars are left in place in a regular pattern while the rooms are mined out. In many room and pillar mines, the pillars are taken out, starting at the farthest point from mine haulage exit, retreating and letting the roof come down upon the floor. Room and pillar methods are well adapted to mechanization.

Processing. Following mining, the ore must be milled to concentrate the uranium. In 1974, there were three uranium milling plants operating in the state. The largest was the Union Carbide Corporation's plant at Rifle, Colorado with a capacity of 2,000 tons per day. Total capacity was 2,500 tons per day, about 10 percent of national capacity. Most of the ore produced in the state was also milled here.

Following the concentrating of uranium ore into yellowcake, further concentration is necessary in order to produce a usable product. To make uranium useful in modern power plants, concentration of the normal U-235 isotope must be increased about 3 to 6 times, to about 4 percent of total content. Following such enrichment, an additional step is undertaken to increase the U-235 content of the feedstock. This is also one of the most complex processes which utilizes a gas diffusion method of concentration. The final processing step to convert the uranium ore into usable form is fuel fabrication. All of these steps take place outside of the state and generally in the eastern portion of the nation.

Marketing. Most uranium is produced by small operations that do not undertake to mill their own ore. Consequently, the ore is usually sold in its raw state to concerns, such as Union Carbide, that operate mills and subsequent enrichment facilities. The miner is paid at the time of delivery of the ore and a final adjustment is made following milling after the actual content of the ore has been ascertained. The federal Energy Research and Development Administration (formerly the AEC) controls the enrichment, sale, and purchase of uranium although they do not currently enter into pricing which is determined by demand. Power plants normally purchase their fuel on long term contracts from companies that are engaged in the enrichment and fabrication of fuel. The Vanadium and other metals contained in the ore would also be included in the sale to the mill. The mill would either further process or sell these other metals in open markets to those industries, such as steel, that utilize them in alloys.

## Molybdenum

Colorado's largest mining operator is the Climax Molybdenum Company, a Division of American Metal Climax, Inc. (AMAX), which has sales as great as the remainder of the state's metals industry combined. This company is the sole producer of molybdenum in Colorado. It is also the largest producer of that mineral in the United States and provides some 35 percent of the free world supply. The company currently operates one mine in the state, the Climax mine, located at the summit of Fremont Pass between Leadville and Frisco. In addition, Climax is reclaiming the tailings ponds and mill site of the Urad mine which was closed in 1974 when the ore body was exhausted. The Henderson mine, located at the eastern foot of Berthoud Pass near the Urad Mine, is under development at the present time and production is anticipated for 1977.

Molybdenum is a lustrous gray metal, somewhat heavier than iron, and with a much higher melting point (4730 degrees Fahrenheit as compared to 2795). The mineral is contained in the mineral molybdenite (molybdenum disulfide) and is found in porphyry or disseminated deposits in which the molybdenite is disbursed through relatively large volumes of altered and fractured rock. In the Climax deposit, approximately 6 2/3 pounds of molybdenite are contained in each ton of ore, an average grade of 0.33 percent. The Henderson deposit is somewhat richer, averaging some 0.49 percent. The Climax deposit has been estimated to contain reserves of 500 million tons whereas the Henderson ore body contains 300 million tons.

Mining. The mining operation utilized by Climax to recover the molybdenum ore is known as a basic block caving method. This method involves several steps. First, a network of passages, known as haulage drifts, are excavated horizontally below the deposit to be mined. These drifts are connected either directly to the surface or to vertical shafts providing access to the surface. Directly above the haulage drafts is a parallel network of drifts known as slusher drifts. Radiating upward at right angles from the slusher drifts are finger

raises which tap the lower portion of the ore body. The ore is then extracted by undercutting the deposit which causes it to collapse down ore passage shutes, the finger raises, into the slusher drifts. The ore is then moved by drag-line scrapers, known as slushers, to passages down to the haulage drifts. These passages are known as ore clutches and the ore which is scraped into them is loaded by gravity into the ore cars of a muck train located on trucks in haulage drifts. A train consists of about 20 cars and it hauls the ore out of the mine. At the Climax mine, there are 21 muck trains operating over 28 miles of underground track.

The Climax mine also utilizes open pit mining to recover ore from the outer edges of the deposit near the surface. Thus ore is not amenable to efficient block caving mining. In the open pit, the ore is blasted and then excavated by 15-cubic-yard shovels and hauled out of the pit in 120-ton trucks. Production levels in the pit are around 7,000 tons per day while the total for the mine is some 42,000 tons per day. Mine and mill employment is about 2,400.

The Henderson mine will operate entirely underground in a similar manner to the Climax mine, the principle differences are that it will utilize rubber tired diesel powered mining equipment rather than slushers and that a 15 mile long railroad with 30 cars will be used to transport the ore out of the mine after being centrally collected by the muck trains. The railroad will utilize a 9.6 mile long tunnel. At full capacity in 1980, the Henderson mine is projected to produce 30,000 tons of ore each day and full production employment is projected at 1,100 workers.

Processing. After being hauled from the mine, the ore is dumped into ore bins from which it is drawn for processing. First it is crushed in three stages by gyratory, jaw, and cone crushers to particles not exceeding 3/8-inch in diameter. It is then ground to the consistency of fine sand in ball mills, where it is tumbled in huge steel cylinders filled with steel balls. After grinding, the ore goes through a flotation process in which the finely ground ore is mixed in tanks, known as flotation cells, with various reagents including oils and detergents. Compressed air is injected and the mixture is agitated by paddles to create a froth of bubbles. The particles of molybdenite have an affinity for oil and attach to the bubbles of oil and float off the top of the cells. The floated particles are subjected to repeated regrinding in pebble mills containing pebbles and flotation, producing a concentrate which is about 90 percent molybdenum disulfide. This concentrate is then filtered, dried by heat and prepared for shipment.

Other products. After the molybdenite is recovered, the material containing no $MoS_2$, which settled to the bottom in the flotation process, is passed through a by-products plant. Here, by various processes of gravity and magnetic separation, some tungsten, tin, and iron pyrite are removed by gravity and magnetic separation. The remaining sand is almost pure silica. known as tailings. Tailings constitute more than 99 percent of the ore mined. Tailings are con-

ducted in slurry through huge concrete conduits to settling "tailings" ponds. Here the sand is settled out, the water recovered through decant lines and by pumps and conveyed to a storage reservoir. From there the water is pumped back to the mill for re-use. Eventually, the tailings ponds will be revegetated and reclaimed.

Marketing. Molybdenum concentrate is loaded into special railroad hopper cars for shipment to a conversion plant in Pennsylvania or packed in steel drums and loaded into special railroad box cars for shipment to overseas conversion plants, primarily in the Netherlands. About 13 percent of the total is sold as concentrate and the balance processed at conversion plants, about 45 percent in the United States. The process of converting molybdenum results in an upgraded product such as molybdic oxide or ferro molybdenum.

The most common use of molybdenum is as an additive to steel. The various resulting alloys are used for structural steel, tool steel, stainless steel, hot water tanks, water tubes, screw machine parts, and other products which require structural strengthening and corrosion resistence. Information presented to the committee by the corporation indicated that the average sales price of the concentrate, without further processing was $8.67 per ton in 1974. Sales price of the various products, including the concentrate, averaged $10.49 per ton. The gross proceeds of 1974 as calculated for property tax purposes were $4.343 per ton of ore mined, or $63,717,918. Net proceeds for property tax purposes were $1.70 per ton for a total of $24,794,464.

## VI. SEVERANCE TAX LEGISLATION PROPOSED TO THE COMMITTEE

Draft legislation to impose a severance tax on gross proceeds from the extraction of specific minerals, with the exemption of small operators was proposed by Co-Chairman Smith and distributed to the committee on September 24. This draft served as the focal point of committee consideration of severance tax legislation and elicited several proposed amendments, both technical and substantive, from spokespersons of interests concerned with the tax. Copies of the Smith proposal and proposed amendments are appended to this report. This section constitutes a description of the Smith proposal and the amendments. As noted in the introduction, no legislation was recommended by the committee, instead it was agreed to include all proposed legislation in this report.

### Smith Severance Tax Proposal

The Smith bill would impose a five percent severance tax on the gross proceeds from metals, including oil shale, oil and gas, and coal. The definition of "gross proceeds" generally corresponds to the value of the mineral at the point of severance. The bill contains exemptions to limit or eliminate its impact on small producers. In addition, the present production tax on oil and gas and the coal inspection fee would be repealed. The Smith bill was not voted on by the committee which agreed, instead, to submit the bill and proposed amendments without recommendation.

The following is an analysis of the major provisions of the proposed bill. The revenue projections are preliminary and subject to revision and are based on estimated calendar 1975 gross proceeds of operators.

#### Metals (Including oil shale)

Base. Gross proceeds as defined for ad valorem tax purposes in section 39-6-106 (1), C.R.S. 1973. This is essentially the value of the mineral at the point of severance which is determined by subtracting from gross value "costs of treatment, reduction, transportation, and sale of such ore or any products derived therefrom".

Rate. Five percent of gross proceeds.

Exemptions. First $10,000,000 of gross proceeds and, for oil shale, (Option 1) all persons operating at less than 60 percent of design capacity with a phased exemption thereafter of 75 percent of the tax in the first year, 50 percent in the second, 25 percent in the third, and no exemption in the fourth and succeeding years, or (Option 2) all persons producing less than 10,000 barrels per day with a phase-in exemption, in lieu of the $10,000,000 exemption, of three-

fourths of gross proceeds in the first year, one-half in the second, and one-fourth in the third.

Revenue projection. (1975) $4,250,000. Growth of revenue largely dependent on development of molybdenum and oil shale and product price.

## Oil and Gas

Base. Gross proceeds, meaning the entire amount realized from the sale or other disposition of all oil and gas produced or extracted from petroleum deposits. (This is the same definition used in the current statute for the oil and gas production tax).

Rate. Five percent of gross proceeds.

Exemptions. All stripper wells producing less than 10 Bbl per day average and all wells producing less than (Option 1) 60,000 or (Option 2) 300,000 cubic feet of gas per day average.

Credits. The lesser amount of fifty percent of the severance tax liability or the equivalent of fifty percent of all ad valorem taxes levied, assessed, and paid, during the taxable year, on oil and gas production.

Revenue projection. (1975) $11,500,000 ($6,800,000 in addition to existing production tax revenue). [NOTE: This projection is based on an estimated taxable value of $360 million from oil and gas and an estimated ad valorem credit of $6.5 million. It represents the best information available at the time of this printing and should be considered as preliminary.] Growth of revenue largely dependent on price of oil and gas; substantial increase if the price of oil is decontrolled.

## Coal

Base. Gross proceeds, meaning the value at the point of severance which is determined by subtracting from the value at the first point of sale all costs of cleaning, sizing, washing, breaking, crushing, screening, drying, dust allaying, treatment to prevent freezing, oiling, loading for shipment, and shipment incurred after severance and before sale.

Rate. Five percent of gross proceeds.

Exemptions. First 5,000 tons of coal extracted each quarter and for coal produced from underground mines an amount equal to 20 percent of the tax liability.

Revenue projection. (1975) $3,000,000. Growth of revenue largely dependent on the development of the industry.

## Welborn Amendment

Mr. Bob Welborn, Colorado Fuel and Iron, proposed an amendment to the committee an amendment which would alter the base in the Smith bill from one of gross proceeds to net proceeds and provide an exemption for any person subject to the tax whose production was in an area of substantial unemployment as determined under federal statutes.

The Welborn proposal would impose a five percent severance tax on the "net proceeds" from metals, including oil shale, oil and gas, and coal. The definition of "net proceeds" is broader than that contained in the ad valorem tax statutes and would allow, as a deduction from sales value to determine taxable value, most costs of extraction, processing, and upgrading as well as ad valorem taxes and administration. Thus, the Welborne base would be essentially the same as South Dakota's "net profits" tax. The proposal contains essentially the same exemptions as the Smith bill, but the levels have been adjusted to reflect the smaller base of the proposed tax. The Welborn amendment was not approved by the committee, with a 5 yes, 5 no vote.

The following is an analysis of the major provisions of the Welborn amendment and the distinctions from the Smith bill. The revenue projections are preliminary and are based on estimated calendar 1975 net proceeds of operators.

### Metals (Including Oil Shale)

Base. Net proceeds is defined to mean the amount for which the minerals were or could be sold less the costs of extraction, treatment, reduction, transportation and sale, to include the costs of mining, refining, cleaning, washing, breaking, crushing, screening, sizing, drying, dust allaying, treatment to prevent freezing, oiling, loading for shipment, ad valorem taxes, depreciation, and administration.

Rate. Five percent of net proceeds.

Exemptions. Any person operating in an area of substantial unemployment, as determined by the U.S. Secretary of Labor or in an area designated by the U.S. Secretary of Commerce as a redevelopment area. Also, first $2,000,000 of net proceeds and, for oil shale, all persons producing less than 10,000 barrels per day with the same phase-in exemption contained in the Smith proposal under Option 2.

Revenue projection. (1975) $900,000. Growth of revenue largely dependent on development of molybdenum and oil shale and product prices.

Comparison with Smith bill. The base is defined as "net" rather than "gross" and includes substantially greater deductions from sales price, primarily costs of extraction, in the determination of

taxable value. The exemption of $2 million of net proceeds is one-fifth that in the Smith bill, to reflect the smaller base of the tax. For oil shale, Option 2 of the Smith bill is employed. The unemployment exemption is not included in the Smith bill.

Oil and Gas

Base. Same as metals.

Rate. Five percent of gross proceeds.

Exemptions. All stripper wells producing less than 10 Bbl per day average and all wells producing less than (Option 1) 60,000 or (Option 2) 300,000 cubic feet of gas per day average. In addition, the unemployment exemption explained above is also provided for oil and gas producers.

Credits. None.

Revenue projection. (1975) As the amendment would eliminate the ad valorem tax credit in favor of a straight deduction of ad valorem taxes to compute net proceeds, tax liability could be substantially increased over the Smith bill. Conversely, the amendment would allow the deduction of certain costs in the computation of oil and gas taxable value and, therefore, might reduce tax liability from the Smith bill. Because no state imposes a tax with a similar base on oil and gas, and because oil producers do not maintain records at present to reflect the deductions proposed by the amendment, the staff has no statistical basis to estimate revenue. Revenue growth would be largely dependent upon the price of oil and gas with a substantial increase expected with decontrol.

Comparison with Smith bill. The base is defined as "net" rather than "gross" and would include some deductions from the wellhead price concept. The Smith version provides for limiting the ad valorem tax credit to 50 percent whereas the Welborn amendment would substitute a deduction for the credit. The unemployment exemption is not included in the Smith bill.

Coal

Base. Same as metals.

Rate. Five percent of gross proceeds.

Exemptions. First 5,000 tons of coal extracted each quarter and the unemployment exemption noted earlier.

Revenue projection. (1975) $400,000. Growth of revenue largely dependent on the development of the industry.

Comparison with Smith bill. The base is defined as "net" rather than "gross" and includes substantially greater deductions from sales price, primarily costs of extraction. The underground credit contained in the Smith bill is not in the Welborn amendment, as the net version provides for the higher costs of underground mining by allowing the deduction of extraction costs. The unemployment exemption is not included in the Smith bill.

Exemption for Producers in Areas of High Unemployment

The Welborn amendment contains an exemption for operators located in areas of high unemployment as designated by the Secretaries of Labor or Commerce. The exemptions include areas of "substantial unemployment" (42 U.S.C. Sec. 4875) and "redevelopment areas" (42 U.S.C. Sec. 3161).

Criteria set forth for determining eligible areas of "redevelopment" or "substantial unemployment" is lengthy, and general. The general definition is "substantial and persistent unemployment for an extended period of time." There are, however, other determinants utilized for designating areas. A list of such requirements is as follows:

1. Unemployment 6 percent or more for the preceding year and averaged at least 6 percent for the time periods in (2), (3), and (4).

2. Unemployment 50 percent above the national average for three of the four previous years.

3. Unemployment 75 percent above the national average for two of the three previous years.

4. Unemployment 100 percent above the national average for one of the two previous years.

5. Median family income not exceeding 50 percent of the national median.

6. Federal or State Indian Reservations or trust or restricted Indian-owned land areas with distressed unemployment or income.

7. Areas that have suffered "loss, removal, curtailment, or closing of a major source of employment" within the previous three years or threatens to cause three years hence.

8. Communities or neighborhoods with a large concentration of low income persons.

9. Rural areas having substantial outmigration.

10. Areas where per capita employment has declined significantly during the previous 10 year period.

11. Areas of substantial unemployment during preceding calendar year.

12. Areas with an unemployment rate of six percent or more for three consecutive months.

The size and boundaries of redevelopment areas (criteria one through 11) are to be determined by the Secretary of Commerce and must have a population of 1,500 persons, with exceptions, and, with exceptions, shall not be smaller than a "labor area" (as defined by the Secretary), a county, or a municipality with a population of over 250,000, "whichever in the opinion of the Secretary is appropriate". If a state fails to have areas designated under the various other methods there is still an alternative. The Secretary of Labor "shall designate as a 'redevelopment area' that area ... which in his opinion most nearly qualifies" according to the eligibility criteria.

According to the Colorado Department of Employment, there are six counties and two Indian reservations currently classified as areas of substantial or persistant unemployment. Costilla, La Plata, and Conejos Counties are currently classified as counties of substantial unemployment. The counties of Archuleta, Crowley, and Huerfano, in addition to the Southern Ute and Ute Mountain Indian Reservations, are currently classified as areas of substantial and persistant unemployment.

There are currently only two operating coal mines located in such classified areas, and both of these mines would be exempt under the 5,000 ton per quarter exemption. No taxable metal mines are so located, whereas oil and gas production in these counties was about 300,000 BBL and 26 billion mcf respectively in 1974. This corresponded to approximately 0.77 percent of oil production and 17 percent of gas production in the state. (The gas production comes primarily from La Plata County.) It is not known what amount of this production might be otherwise exempt due to the provision for stripper well exemption.

## Kimball Amendment

In a letter to the committee, dated September 30, Mr. Ray Kimball, spokesperson for the Colorado Association of Commerce and Industry, stated, in part:

> ...it should be noted that the proposed repeal of Section 34-23-101 (1) (f), the 7/10¢ per ton safety inspection fee should be deleted from the proposal for two main reasons. First, it would continue a major misunderstanding about the existing level of coal taxation in Colorado because it is only

an inspection fee. Secondly, it would be misunderstood as a repeal of some of the existing tax burden on coal mining. Elimination of any reference whatsoever to it would at least clarify the bill as a net additional tax on the coal industry.

The Kimball amendment to the repealer section of the Smith bill would remove the coal inspection repeal, leaving only the repeal of the existing oil and gas production tax which would be replaced by a comparable severance tax under the bill. Fiscal year 1975 revenue from this fee was $45,561. The Kimball amendment was approved by the committee with a 7 yes, 0 no vote.

## Logan Amendment

At the October 15 meeting of the committee, Mr. Clyde Logan, Rocky Mountain Oil and Gas Association (RMOGA) Tax Committee, proposed that if the ad valorem tax credit were limited to fifty percent, the limit should be the "greater" and not the "lesser" "amount of fifty percent of the severance tax liability or the equivalent of fifty percent of all ad valorem taxes levied, assessed, and paid during the taxable year upon oil and gas leaseholds, leasehold interests, royalties, and royalty interests for state, county, municipal, school district, and special district purposes pursuant to section 39-7-102."

The Logan amendment would cause a reduction in the severance tax liability under the Smith bill. The amount of the reduction could have been some $2 million had the tax been implemented in 1975. The Logan amendment was not approved by the committee with a 5 yes, 5 no vote.

## O'Brian Amendment

At the October 15 meeting of the committee, Mr. Larry E. O'Brian, Sand and Gravel Reclamation Group, expressed concern that the definition of "metallic minerals" in the Smith bill which refers to section 39-6-104 could cause operators to be subject to the tax, even though not intended under this bill, if that section were amended at a later time. He observed that a new definition for ad valorem purposes under section 39-6-104 was under simultaneous consideration by the interim Committee on Property Tax Assessment Practices and School Finance. Thus, Mr. O'Brian proposed that the definition of "metallic minerals" specifically state those minerals not to be subject to the proposed severance tax. The O'Brian amendment would exempt from the definition oil and gas and coal (subject to the proposed tax in other sections of the bill) and rock, sand, gravel, stone products, earths, limestone, and dolomite. As those minerals were not included in the Smith bill draft, there would be no change in the revenue estimates. The O'Brian amendment was approved by the committee with a 9 yes, 1 no vote.

## Department of Revenue Amendments

At the request of the committee, the Department of Revenue proposed amendments which would provide the department with the appropriate powers to enforce the proposed severance tax. Mr. Jim Davis, spokesperson for the department, explained to the committee that the intent of the amendments was to provide clarifying language and not to change the nature of the proposed tax. The focus of committee discussion was the proposed addition of a section 39-29-107 on page 3, lines 25 through 27 and page 4, lines 1 through 7 of the department's amendment. Mr. Davis explained that the purpose of the amendment was to require that a person establish "by the clear preponderance of the evidence" that the purpose of a transfer of all or part of his property was not to secure additional exemptions from the tax. Some members of the committee and interested persons contended that the burden of proof, or at least cause for belief, that the transfer was to secure an exemption should lie with the department and not the person to be taxed.

Senator Strickland proposed that the amendment should read as follows:

> 39-29-107. Exemption prohibited - when. (1) If any person likely to be liable for taxes imposed pursuant to the provisions of this article transfers all or part of his property to another person controlled directly or indirectly, by the transferor before or after the transfer, the executive director of the department of revenue, if he has reasonable cause to believe the transfer was made to secure such exemption, may disallow to the transferee any exemption from tax otherwise authorized pursuant to this article.

The Strickland amendment was adopted by the committee and the department amendment was approved without dissent.

## Persons Subject to the Proposed Severance Tax

The following information describes those operators who would be subject to the severance tax proposed by Representative Smith. Although this information does not address the Welborn proposed tax, it is likely that most persons subject to the tax under the Smith bill would also be liable under the Welborn amendment with the exception of some oil and gas operators (upon whom the effect of the Welborn amendment is not clear, as previously noted) and those exempted because of the unemployment exemption.

Due to the limited availability of data, the only operators addressed are those who, for calendar year 1974 production, would hypothetically have been subject to the tax had it been in effect at

that time. It should be emphasized that changes in operation size or ownership may have affected the operations listed and that the similar list for 1975 production would likely not be identical, especially regarding oil and gas operators.

Metals. Due to the $10,000,000 annual exemption of gross proceeds from the tax for metals, only two companies and no individuals would have been subject to the severance tax in 1974, Idarado Mining Company and Climax Molybdenum Company. Projections for the 1975 gross proceeds of these two companies indicate that only Climax Molybdenum would have been subject to the tax for 1975. Table XIV lists the gross proceeds and the taxable value for the two companies for 1974 and projects to 1975 for Climax Molybdenum. (These data were made available by the companies to the committee.) Assuming only Climax would currently be affected, the bill would have taxed 56 percent by the state's 1974 metal production by value, as reported by the Division of Mines.

TABLE XIV

METAL MINING OPERATIONS
SUBJECT TO TAX
(1974)

| | Gross Proceeds | Taxable Value |
|---|---|---|
| Idarado Mining Company | $12,109,701 | $ 2,109,701 |
| Climax Molybdenum Company | 67,599,657 | 57,599,657 |
| (1975 Estimate) | | |
| Climax Molybdenum Company | $93,010,214 | $83,010,214 |

Oil and Gas. The "1974 Oil and Gas Statistics" report published by the state Oil and Gas Conservation Commission includes a listing of 1974 production by field, well, and operator. The staff reviewed the production listing and identified the operators of wells that had production of over 3,650 Bbl of oil or 21,900 mcf of gas during the year. These levels would correspond to production from wells producing above the stripper level. The conservation commission has estimated state stripper production of 4.88 percent of total oil

produced. It was assumed that all wells produced every day of the year and that the lower, Btu equivalent, "gas stripper" exemption of the bill (60 mcf per day) would have been applicable. It is notable that 214 separate oil and gas operators out of a statewide total of about 250 would have been affected by the bill if it had applied to 1974 production. Approximately one-fourth of the operators (55) produced over 90 percent of the state's oil production in that year while the remaining 159 operators produced a total of less than 4 million Bbl. Table XV lists the operators who would have had production subject to the tax in 1974. Production is listed for those operators with annual production in excess of 50,000 Bbl.

It should be noted that the operators of non-stripper wells, and those accordingly listed in Table XV, do not necessarily own 100 percent of the oil and gas produced from those wells. Owners of royalty interests in those non-stripper wells examined may not be included in the listing although they would be subject to the severance tax proposed by the bill. It is not known how many royalty interest owners would be so affected or the amount of production that actually belongs to them.

According to the Department of Revenue, over 4,000 returns were filed for the existing oil and gas production tax in fiscal year 1975. These returns can be broken down as follows:

| | |
|---|---|
| Corporate | 253 |
| Individual | 4,013 |
| Fiduciary | 217 |
| TOTAL | 4,483 |

It would appear from the number of returns filed that royalty interests in oil and gas production are held by a significantly larger number of companies and individuals than are associated directly with the oil industry as operators.

Since the Smith bill would substantially revise the existing tax law, particularly in the area of rates and provision of an exemption, it would seem probable that it would affect virtually all existing oil and gas production taxpayers. It is also likely that a similar number of returns would be filed because the bill would continue to tax oil and gas royalty interests, require the filing of estimated tax returns, and require the withholding of tax by operators from interest owners. It is not known, however, what portion of existing taxpayers have income exclusively from stripper production and, therefore, would be exempted under the proposed bill. In spite of the exemption, most such taxpayers would likely still file returns in order to receive refunds of estimated or withheld taxes.

TABLE XV

OIL AND GAS OPERATIONS SUBJECT TO TAX

(1974)

| | Company | Production |
|---|---|---|
| 1. | Chevron Oil Company | 20,685,718 Bbl |
| 2. | Amoco Production Company | 2,532,314 |
| 3. | Texaco, Inc | 1,624,205 |
| 4. | Koch Exploration Company | 640,635 |
| 5. | Inexco Oil Company | 554,347 |
| 6. | Champlin Petroleum Company | 466,040 |
| 7. | Continental Oil Company | 415,850 |
| 8. | Trend Exploration, Ltd. | 366,818 |
| 9. | J. H. Bander | 312,628 |
| 10. | Thomas G. Vessels | 275,338 |
| 11. | Burton-Hawks Exploration Company | 275,225 |
| 12. | Sands-American Corporation | 264,578 |
| 13. | Tiger Oil Company | 249,114 |
| 14. | Beaver Mesa Exploration Company | 235,539 |
| 15. | Gulf Oil Corporation | 226,517 |
| 16. | Clinton Oil Company | 209,928 |
| 17. | Okmar Oil Company | 204,278 |
| 18. | Don M. Rounds Company | 193,235 |
| 19. | Energy Minerals Corporation | 185,911 |
| 20. | Martin Oil Service, Inc. | 176,850 |
| 21. | Patrick A. Doheny | 171,749 |
| 22. | Mountain Fuel Supply Company | 160,579 |
| 23. | Mobil Oil Corporation | 160,396 |
| 24. | Atlantic Richfield Company | 158,247 |
| 25. | Cherokee & Pittsburgh Coal and Mining Company | 154,846 |
| 26. | Frank H. Walsh | 153,516 |
| 27. | Sundance Oil Company | 151,269 |
| 28. | Monsanto Company | 149,434 |
| 29. | Petroleum, Inc. | 142,638 |
| 30. | Mull Drilling Company | 141,533 |
| 31. | Manning Gas & Oil Company | 134,431 |
| 32. | Phillips Petroleum | 129,690 |
| 33. | Rex Monahan | 123,231 |
| 34. | Union Oil Company of California | 120,915 |
| 35. | R. E. Hibbert Oil Properties | 112,906 |

TABLE XV (continued)

| | Company | Production |
|---|---|---|
| 36. | Bright & Schiff | 109,366 Bbl |
| 37. | Webb Resources | 108,475 |
| 38. | A. T. Skaer | 107,698 |
| 39. | Union Texas Petroleum | 107,620 |
| 40. | Polumbus Corporation | 104,225 |
| 41. | Allison Drilling Company | 90,543 |
| 42. | R. D. Brew | 88,207 |
| 43. | E. Doyle Huckabay, Ltd. | 87,984 |
| 44. | Bobcat Oil Company | 74,537 |
| 45. | Enbrook Oil & Gas Company | 70,085 |
| 46. | Kimbark Exploration Company | 69,192 |
| 47. | W. C. McBride, Inc. | 68,208 |
| 48. | Skelly Oil Company | 65,351 |
| 49. | Centennial Oil Company | 62,736 |
| 50. | Gary Sandlin | 62,057 |
| 51. | Herndon Drilling Company | 55,276 |
| 52. | Charter Exploration & Production Company | 54,408 |
| 53. | Alfred Ward & Son | 52,487 |
| 54. | Macchi-Ross Petroleum Company | 51,375 |
| 55. | Carl A. Houy | 50,861 |

The following operations had production of less than 50,000 Bbl for the year. All together, their total for the year was less than 4 million Bbl, or 10% of the state's production.

Toltek Drilling Company
Westwood
Byron Oil Industries
Chaparral Resources
Mitchell Energy & Dev. Co.

Vaughey & Vaughey
William E. Hughes
Horizon Oil & Gas Co. of Texas
Kerr McGee Corp.
Service Drilling Co.

Pioneer Petroleum
Adolph Coors Co.
Davis Oil Co.
Sun Oil Co.
Western Drilling Co.

Executive Properties Inc.
Herman George Kaiser
Mapco Production Co.
Labeco Operating Co.
Weco Development Corp.

TABLE XV (continued)

Powell & Stone
Robert J. Beams
Texas Oil & Gas Corp.
Texas Pacific Oil Co.
Colorado Oil Co.

C. W. Hughes
J & L Oil Corp.
Kenneth Luff, Inc.
Arthur M. Guida
Jack Prather

W. R. Pfeifer
Thomas B. Burns
Depco, Inc.
Sotexco, Inc.
Sage Oil Co.

Fees-Key, Inc.
Tesoro Petroleum Corp.
Kemmerer Coal Co.
Stauffer Chemical Co. of Wyoming

Bomac Exploration Co.
Development Services Corp.
Jack Grynberg & Associates
Fuel Resources Development Co.

Imperial American Management Co.
Dye Carbonic, Ltd.
Harlan Drilling

Raymond Oil Co.
Juniper Petroleum Corp.
Nor-Am Exploration Corp.
Zoller & Danneberg

Mont Rouge
Domestic Energy Corp.
Austral Oil Co.
Belco Petroleum Corp.
Walter S. Fees, Jr., et al

Gasco
J. M. Huber Corp.
N. L. Korn
Arapaho Petroleum
Cabot Corp.

Planet Associates
Fred I. Shaffer
El Paso Natural Gas Co.
Amerada Hess Corp.
E. L. Fundingsland

W. M. Gallaway
Brooks Hall Oil Corp.
Ladd Petroleum Corp.
Lynco Oil Corp.
Jerome P. McHugh & Assoc.

Dixie M. McLane Trust
National Cooperative Refinery Assn.
Northwest Pipeline Corp.
C. F. Raymond

Republic Mineral Corp.
Sohio Petroleum Co.
Southern Union Production Co.
Roy L. Cook
Joseph B. Gould

Joseph S. Gruss
Merrion & Bayless
Mesa Petroleum Co.
Murchison Brothers
Murchison Trusts

Northwest Production Corp.
Penrose - Zachary Co.
The Stone Oil Co.
Pyramid Oil Co.
Coquina Oil Corp.

Brock Exploration Corp.
Pomeroy Producing Escrow
Chandler & Associates
Marvin R. Brown
Milinda Oil Co.

TABLE XV (continued)

Beren Corp.
Ferguson Oil Co.
Burton C. Dunn
Buttes Gas & Oil Co.
Gremlin Oil Co.

Shawnee Oil Dev. Co.
Gage Oil & Gas Corp.
Norris Oil Co.
Northland Resources Co.
Equity Oil Co.

Peacock Oil Co.
Premium Oil Co.
Twin Arrow, Inc.
Willard Pease Drilling Co.
Cities Service Oil Co.

American Resources Mfg. Corp.
Stuart W. McLaughlin Estate
Belco Petroleum Corp.
Graham-Michaelin Drlg. Co.
E. Lyle Johnson

Bob Burch
Petro-Lewis Corp.
Westgate Oil Co.
B. F. Allison Estate
Inter-American Petroleum

Kirkwood-Joeckel
E. W. Olson
William A. Sidwell, Jr.
Summit Oil Co.
Triangle J. Oil Co.

Le Clair Operating Co.
Exeter Drlg. & Expl. Co.
General Oil Field Service
Tenneco Oil Co.
XO Exploration

Pennzoil United
Smitherman Oil & Gas Co.
W. W. Ferris
Tipps Drilling Co.
W. G. Rogers

William D. Hewit
J. W. Gibson
Marlon Oil Co.
K. R. M. Petroleum Corp.
R. D. Brew

John Brunel
Burlington Northern Inc.
Kenneth L. Tipps
Western Operating Co.
Robert Schulein

Tod Gross
Colton & Colton
Republic Engineers, Inc.
Conley P. Smith
Mary Auld Hamilton

Griffin Oil & Gas
Rodney P. Calvin Oil & Gas
Haynie & Mayer
Gen Oil, Inc.
John H. Hill

Charles R. Bain
Walter Duncan
Joe D. Mechalke

Coal. Production data contained in the "Coal 1974" publication of the Colorado Division of Mines was used to determine which 1974 producers would likely have been subject to the tax. It was assumed for the purposes of the analysis that the 5,000 ton per quarter exemption per producer would equal 20,000 tons per year, therefore, only those companies with production in excess of 20,000 tons per year were examined. It is possible that some operations with lesser annual production may have exceeded 5,000 tons per quarter due to seasonal demand and production and would have also been subject to the tax. Table XVI lists the production by company, not mine, and indicates if that production is from surface mines or from underground mines which would be eligible for the 20 percent credit in the bill. Fifteen companies operating 20 of the state's 33 mines would have been subject to the tax. These companies produce about 99 percent of the total production and, with the exemption, 95 percent of the production would be subject to the tax.

TABLE XVI

COAL MINING OPERATIONS SUBJECT TO TAX
(1974)

| County<br>Company | Surface or Underground | 1974 Production | Taxable Production |
|---|---|---|---|
| Fremont | | | |
| Canon Coal Corp. | S | 117,236 tons | 97,236 tons |
| Twin Pines Coal Co. | U | 30,154 | 10,154 |
| Gunnison | | | |
| Bear Coal Co. | U | 134,332 | 114,332 |
| Western Slope Carbon, Inc. | U | 253,549 | 233,549 |
| U.S. Steel Corp. | U | 868,695 | 848,695 |
| Las Animas | | | |
| CF&I Steel Corp. | U | 539,845 | 519,845 |
| Moffat | | | |
| Colowyo Coal Company | S | 28,741 | 8,741 |
| Empire Energy Corp. | U | 212,010 | 192,010 |
| Montrose | | | |
| Peabody Coal Co. | S | 106,723 | 86,723 |
| Pitkin | | | |
| Mid Continent Coal & Coke Co. | U | 865,988 | 845,988 |
| Routt | | | |
| Pittsburg & Midway Coal Mining Co. | S | 1,134,089 | 1,114,089 |
| Energy Fuels Corp. | S | 1,815,543 | 1,795,543 |
| Seneca Coals Ltd. | S | 496,985 | 476,985 |
| Weld | | | |
| Imperial Coal Co. | U | 167,909 | 147,909 |
| Adolph Coors Co. | U | 134,454 | 124,454 |
| Total | | 6,906,253 tons | 6,606,253 tons |
| Total Statewide Production | | 6,960,686 tons | |

## VII. POSITIONS ON TAXATION - MINERAL OPERATORS AND OTHER PERSONS

Throughout the interim the committee received testimony from a variety of persons concerned with the taxation of the minerals industry in general and with severance taxation in particular. The following summarizes the positions of those persons who testified in person or in writing concerning severance taxation.

### Coal and Other Nonmetals

Representatives of three operational and two contemplated coal operations presented testimony to the committee concerning the taxation of coal. The testimony emphasized the differences between underground and strip mined coal in terms of the costs of extraction and distinction between steam and metallurgical coal with regard to the ability of the operator to pass-on increased costs resulting from the imposition of new taxes.

Mr. Mart Thurman, Pittsburgh-Midway Coal Company, a subsidiary of Gulf Oil Corporation, stated that his company would pass on increased costs due to taxes to the purchasers of the steam coal strip mined from their Edna strip mine. Mr. Robert Delaney, Mid-Continent Coal and Coke Company, an underground extractor of coking coal, proposed that the higher costs of underground coal should be recognized in any tax legislation and stated that allocation of costs to certain upgrading processes allowed as specific deductions to determine taxable value would be difficult under the accounting procedures maintained by his company. Mr. Delaney noted that if a severance tax is to be adopted, the most equitable base would utilize the income tax structure. Mr. Bob Welborn, Colorado Fuel and Iron, offered a position similar to that of Mr. Delaney and noted that if there is to be a severance tax, the base should be on net proceeds rather than gross proceeds. He illustrated the difference between gross and net by estimating a severance tax liability of $603,200 on his company under the Smith Bill as compared to $60,000 under a net approach. This estimate was based on annual production of 600,000 tons, a sale price of $31 per ton, allowable deductions under the Smith bill of $5 per ton, and additional deductions under his net approach of $24 per ton. He stated that to impose a severance tax on gross proceeds would be as unreasonable as to base the income tax on gross proceeds. He noted that an underground operator could have a tax liability, if based on gross, that would be higher than his net proceeds. In addition, he observed that the interim Committee on Local Government was very much concerned with reclamation of areas subject to strip mining and sensed that the consensus of that committee was to encourage underground mining to any extent possible. He stated that a tax on gross proceeds would discourage rather than encourage underground mining.

Mr. David L. Marshall, Freeport Coal Company, provided the committee with testimony concerning a prospective underground coking

coal operation in southern Colorado. Mr. Marshall stated that his company is evaluating the prospects for a mine, near Trinidad, which would have capitol costs of approximately $40 million dollars and achieve commercial production in 1979. He noted two concerns with severance taxation. First, his operation would need to be competitive with other metallurgical coal produced in the region (primarily in northern New Mexico and east-central Utah). He observed that a severance tax as high as that proposed in engrossed H.B. 1196 would have placed his operation at a substantial disadvantage with respect to competition from coal produced in those states. In addition, if Freeport coal were to be competitive with eastern coal, it would be necessary to consider both any new severance tax and the larger freight costs required to move Freeport coal to the steel producing centers in the mid-west. Mr. Marshall's second concern, also relating to the competitiveness of Colorado coking coal, was that his company's coal will require upgrading (particularly cleaning) to a greater degree than is customary. He concluded that the two considerations of competitive pricing and upgrading costs when combined with the severance tax proposed by engrossed H.B. 1196 would have levied an unacceptable economic burden on the proposed development. Speaking for another proposed underground coal facility, Mr. Hugh Evans, Manager, Coal Operations, Atlantic-Richfield Company, also emphasized the importance of maintaining a competitive climate for Colorado underground steam coal. Although he expressed no opposition to the concept of the Smith bill, he stated that the underground credit of 20 percent was insufficient, but if the credit were 60 or 70 percent the Smith bill would be acceptable to his company. Mr. Evans noted that transportation costs make it more difficult for western slope Colorado underground steam coal to be competitive at the outset, particularly as compared to Wyoming stripped coal, and stated that his company could not begin production until a contract for purchase of the coal had been consumated. He observed that any such contract would include an automatic pass-through of any severance tax.

Mr. Ray Kimball, Colorado Association of Commerce and Industry, testified that coal operators feel quite strongly that any proposed new or additional tax on coal should be in lieu of or subject to a total or partial credit for existing taxes on coal.

Speaking for the Sand and Gravel Reclamation Group, Mr. Larry O'Brian explained that because virtually all sand and gravel extracted in Colorado is used in the state, a severance tax on sand and gravel would be passed on directly to Colorado consumers in the form of higher construction costs. Mr. O'Brian urged the committee to exclude sand and gravel from any proposed tax.

Oil and Gas

Mr. Conley Smith, Independent Petroleum Association, observed that production or severance taxes impact adversely on exploration, but that Representative Smith's bill would be a useful one in terms of addressing small and marginal operators. Mr. Smith opinioned that a

severance tax should be tied to the ability to pay. Mr. Clyde Logan, Chairman, Rocky Mountain Oil and Gas Association Tax Committee, concurred with Mr. Smith that a tax increase on the oil and gas industry would adversely affect exploration. In addition, Mr. Logan stated his preference for a full property tax credit and noted that if the credit is to be limited to 50 percent it should be the "greater", and not the "lesser" as discussed in the previous section of this report.

Metals

Mr. Harold Ballard, Climax Molybdenum, Inc., expressed his opposition to severance taxation on metals and contended that the ad valorem tax on metals is, in effect, a severance tax since it is based on production value. Mr. Ballard noted that Climax has provided substantial property tax revenues to the area affected by its operation and, in addition, has provided substantial amounts of aid not required by statute. He stated that the current property tax equals a severance of some 2.5 percent. Further, he contended that since a severance tax is similar to existing property taxes it may exceed the spirit of the state constitution. Mr. Ballard disputed the contention that a severance tax is justified because of the removal of an irreplaceable resource and countered that a mineral has value only because one assumes the task of removal. He stated that a severance tax, such as the Smith bill, may be a gross income tax imposed in addition to the state's net income tax. Mr. Ballard also stated that a severance tax is an assertion of a state royalty interest that does not, in fact, exist.

Addressing metals other than molybdenum, Mr. Tom Watkinson, Idarado Mining Company, presented the committee with extensive data on his company's production and profitability, and the committee toured the mine during the early portion of the interim. Mr. Watkinson did not specifically address the subject of severance taxation. Mr. Douglas Watrous, urged that the General Assembly seek methods of providing incentives for small mine operators and that the staff of the Colorado Division of Mines be increased in order to provide technical advice to small mine operators. He discussed the impact of high levels of taxation on mineral operations in British Columbia. In addition, he noted the problems small mine operators face in milling and marketing their ore. Mr. Howard B. Williams, Mine Accountant, Camp Bird Mine, and Ouray County Commissioner, objected to a severance tax because minerals have no value until they are discovered, removed, mined, and smelted. He contended that other businesses should also be required to pay a comparable tax on gross receipts if such were required of metals. He suggested that, if a severance tax is determined necessary, it must be based on net income with allowance for depreciation and depletion or it will discourage any new exploration or development in the state. In addition, he proposed that base metals be entirely exempted from the tax.

Mr. D. M. Pembridge, Union Carbide, indicated that a severance tax on uranium produced by his company could not be passed on under existing contracts, but new contracts could include such a provision.

## Oil Shale

Mr. David L. Harris, Colony Development Operation and federal tract C-b, explained that the economics of oil shale development have not been determined and that a severance tax could be an additional factor which would forstall development. He did note, however, that his company was anxious to ascertain any new tax which might be imposed on oil shale in order that it could be considered prior to development. Mr. Mart Thurman, Gulf Oil Corporation and federal tract C-a, stated his opinion that any severance tax should be imposed at the point of severance and not on the basis of a value added. He expressed no criticism of the Smith bill and observed that he had talked with no one in the industry who had expressed opposition to the Smith bill.

## Statements by Other Persons Interested in Severance Taxation

A number of persons associated with state and local governments presented testimony to the committee concerning severance taxation. Mr. Phillip F. Icke, County Attorney, San Juan County, stated that any severance tax which might be placed on the extraction of the various ores in place or potentially in place in San Juan County would effectively curtail mining operations in the county to the point that there would be no effective tax producing operations of any consequence in the county. He urged the committee not to destroy the mining operations in that county. Mr. Richard P. Tisdel, County Attorney, Ouray County, offered the committee an opinion concerning the constitutionality of the Smith severance tax bill. It was Mr. Tisdel's opinion that, although there is no clear constitutional or statutory conflict with the enactment of the proposed severance tax, there could be problems under Article 10, Section 11 of the Constitution which limits the state's property tax to four mills and Article 10, Section 3 which provides that there shall be substantial uniformity of taxation. In the case of the first provision, he argued that since the proposed tax on metals would be based on the same definition as that used for ad valorem purposes, it must be considered as a tax on property and, if the rate were five percent, could effectively exceed a four mill property tax levy. In the latter section, he contended that it could be argued that the double taxation on mining, caused by a severance tax, would be "palpably unjust" or "oppressive" and thus a violation of the uniformity provision. Mr. Millard S. Fairlamb, County Attorney, San Miguel County, noted the taxes paid by the mining industry and contended that it would definitely be foolhardy to impose upon it an additional tax and even more foolhardy to take away local revenues and funnel them into the state government.

Mr. Jim James, Office of the Governor, spoke in behalf of severance taxation in general and the Smith bill in particular, noting that his only hesitation with the Smith proposal concerned the definition of gross proceeds for metal mines. Mr. James proposed that the definition include specific language as to which deductions would be allowed from sales price rather than through reference to the definition for ad valorem purposes.

## VIII. ARGUMENTS FOR AND AGAINST SEVERANCE TAXATION

The staff was directed by the committee to provide arguments for and against severance taxation. The first section of this part summarizes the primary arguments raised both in support of and in opposition to severance taxation in general. The second section summarizes the primary arguments for and against two alternative approaches to severance taxation -- gross proceeds versus net proceeds. These approaches were exemplified during the interim by the Smith bill and the Welborn amendment, respectively.

### Severance Taxation in General

Arguments for:

(1) When a natural resource is extracted, its value is irretrievably lost to the state. The state is, therefore, justified in compensation for a portion of such resources removed and sold for private profit. A severance tax imposed on the extraction of an irreplaceable natural resource, in addition to other business taxes, is the accepted method for the state to collect the appropriate amount.

(2) The minerals industry benefits from substantial preferential treatment under the federal income tax laws, including depletion allowances. Since the state accepts the federal deductions and in the case of oil shale provides an enlarged depletion allowance in determining the state income tax, the state effectively also grants the industry preferential tax treatment. As a result, state income tax revenues from mineral operators are less than they would otherwise be. Minerals extracted in Colorado provided revenues to the operators in excess of $500 million during the past year, and yet severance tax revenues to the state totalled only some $3.5 million, all from the oil and gas industry. Further, data indicate that the minerals industry, in some cases, is paying far less than an equitable portion of the state's property taxes. A severance tax would be a highly visible means of ensuring that the industry pays a proportionate share of taxes.

(3) Severance taxes are an established and accepted revenue source in states with mineral resources. In Colorado, oil and gas production has been subject to a severance tax for many years. By not imposing severance taxes on other minerals, the state is allowing substantial revenue sources to remain untapped -- revenues that could be used to lessen the tax burden on other taxpayers in the state. As most states with significant production impose such taxes, the industry would not be placed at any competitive disadvantage. Severance taxes have traditionally been considered as a cost of doing business in the industry, as have royalties and the severance tax on oil and gas in this state. Other Colorado mineral extractors can similarly assume the tax without adverse consequences.

(4) In most, if not all, instances the burden of severance taxes will be borne by the ultimate consumer of the mineral product. At the present time, Colorado residents effectively pay severance taxes when they purchase goods and services derived from mineral products of states which impose such taxes. For example, the price of coal from Wyoming used in Colorado for power generation includes that state's severance tax and the extra cost for that tax is directly passed on to Colorado consumers of the electricity. As Colorado coal is exported without such a tax, importers are thus granted a tax advantage by Colorado. The result of this policy is to favor out-of-state consumers of Colorado mineral products over Colorado consumers of out-of-state mineral products. A severance tax in Colorado would rectify this situation and foster interstate tax equity.

(5) Although the Colorado minerals industry is not a large one when compared to other states, the potential for the industry is enormous, particularly in the case of coal and oil shale. While state tax policy in the past can be viewed as encouraging an unhealthy industry, no such inducement is needed today. Instead, with federal policy encouraging the development of mineral fuels and activity by Congress to provide financial assistance, mineral production in this state may increase at a rapid pace. The result of increased mineral production will be major environmental and socio-economic costs to the state. The costs to state and local governments of these impacts should not burden the taxpayers of Colorado. Instead, the costs should be passed on through severance taxes to the ultimate consumers of Colorado mineral products.

Arguments Against:

(1) Severance taxation constitutes the discriminatory imposition of a special tax on one segment of business in the state. The minerals industry is presently subject to the same taxes levied on other business and would not be relieved of that burden. The minerals extractive industry pays substantial property taxes and, in the case of metals and oil and gas, property taxes are based on production value and effectively constitute a local severance tax. The special deductions allowed mineral operators in computing income taxes are legitimate tax deductions similar to the deductions allowed other forms of business. The depletion allowance in particular serves a proper and useful public purpose by encouraging exploration for additional resources. A special tax on the minerals industry would place the industry at a competitive disadvantage in relation to other business seeking limited investment capital. If the purpose of a severance tax is to raise new revenue for the state, the tax should have a broad base and be applicable to all business.

(2) The minerals industry in Colorado faces unique problems of competitiveness without the additional burden of a severance tax. With the probable exception of molybdenum, the metals industry is a small one whose product prices are set by world markets impacted by large efficient producers. In addition, Colorado metal production is

located far from necessary smelters which add large transportation costs to other expenses. While major steam coal markets are located on the eastern slope, the deposits are on the western slope -- mountainous terrain increases the transportation costs over those incurred by the production of other western states. The oil shale industry is not yet in existence and its economics are unknown, although it is doubtful that shale oil can compete with conventional oil and gas at current price levels. Any additional tax on the minerals industry would place Colorado mineral production at a further competitive disadvantage as compared to other states.

(3) It is the stated policy of the President that the United States should strive for energy independence through the development of available domestic energy sources. Colorado contains vast quantities of both oil shale and coal which have been identified as important future national sources. The state should not enact legislation which would counter national policy by increasing the costs of mineral fuels or imposing a tax burden which would discourage or delay the development of needed mineral fuels from this state.

(4) In view of the current economic situation in the nation and in Colorado, the state should attempt to encourage, not discourage, the creation of new business and expansion of existing operations. A healthy economy is prerequisite for adequate state revenues and full employment. An additional tax on mineral production could curtail or forestall portions of the industry in the state, thus adversely impacting employment.

(5) A severance tax is the assertion of a royalty interest by the state on resources that it does not own. Colorado receives royalties on mineral production from lands that were granted to it by the federal government, but other resources, whether located on federal or private land, do not belong to the state. Imposition of a severance tax is effectively the assertion of royalty interests by the state that have no basis in fact.

## Gross Proceeds Versus Net Proceeds Basis for Severance Taxation

### Arguments For Gross and Against Net:

(1) Gross proceeds is the only basis for a true severance tax designed to compensate the state for present and future lost wealth for it establishes the tax at the point of severance. A larger base, such as sales price on the upgraded mineral, includes processing costs as an addition to the base and thus assumes the characteristics of a value-added tax. A smaller base allows deductions for costs of extracting the mineral and assumes the nature of an income tax or surtax. If a severance tax is to be imposed upon the removal of an irreplaceable resource, the tax should be based on the value of that resource as removed -- at the point of severance. This would be on the gross value of the mineral.

(2) Gross proceeds is the most widely accepted base for severance taxation in the various states which impose such a tax. With such a base, Colorado's tax could be comparable with other state's severance taxes. Many Colorado mineral operators have interests in other states. A severance tax on a base similar with those states would allow them to determine their taxes under established procedures rather than an entirely new accounting method. A net proceeds basis has not been accepted in many states because of its low yield, administrative and compliance complexity, and because it is essentially only an additional, or in lieu of, income tax.

(3) A gross proceeds basis allows greater simplicity of administration for the state and is more easily calculated by those liable for the tax. It is easier to estimate revenues and to check compliance with such a basis due to the availability of production figures and sales prices as compared to the relatively unknown costs that would be deducted in computing net. Any tax should meet these goals. For those with greater extractive costs, this simplicity can be maintained by allowing established credits to reflect the additional costs.

Arguments For Net and Against Gross:

(1) A severance tax on gross proceeds could easily become a tax on an operator with marginal profitability or one who is operating at a loss. As such, it could become a major factor in causing a marginal producer to cease operation. An established goal of tax policy is to relate the tax to the ability to pay. A tax on gross can only incidently relate to the ability of the operator to assume an additional tax burden. A tax on net, in contrast, would closely relate to the profitability of the operation.

(2) A tax on gross proceeds constitutes an unfair and inequitable burden on those mineral operators who face substantial extractive costs. Because the sales price of minerals extracted from underground facilities does not necessarily correspond to the costs of extraction, a severance tax on gross proceeds could result in underground operators being placed on a competitive disadvantage. Even if a credit were allowed, it would likely be an arbitrary one which might not relate to the greater extractive costs of underground miners. It is a goal of many persons in this state to encourage the development of underground mines. A tax on gross can effectively counter this goal. A tax on net would provide for higher extractive costs as a deduction and thus bring about tax equity among the various mining operations.

(3) A severance tax on gross proceeds could cause mineral operators to engage in a process known as "high grading" in order to maintain a profitable operation in spite of the tax. Under such an extractive method, only the richer reserves would be mined, with the costs per ton of ore extracted less than would be the cost if a greater percentage of the total ore were mined. High grading was a

procedure employed by the early miners in Colorado which resulted in the more valuable portions of mines being depleted. Today, much of Colorado's mineral production is based on the remaining lesser grades of ore. Tax policy should not dictate that only the better grades of the remaining ore be extracted thus wasting resources. A net tax, which would reflect extractive costs, would not discourage recovering lower grade ores.