VIRGINIA CENTER FOR COAL AND ENERGY RESEARCH

IN-STATE ECONOMIC IMPACTS OF THE VIRGINIA COAL INDUSTRY AND POTENTIAL COAL PRODUCTION DECLINES

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Virginia Center for Coal and Energy Research Report 95-1
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061-0411
May, 1995

Executive Summary

Mining and transport of coal makes a significant contribution to Virginia's economy. Virginia's coal production has declined in recent years, from a 46.5-million-ton peak in 1990 to less than 40 million tons in 1994, and further declines are expected.

This study estimates contributions of Virginia's coal industry to the state's economy, and the potential economic impacts of continued production declines. Economic impacts of the Virginia coal industry include both mining and in-state transport of Virginia-mined coal.

The economic impacts of coal mining and transport include direct, indirect, and induced effects. Direct effects include employment, payroll expenditures, and state and local tax expenditures by Virginia's coal producers; baseline data from several sources were used to estimate direct effects.

A measure of the coal's direct effects, however, does not capture the full range of the industry's economic impact. A portion of the revenues received by Virginia's coal producers are spent in Virginia's communities to purchase goods and services. In addition, wages and salaries received by coal-industry employees, and by employees of supporting industries, support economic activity within the state. The business activities supported by industry and employee expenditures are called indirect and induced effects. Economic multipliers were applied to baseline data to estimate the indirect and induced economic effects due to mining and transport of Virginia coal.

Table ES-1. Estimated In-State Economic Impacts of Virginia Coal Production and Transport in 1993, and of Potential Coal Production Declines.

Measure	Current Economic Impacts (total)	Current Economic Impacts (per million tons of production)	Potential Loss Due to Production Decline (per million tons of production)
Employment	37,500	926	876
Personal Income	$1.04B	$27M	$25M
State and Local Tax Revenues	$149M	$3.9M	$3.3M

Notes:
All figures include direct, indirect, and induced effects.

In 1993, the direct economic impacts of Virginia's coal industry included over 9,000 people employed, a $340 million payroll, and $36 million in state and local tax payments. Total economic impacts of Virginia coal went well beyond these figures. Total economic impacts --including indirect and induced effects -- are estimated to have totaled over 35,000 jobs and $1 billion in personal income, statewide. Each million tons of coal produced in Virginia supports over 900 jobs and generates nearly $4 million in state and local taxes. The direct, indirect, or induced effects of Virginia coal are estimated to provide over 40 percent of the personal income received by residents of southwestern Virginia's seven coal-producing counties.

If Virginia coal production continues to decline, fiscal impacts will be substantial. Declining employment, payroll income, and tax collections will occur. These impacts will be most severe in the southwestern counties where coal remains the major industry, alternative employment opportunities are limited, and current unemployment levels are high. For each million-ton decline in Virginia coal production, approximately 90 percent of the associated employment and personal income currently generated by the mining and transport of that coal, and over 80 percent of the resulting state and local tax payments, will be lost by the state (Table ES-1).

Introduction

Production and transportation of coal make a significant contribution to the Virginia economy. Several recent reports, however, indicate that Virginia coal production appears vulnerable to substantial decline in the near future (Milici and Campbell, 1991; Energy Ventures Analysis, 1994; Crabtree, 1995).

This report provides an estimate of the in-state economic impacts of the Virginia coal-mining industry during the year 1993. The analysis also addresses the potential economic impacts of declining coal production. This analysis was conducted prior to the April, 1995, enactment of coal tax credit legislation by the Commonwealth of Virginia; neither the effects of that legislation, nor those Virginia tax credits available to coal purchasers in effect prior to that legislation, are considered in this analysis.

Virginia coal production in 1994 (38.8 million tons, according to Virginia DMME) was over 16.5 percent below 1990's peak production levels. Virginia Employment Commission data show that coal-industry employment declined by well over 2,000 jobs (approximately 20 percent) between 1990 and 1993. Preliminary data from the Virginia Department of Mines, Minerals and Energy indicate that, during 1994, approximately 830 additional coal-mining jobs have been lost.

The impact of declining coal-mine employment has been especially severe in southwestern Virginia's coal-producing counties. In 1994, five of southwestern Virginia's seven coal-producing counties had unemployment rates which were among the state's top eight, out of 136 jurisdictions statewide (Figure 1). Two of the major coal-producing counties ranked first and second for having the state's highest unemployment rates: 16.2% in Dickenson County and 15% in Buchanan County. The state average for 1994 was 4.9%.

Figure 1:
1994 Unemployment in Virginia's Seven Coal-Producing Counties:
Percent Unemployment, and Ranks among 136 Virginia Jurisdictions
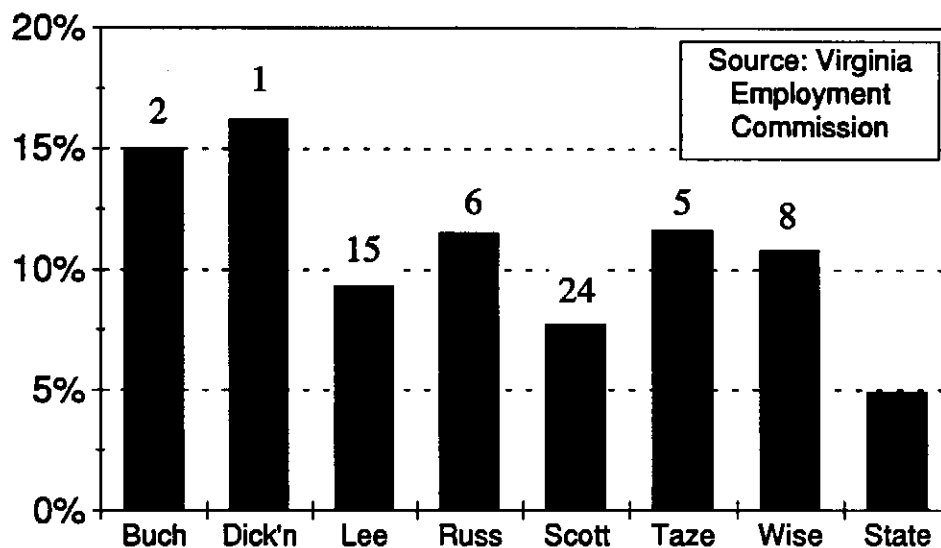
Economic Impacts of Coal

The current analysis focuses on jobs, payroll income, and state and local tax payments generated by the Virginia coal industry as indicators of in-state economic impacts.

Employment and payroll supported by Virginia's coal mining industry (called *direct* effects), although substantial, are not a full measure of the industry's economic impact. As a basic industry, coal production also creates a variety of economic impacts due to "spinoff" effects. A portion of the revenues received by Virginia's coal producers are spent in Virginia's communities to purchase goods and services necessary to coal production; the business activity supported by these expenditures are the coal industry's *indirect* effects. In addition, wages and salaries received by coal-industry employees, and by employees of supporting industries, are spent in Virginia communities; the economic activities supported by these expenditures are the *induced* economic impacts of the coal industry.

Transportation is essential to the creation of economic value which occurs through the mining of coal. As a bulky product, coal's transportation creates economic impacts which are substantial. The vast majority of Virginia's coal is transported from mines to processing and rail facilities by contract truckers who are not directly employed by the coal industry. Coal is moved from these facilities by rail to purchasers throughout Virginia, the eastern U.S., and the world. Exported coal, and a small portion of the Virginia coal industry's domestic sales which are moved by tidewater barge, create additional economic value when transferred and shipped at Virginia's Port of Hampton Roads.

The coal industry is also subject to regulation by government agencies at the state and federal levels. About 3/4 of this activity is supported by federal dollars that would not otherwise be spent in southwestern Virginia. Fees paid by the coal industry also help to support these agencies. Mining agency activity also has indirect and induced economic effects.

This analysis includes the effects of "backward linkages" (*i.e.*, economic impacts of purchases of goods and services by coal and its supporting industries), but it does not consider "forward-linked" impacts, such as electricity generation. The rationale for this approach is straightforward: Most Virginia industries that use Virginia coal would continue to operate, even if unable to procure coal from Virginia sources. The vast majority of backward-linked economic activity, however, would cease to occur within Virginia in the absence of Virginia coal mining.

Methods of Analysis

The analysis was conducted in four major phases:

1.   Gather baseline data on the direct economic impacts of coal mining in Virginia, and on transportation of Virginia-origin coal within the Commonwealth.

2.   Use multipliers from various sources to estimate the indirect and induced impacts of Virginia coal, and those direct effects that cannot be estimated from primary data.

3.   Estimate the contribution of direct, indirect, and induced economic impacts of coal mining and its supported industries on Virginia's state and local tax revenues.

4.   Using the results of phases 2 and 3 above, estimate the in-state economic impacts of potential coal production declines.

We were aided in this process by the existence of several previous studies. VCCER had estimated the economic impacts of the Virginia Coal Incentive Act in 1989 (Randolph, 1989). VCCER had also conducted a study of the Virginia coal industry's economic activity in 1992, based on calendar year 1990 (Zipper et al., 1992). An informal survey of the Virginia Coal Association (VCA) membership, conducted by VCA, contributed valuable data to VCCER's 1992 study.

Adam Rose, of Pennsylvania State University, conducted a study of the U.S. coal industry's economic impacts for the National Coal Association; Rose's study was based on calendar year 1992, and completed in April of 1994. In the course of conducting this study, Rose also compiled economic impact estimates for the principle coal-producing states, including Virginia. Rose's work did not directly consider coal transportation.

Yochum and Agarwal, of Old Dominion University, have conducted a series of economic impact analyses which estimated economic activity associated with the Port. Yochum and Agarwal's study considers the in-state economic impacts of transporting products to the Port, as well as services provided at the Port. Their most recent study, completed in 1994, is based on calendar year 1992.

The Virginia Coal Association has compiled a report of the Virginia coal industry's competitive status which includes data on the industry's economic activity that had not previously been available (EVA, 1994).

Results

Baseline Data

Table 1 contains the baseline data used in this report. These data form the basis for subsequent analyses. Virginia Employment Commission (VEC) data were used to estimate coal-industry employment and payroll, rather than the more widely cited Virginia Department of Mines, Minerals and Energy (VDMME) figures, because VEC figures are more complete. Coal production figures are taken from Energy Ventures Analysis (EVA, 1994), which utilizes federal Mine Safety and Health Administration data. The Virginia Department of Mines, Minerals and Energy reports 1993 production to have been 40.09 million tons.

Coal distribution (rather than production) was used as the basis for estimating transportation impacts. Each year, several million tons of coal are mined in Kentucky and trucked to Virginia for rail shipment from Virginia facilities. In estimating the impact of coal trucking, we assumed that Virginia trucking firms are responsible for one-half of this cross-border traffic. The economic impacts of shipping this "imported" coal by rail from Virginia facilities is considered to be a legitimate impact of the Virginia coal industry because it would not occur unless Virginia-based mining operations were present. Rail revenue estimates, compiled using rail rate estimates and the method of our previous economic impact study (VCCER, 1992), include only revenues derived from transport of Virginia-origin coal within the state.

TABLE 1. Basic Data Used to Estimate In-State Economic Impacts of Virginia Coal Production in 1993.

Data Type	Amount	Data Source
Coal Production - Million tons	38.607	EVA (1994), Table 1-2
Coal Revenues - $ per ton	31.36	EVA (1994), Table 3-8
Coal Revenues - Million $, total	1,210.7	Calculated from above
Coal Industry Employment	9,383	V.E.C. (verbal)
Coal Industry Payroll - Million $	345.5	V.E.C. (verbal)
Coal Industry State and Local Taxes - Mil. $	36.0	Estimate based on EVA (1994), Table 3-8
Coal Industry St&L Taxes - as % of revenues	3.0%	Calculate from above
Coal Industry Investment - as % of revenues	6.6%	Rose(1994), VCA (1991) - average
Coal Distribution from Va. - Million tons	41.6	EVA (1994), Table 1-1
Trucking by Virginia Firms - Million tons	40.1	Estimated from above
Trucking Revenues -$ per Ton	1.27	EVA(1994), Table 3-8
Trucking Revenues - Million $, total	50.9	Calculated
Rail Revenues, In State - Million $	381.3	Calculated, based on VCCER (1992)
Rail Revenues, in SW Virginia - Million $	104.0	est. @ $2.50/ ton
Rail Investment - as % of revenues	16.0%	VCCER (1992)
Rail St&L Taxes - as % of revenues	3.2%	VCCER(1992)
Shipped from Hampton Roads - Million tons	13.7	EVA (1994) and U.S. EIA (Overseas exports plus NJ utility sales)
Hamp.Rds Shipping Revenues - $ per ton	2.50	Yochum and Agarwal (1994)
Hamp.Rds Shipping Revs - Million $, total	34.2	Calculated from above
Hamp.Rds. St&L taxes - as % of revenues	1.8%	Yochum and Agarwal (1994)
Mining Agency Employees in Southwestern Virginia (federal and state	304	Compiled by calling agencies

Multiplier Analysis to Estimate Economic Impacts

Economic impact "multipliers" were used to estimate the indirect and induced economic impacts, since it is impossible to measure those impacts directly. In some cases, direct impacts which could not be otherwise estimated were derived from the primary data in Table 1 using the multipliers. Most of the multipliers in the current analysis were derived from an IMPLAN input-output model which is based on a 1990 Virginia data set, but several were derived from other sources. The IMPLAN model was also used to generate a set of multipliers for use in estimating economic impacts within southwestern Virginia's coal-producing counties.

Although models such as IMPLAN can be tailored to reflect Virginia conditions, they rely on national-level data for many assumptions. Our method for using multipliers is to check and compare results to data

from other sources whenever possible and make adjustments where needed. Of the two input-output models that are most widely used for economic impact estimation (IMPLAN and RIMS), IMPLAN is generally considered to be more conservative.

Multipliers were used to estimate employment, personal income, and total income effects for several industry segments (Tables 2 and 3). The personal-income measure is equivalent to wage and salary payment effects, while the "total income" measure also includes income from non-payroll sources - such as rental payments, corporate profits, and dividend payments.

Standard procedures for conducting economic impact analyses using multipliers require that investment and taxation impacts be considered separately from primary industry impacts. The major reason for considering these factors separately is the fact that investment and tax payments can vary widely from firm to firm within the same industry; therefore, industry-wide multipliers are not intended to reflect the indirect and induced effects of these expenditures.

VEC data on coal employment and payroll were used as a basis for estimating the industry's economic impacts. Rose's multipliers, rather than IMPLAN, were used to analyze the coal industry's direct, indirect, and induced effects for several reasons. Most importantly, inspection of the IMPLAN multipliers showed that they do not appear to reflect Virginia conditions. For example, the IMPLAN coal industry multipliers indicate that $0.49 of every coal-industry revenue dollar is used to pay employees. The data in Table 1 clearly demonstrate that this figure is not correct.
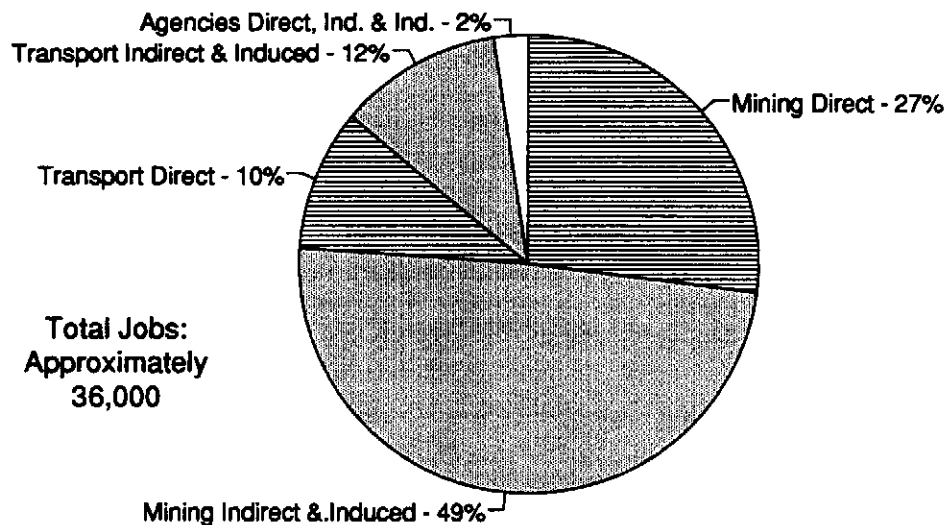
Rose did not conduct a total income analysis, so the total income effects of coal-mining and coal-industry investment expenses were estimated through an indirect application of IMPLAN. Considering the direct total income impacts of coal production, for example: The ratio of IMPLAN's total income and personal-income multipliers is 1.3844 for direct effects, and 1.4719 for direct, indirect, and induced effects. These factors were applied to the personal-income figures to obtain corresponding estimates of total income.

Rail and shipping multipliers were adjusted with reference to Yochum and Agarwal's study. Coal movement is much less labor-intensive than is movement of other commodities, and the IMPLAN multipliers reflect averages for all cargoes. The IMPLAN multipliers were adjusted downward, by a factor of 0.5 for rail transport and a factor of 0.4 for shipping (*i.e.*, our multipliers are 40 percent of the IMPLAN's "Water Transportation"), with reference to Yochum and Agarwal's results.

The results of this analysis indicate that, in total, the economic activity of coal mining has a considerable multiplier effect (Figure 2). For each person directly employed by the coal industry, "spinoff" effects (including transportation of its product) within the state employ another 2.8 people. For every dollar of industry wages, another two dollars of payroll income is generated in Virginia. Table 3 indicates that approximately 75 percent of the coal industry's employment and payroll impact are concentrated in southwestern Virginia's coal producing counties, while another 25 percent is located elsewhere in the state.

We believe that these estimates are conservative. Had we used the RIMS input-output model to estimate economic impacts, it is likely that the employment and payroll estimates generated would have been higher. RIMS is a widely used and accepted method of estimating economic impacts, as is IMPLAN.

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Figure 2:
Estimated Distribution of Jobs Supported by Mining
and In-State Transport of Virginia Coal

Agencies Direct, Ind. & Ind. - 2%

Transport Indirect & Induced - 12%

Transport Direct - 10%

Mining Direct - 27%

Total Jobs:
Approximately
36,000

Mining Indirect &.Induced - 49%

State and Local Taxes

Estimates of state and local tax payments supported by Virginia coal are summarized in Table 4.

Payments by the Coal Industry

Information from EVA (1994) forms the basis for these estimates. Reports of tax payments by VCA members were used to estimate industry-wide tax payments, assuming a constant ratio to production. The result is an estimate of $36 million in total state and local tax payments, or $0.93 per ton (Figure 3).

Payments by the Rail and Port Industries

These estimates are based on previous studies by VCCER (1992) and Yochum and Agarwal (1994). State and local tax payments, in each case, are estimated as a percentage of industry revenues. The result is a combined estimate of $12.7 million, or $0.33 for each ton of coal produced in Virginia in 1993.

Payments by Other Businesses

A variety of Virginia businesses are supported by the indirect and induced impacts of Virginia coal production, rail transportation, and the movement of Virginia coal through the Port of Hampton Roads. Yochum and Agarwal (1994, Appendix B) review the results of a 1981 study conducted by the Virginia Department of Economic Development (VDED) to estimate state and local tax payments by Virginia

**Figure 3: Estimate of State and Local Tax Payments by
Virginia Coal Industry, per Ton of Coal Produced**

Corporate Income
$0.05

Unemployment
$0.06

Property
$0.26

Severance
$0.55

Sales
$0.02

Total: $0.93
per ton
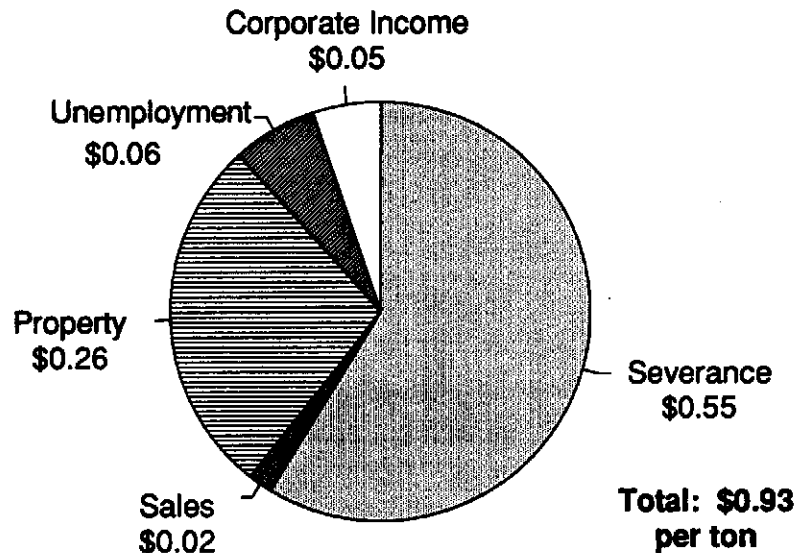
manufacturing industries. Yochum and Agarwal use this study as a basis for estimating tax payments by Port industries.

Yochum and Agarwal translated the 1981 study to 1991 dollars; the resulting $477.25 per employee is an estimate of "average" Virginia manufacturing firm state-and-local tax payment. They note that estimates based on this study's results are probably underestimated, since tax rates have increased over the intervening years. Some inaccuracy is inherent in application of a manufacturing industry study result to a broad base of business activities. However, the authors also note a lack of practical alternatives.

In order to obtain the $115.76 per employee estimate in Table 3, we made the following adjustments in the above figure:

1.   Excluded corporate income taxes, since they would be included within the "On Non-Payroll Income" category of tax payments estimated below.

2.   Excluded all but 14 percent of the machinery and tool taxes, to reflect the fact that only 14 percent of Virginia workers were employed in manufacturing in 1993.

3.   Updated the 1991 dollar figures to a 1993-dollar basis.

Virginia Employment Commission data for 1993 show that 20 percent of the jobs in VEC's 1993 data base (which excludes self-employed workers) were in the federal, state, and local government. Based on

TABLE 2. Estimating The Statewide Economic Impacts of Coal Mining.

	Employ-ment	Personal Income	Total Income	Notes on Multipliers
Coal Production				
Coal Employment	9383			
Coal Payroll		345.5		
Multipliers	2.51	1.97	*	from Rose (1994)
Direct			478.3	
Direct, Indirect, and Induced	23,542	679.3	999.1	
Coal Industry Investment	80.2	80.2		
Multipliers	26.12	0.60	*	from Rose (1994)
Direct, Indirect, Induced	2,095	48.1	107.6	
Coal Industry Taxes	36.0	36.0	36.0	IMPLAN Sector 512
Multipliers	22.45	0.60	1.04	"Other State and Local
Direct, Indirect. Induced	808	21.5	37.2	Government"
Trucking				
Trucking Revenues	50.9	50.9	50.9	IMPLAN Sector 435
Multipliers (Direct)	17.31	0.37	0.59	"Motor Freight,
Direct	881	18.6	30.0	Transportation ..."
				(SWVa)
Trucking Revenues	50.9	50.9	50.9	
Multipliers	36.69	0.81	1.07	IMPLAN Sector 435
Direct, Indirect, Induced	1,868	41.3	54.5	
Trucking Taxes (est. 3% revs)	1.5	1.5	1.5	
Multipliers	22.45	0.60	1.04	IMPLAN Sector 512
Direct, Indirect, Induced	34	0.9	1.6	
Trucking Investment:				est. at 5% of direct,
Direct, Indirect, Induced (est.)	93	2.1	2.7	indirect, induced
Rail Transport				
Rail Revenues	381	381	381	IMPLAN Sector 433
Multipliers	12.54	0.46	0.58	("Railroads"), adjusted w/ref
Direct, Indirect, Induced	4,782	174.9	219.4	to Yochum & Agarwal
Rail Investment	60.9	60.9	60.9	IMPLAN Sector 394
Multipliers	15.75	0.46	0.72	("Railroad Equipment")
Direct, Indirect, Induced	959	27.9	43.6	
Rail Taxes	12.1	12.1	12.1	IMPLAN Sector 512
Multipliers	22.45	0.60	1.04	
Direct, Indirect, Induced	272	7.3	12.5	

TABLE 2. Estimating The Statewide Economic Impacts of Coal Mining (cont'd).

	Employ-ment	Personal Income	Total Income	
H.R. Shipping				
Shipping Revenues	34.2	34.2	34.2	IMPLAN Sector 436
Multipliers	11.73	0.32	0.40	("Water Transportation"),
Direct, Indirect, Induced	402	10.9	13.7	w/ref to Yochum & Agarwal
Shipping Taxes	0.6	0.6	0.6	
Multipliers	22.45	0.60	1.04	IMPLAN Sector 512
Direct, Indirect, Induced	14	0.4	0.6	
Shipping Investment				est. at 10% of direct,
Direct, Indirect, Induced (est)	40	1.1	1.4	indirect, induced
Mining Agencies				
Agency Employment	304			IMPLAN Sectors 512 and 515
Multiplier	2.8	*	*	("Other federal government")
Direct, Indirect, Induced	841	19.7	25.8	averaged
Totals				
Coal Mining - Direct	9,383	345.5	478.3	
Coal Mining - Indirect & Induced	17,061	403.4	665.6	
Coal Mining - Total	26,444	748.9	1,143.9	
Trucking - Direct	881	18.6	30.0	
Trucking - Indirect & Induced	1,114	25.7	28.8	
Trucking - Total	1,996	44.3	58.8	
Rail - Direct, Indirect, Induced	6,013	210.1	275.6	
Shipping - Direct, Indirect, Induced	456	12.3	15.7	
Agencies - Direct, Indirect, Induced	841	19.7	25.8	
Total - Virginia	35,749	1,035.3	1,519.8	
Multiplier, vs. coal mining direct	3.8	3.0		

Notes:
1. All dollars in millions, 1993 basis.
2. Revenue-employment multipliers updated to 1993 basis using CPI.
3. *'s indicate estimates derived from IMPLAN multiplier ratios (see text).

TABLE 3. Estimating the Economic Impacts of Coal Mining in the Seven-County Mining Area of Southwestern Virginia.

	Employ-ment	Personal Income	Notes on Multipliers
Coal Production			
Coal Employment	9,383		
Coal Payroll		345.5	
Multipliers	2.15	1.72	Rose (1994), adjusted w/
Direct, Indirect, and Induced	20,171	594.8	ref to IMPLAN
Coal Industry Investment	80.2	80.2	
Multipliers	22.49	0.52	Rose (1994), adjusted w/
Direct, Indirect, Induced	1,804	41.8	ref. to IMPLAN
Coal Industry Taxes	36.0	36.0	IMPLAN Sector 512
Multipliers	17.24	0.39	("Other State and Local
Direct, Indirect. Induced	620	13.9	Government")
Trucking			
Trucking Revenues	50.9	50.9	IMPLAN Sector 435
Multipliers (Direct)	17.31	0.34	("Motor Freight,
Direct	881	17.5	Transportation ...")
Trucking Revenues	50.9	50.9	
Multipliers	34.62	0.66	IMPLAN Sector 435
Direct, Indirect, Induced	1763	33.4	
Trucking Taxes (est. 3% revs)	1.5	1.5	
Multipliers	17.24	0.39	IMPLAN Sector 512
Direct, Indirect, Induced	26	0.6	
Trucking Investment:			est. at 5% of direct,
Direct, Indirect, Induced (est.)	88	1.7	indirect, induced
Rail Transport			
Rail Revenues	104	104	IMPLAN Sector 433
Multipliers	12.01	0.36	("Railroads"), adjusted w/ref
Direct, Indirect, Induced	1,249	37.8	to Yochum & Agarwal
Rail Investment	60.9	60.9	IMPLAN Sector 394
Multipliers	7.87	0.23	("Railroad Equipment")
Direct, Indirect, Induced	480	14.0	(Statewide*0.5)
Rail Taxes	12.1	12.1	IMPLAN Sector 512
Multipliers	17.24	0.39	
Direct, Indirect, Induced	209	4.7	

TABLE 3. Estimating the Economic Impacts of Coal Mining in the Seven-County Mining Area of Southwestern Virginia (cont'd) .

	Employ-ment	Personal Income	Notes on Multipliers
Mining Agencies			
Agency Employment	304		IMPLAN Sectors 512 and 515
Multiplier	2.0	*	("Other federal gov't ...") avg'd
Direct, Indirect, Induced	613	13.8	Statewide*0.7
Totals			
Coal Mining - Direct	9,383	345.5	
Coal Mining - Indirect & Induced	13,212	305.1	
Coal Mining - Total	22,595	650.6	
Trucking - Direct	881	17.5	
Trucking - Indirect & Induced	996	18.1	
Trucking - Total	1,877	35.6	
Rail - Direct, Indirect, Induced	1,938	56.5	
Shipping - Direct, Indirect, Induced	0	0.0	
Agencies - Direct, Indirect, Induced	613	13.8	
Total - Southwest Virginia	**27,022**	**756.5**	
Ratio: SWVa to State	75.6%	73.1%	

Notes:
1. All dollars in millions, 1993 basis.
2. Revenue-employment multipliers updated to 1993 basis using CPI.
3. *'s indicate estimates derived from prior figures and IMPLAN multiplier ratios.

TABLE 4. Estimate of 1993 Virginia State and Local Tax Payments Supported by Virginia Coal.

By Coal Industry (EVA, 1994. Table 3-8)

	Payments Reported	Tonnage Base	Estimate - Total Payment
Severance	18,849,481	34,446,709	21,126,021
Property - Real	5,823,447	30,084,792	7,473,072
Property - Tangible Personal Property	2,137,106	33,487,731	2,463,805
State Sales & Use Tax	258,643	14,498,991	688,698
Unemployment	2,069,992	34,002,590	2,350,297
Corporate Income	780,327	16,151,635	1,865,203
Total			35,967,097
per ton			0.93

By Rail and Port Industries

	Factors	Estimated Payments
Rail Revenues	381,300,000	
State & Local Taxes @ 3.1% of Revenue		12,113,002
Shipping Revenues	34,240,000	
State & Local Taxes @ 1.8% of Revenue		616,320
Total		12,729,322
per ton		0.33

By Other Businesses

	Factors	Estimated Payments
Estimated number of coal-generated jobs (Table 2)	35,749	
Minus direct jobs in coal, rail, and port industries and government	(12,089)	
Remaining	23,660	
80 percent of above (jobs in "other businesses")	18,928	
Estimate of taxes (other than corporate income) paid by Virginia businesses, per employee (Yochum & Agarwal, p.78)	115.76	
Total		2,191,172
per ton		0.06

By Households - Income and Sales Taxes

		Factors	Estimated Payments
Statewide personal income generated by coal mining		1,035,323,732	
State Income Tax	Avg effective tax rate:	3.6%	37,271,654
State & Local Sales Tax	Est. as % of personal income	2.0%	20,706,475
Total			57,978,129
per ton			1.50

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TABLE 4. Estimate of 1993 Virginia state and local tax payments supported by Virginia coal (continued)

On Non-Payroll Income	Factors	Estimated Payments
Difference between total income and personal income, excluding direct effects of coal mining, rail, and port industries (Table 2)	340,679,494	
Assume state taxation at average rate:	5.5%	18,737,372
Royalty payments reported by EVA study participants	41,412,565	
Estimated royalties, full 38.6 million-ton Virginia production.	46,063,371	
Assume 50 % of royalties are taxed at 5.5 percent average rate.		1,266,743
Total		20,004,115
per ton		0.52

By Households - Real and Personal Property	Factors	Estimated Payments
Real Property Taxes in Southwestern Virginia		
Coal-supported personal income in southwestern Virginia (Table 3)	756,477,971	
Total Adjusted Gross Income, SWVa , in 1991 (VaDTax, Table 1.8)	1,727,530,908	
Ratio: 1993 SWVa personal income from coal to 1991 AGI	43.8%	
Total Real Property Tax Levies, 1992 (VaDTax, Table 5.4)	28,348,201	
Estimated percent real estate taxes paid by households	75%	
Payments of household real property tax levies supported by coal (est)		9,310,162
Tangible Personal Property Taxes in Southwestern Virginia:		
Ratio: 1993 SWVa personal income from coal to 1991 AGI	43.8%	
Total personal property tax levies, 1992 (VaDTax, Table 5.5)	11,089,844	
Portion of tangible personal property taxes levied on households (est.)	80%	
Payments of household personal property tax levies supported by coal (est.)		3,884,954
Real and Tangible Personal Property Taxes in the Rest of the State		
Coal-Generated Real & Tangible Personal Property Taxes in SWVa	13,195,116	
Ratio: SWVa "tax effort" to Virginia average (see text)	71.0%	
Proportion of Virginia coal-generated personal income received by SWVa residents (from Tables 2, 3 73.1%		
Coal-generated personal income ratio: rest of state to SWVa	36.9%	
Estimated coal-generated real and tangible personal property tax revenues in non-SWVa areas		6,851,521
Total		20,046,636
per ton		0.52

Total Estimated State and Local Taxes Supported by Virginia Coal		148,916,472
Total per ton		3.86

this fact, and the figures shown in Table 2, we estimate that approximately 18,000 private-sector jobs were supported by coal mining in 1993. Application of the $115.76 per employee estimate yields a total figure of $2.2 million, or $0.06 per ton.

This crude estimating method yields a figure which appears conservative and has a minor impact on the analysis.

By Households - Income and Sales Taxes

The personal-income total estimated in Table 2 ($1,035 million) forms the basis for these tax-payment estimates. The Virginia Department of Taxation 1993 Annual Report (Table 1.2) indicates that 1991 Virginia income-tax payments averaged 3.6 percent of adjusted gross income. Using the 3.6 percent average tax rate, 1993 income-tax payments generated by Virginia coal-supported payrolls were estimated to be $37.2 million.

Sales taxes generated by Virginia coal-supported payrolls are estimated at $20.7 million. This estimate was developed by assuming that 40 percent of an average Virginian's wage or salary is used to purchase items that will be subject to sales taxation at a 4.5 percent rate.

The result of these two calculations is an estimate of $1.50 in Virginia tax revenues generated per ton of coal produced.

Taxes on Non-Payroll Income

The difference between total income and personal income (Table 2) is termed "Non-Payroll Income" for the purpose of this analysis. Multiplier analysis indicates that, in 1993, nearly $500 million in non-payroll income was generated by coal and related industries.

In seeking to estimate the amount of taxes generated by this non-payroll income, we excluded the portion generated by the coal industry itself (estimated by multiplier analysis to be approximately $130 million) for several reasons. One is that the corporate income tax payments by the coal industry (Table 4) and the royalty payments listed below are components of this non-payroll income stream. Another is the Virginia coal industry's current financial difficulties, which would appear to indicate that profit expectations based on national trends would not be appropriate. We also eliminated another $11 million, which represents direct non-payroll income received by the rail and port industries, to eliminate the possibility of double counting.

After the above adjustments, approximately $340 million in non-payroll income remains. It should be emphasized that the "total income" measure does estimate income; this is not a revenue estimate. Our choice of a 5.5 percent average tax-rate estimator was based on several factors. The 1993 average corporate income-tax rate in Virginia was 5.45 percent, which is close to the average combined tax rate for wage and salary income (5.6 percent) estimated above. We expect that virtually all of the non-payroll income generated within the state will be subject to either individual or corporate taxation.

The VCA study participants reported making $41.4 million in royalty payments to coal owners during 1993. Assuming that royalties remain proportionate to production, an estimated $46.6 million in royalty payments were made by the entire Virginia coal industry in 1993. Unlike the "non-payroll income"

measure discussed above, some portion of the royalties received by coal owners will be counted as revenue. However, a substantial portion of the royalty payments go to individuals. To account for these factors and using logic similar to the above, we assumed that one-half of the royalty payments would be considered as income by individual or corporate tax payers, and that this income would be subject to an average 5.5 percent taxation rate.

By Households - Real and Tangible Personal Property

Coal mining income (including its indirect and induced effects) is also a basis for payments of real property and tangible personal-property taxes by individuals throughout the state. We estimated real property and tangible personal-property tax payments for southwestern Virginia residents supported by coal mining, and for residents of other parts of the state.

Personal income from the direct, indirect, and induced effects of coal mining (Table 3) constitute between 40 and 45 percent of the total adjusted gross income of all state income taxpayers in the seven-county coal-producing area. Based on discussions with parties familiar with southwestern Virginia's local government finances, we estimated that 75 percent of the real property tax payments and 80 percent of the tangible property tax payments are paid by households in southwestern Virginia localities. Using the above factors, it can be calculated that an estimated $13 million in southwestern Virginia real and tangible personal-property tax payments are generated by the direct, indirect, and induced economic impacts of Virginia coal.

The estimate of real and tangible personal-property tax payments by non-southwestern Virginia residents is based on the southwestern Virginia figure. The Virginia Commission on Local Government compiles annual estimates of "tax effort" by Virginia localities. Tax effort is defined as the "degree to which a particular county or city converts its revenue-generating potential into actual collections through imposition of taxes and such other funding instruments as service charges, license fees, and fines."

The analysis in Table 4 excludes coal severance tax effects from the "tax effort" figures, since these are unique to the coalfield counties. Excluding severance taxes, the tax effort in southwestern Virginia localities is approximately 71 percent of the state average. Using this "tax effort" ratio, the fact that 27 percent of the total personal income generated by coal mining is received by persons living in Virginia areas other than the coal-producing counties (Table 3), and the above southwestern Virginia figures, we estimated that approximately $7 million in 1993 real and tangible personal-property tax payments were based on coal-generated income received by Virginia residents residing outside of the seven coal-producing counties.

In total, approximately $20 million in 1993 real and tangible personal-property tax payments were made with income generated by Virginia coal.

Total

The result of the above analyses is a combined estimate of $149 million in state and local tax payments generated by Virginia coal in 1993, or $3.86 for each ton produced (Figure 4, Table 5). Because of its transportation impacts, each ton coal of shipped through Hampton Roads yields an estimated $4.43 in state and local tax revenues.

TABLE 5: Summary of Estimated In-State Economic Impacts of Virginia Coal (1993).

| Overall Estimates	Total Estimates ($ in Millions)	Tonnage-Based Estimates	
Employment:			
Statewide	35,749	926	jobs per
In Southwestern Virginia	27,022	700	million tons
Payroll:			
Statewide	1,035.3	26.8	million $ per
In southwestern Virginia	756.5	19.6	million tons
State and Local Tax Payments:			
By coal industry	36.0	0.93	$ per ton
By rail and port industries	12.7	0.33	
By other businesses	2.2	0.06	
By households - income and sales taxes	58.0	1.50	
By households - real & personal property	20.0	0.52	
On non-payroll income	20.0	0.52	
Total	148.9	3.86	

Estimates for Coal Shipped Through Hampton Roads

Employment		1,041	jobs per million tons
Payroll		30.7	million $ per million tons
State and Local Tax Payments		4.43	$ per ton

Notes:

1. "Southwestern Virginia" includes seven coal-producing counties (Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise) and the City of Norton.

2. Estimated corporate income tax payments by non-coal, non-rail, and non-port businesses ("other businesses") are included within the "On non-payroll income" category.

3. The information in this table is derived from Tables 2, 3, and 4.

Figure 4: Estimated State and Local Tax Payments
Generated by the Average Ton of Virginia Coal

Total: $3.86 per ton
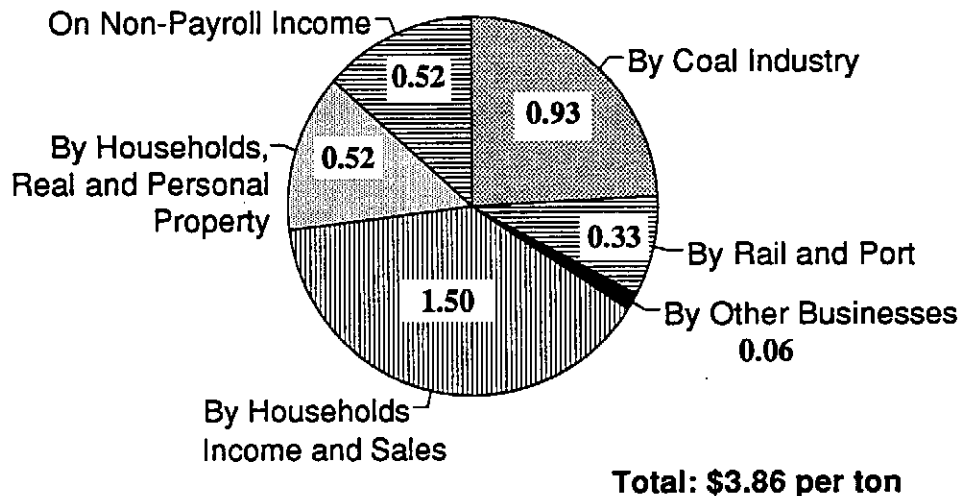
Appendix A estimates tax revenues generated by the "average" ton using an alternate method, which yields results comparable to Table 4.

Potential Coal Production Declines

If coal production continues its recent decline, Virginia will suffer economic losses; a full measure of those will be somewhat less than coal's current economic contributions.

Given the rising demand for U.S. coal, it is likely that economic activity associated with a decline in Virginia mining will be shifted to other states; virtually all of the employment and personal-income benefits associated with the decline in mining will be lost from Virginia. Some of the employment and personal-income benefits associated with in-state transport of lost Virginia production, however, will be retained when coal from other states is transported through Virginia to markets formerly served by in-state producers.

Declining Virginia coal production will affect state and local tax revenues. As production declines, taxes formerly paid directly from the "lost" production revenues (such as those taxes paid by the coal industry) will no longer be paid; taxes formerly paid directly from those transportation revenues that are lost from Virginia will be affected similarly. Tax payments by individuals, however, are a more complex issue. While some of the tax revenues formerly supported by coal (such as state income taxes formerly paid from lost wages) will no longer be paid in the event of a production decline, other taxes may not be affected. Real property taxes, for example, will continue to be assessed, regardless of the property owner's occupation.

The figures shown in Table 6 are estimates of the in-state fiscal impacts likely to occur if Virginia coal production continues to decline.

Jobs and Payroll Income Losses - Coal Industry

A decline in coal production would result in a loss of coal-mining jobs. If mine productivity remains at 1993 levels, losses of coal-mining jobs and payroll income would occur in direct proportion to the decline in production tonnage. The figures shown in Table 6 assume constant labor productivity, and are based on 1993 productivity levels.

Jobs and Payroll Income Losses - Coal Industry Support

If labor productivity and mine prices remain relatively constant, coal-industry-support job and payroll income losses would occur in direct proportion to production tonnage declines. The majority of these jobs are located in southwestern Virginia's coal-producing counties. This category includes the direct and induced impacts of coal production; and the direct, indirect, and induced impacts of coal trucking and the mining agencies.

Job and Payroll Income Losses - Rail, Port, and Supporting

In the event of a Virginia coal production decline, the majority of markets currently served by Virginia coal producers would continue to use coal. In some cases, transportation-related economic impacts would be retained within Virginia, if Virginia coal shipments were replaced by shipments from alternative coal suppliers.

Only one of the Virginia coal industry's current domestic markets would continue to generate considerable in-state rail traffic if served by non-Virginia producers: In-state electric power plants. Currently, traffic from Virginia mines to Virginia utilities generates approximately $45 million annually in rail revenues. Approximately two thirds of this total ($30 million) would be retained within Virginia if these markets were served by West Virginia or Kentucky producers. However, the $3-per-ton coal-tax credit available to Virginia utilities for purchase of Virginia coal reduces Virginia producers' vulnerability to the loss of in-state utility markets.

Coal traffic from Virginia mines to Hampton Roads is responsible for approximately $200 million in annual in-state rail revenues, close to 55 percent of the $380 million in-state rail revenue total (Table 1). If Virginia mines were to lose export markets to West Virginia or Kentucky producers, most of the in-state economic impacts currently generated by transportation of Virginia coal to and through the Port would be retained within Virginia. However, overseas coal suppliers also compete with Virginia producers for international markets; loss of export markets to foreign competitors would result in the complete loss of in-state transportation revenues.

The estimates in Table 6 were calculated assuming that 30 percent *pro-rata* proportion of the rail-transport and port-related revenues currently generated by Virginia coal, on average, would be retained within the state in the event of a Virginia coal production decline. The choice of the 30-percent figure is arbitrary; however, changing the estimate to 20 percent or 40 percent would not have a material effect on results.

TABLE 6. Estimated Impacts of Coal Production Decline.

Job and Payroll Income Losses	Per Million Tons of Lost Production	Comment
Coal Industry		
Job losses	243 jobs	See
Payroll income losses	$8.9 million	Note 1
Coal Industry Support		
Job losses	515 jobs	
Payroll income losses	$12.1 million	
Rail, Port, and Supporting		
Job losses:	117 jobs	See
Payroll income losses	$4.2 million	Note 2
Total		
Job losses	876 jobs	
Payroll income losses	$25.2 million	

Loss of State and Local Tax Revenues	Per Million Tons of Lost Production	
Loss of tax revenues	$3.29 million	

Loss of Return on CEDA Investment	Per Million Tons of Lost Production	
Estimated annual loss of local economic benefits created by CEDA	$0.21 million	

Increased Unemployment Compensation Expenditures by State	Per Benefit Claimant	See Note 3
Unemployment compensation - coal miners	$2,500	
Unemployment compensation - others (SWVa)	$1,750	
Unemployment compensation - Va. average	$1,977	

Increased Public Assistance Expenditures by State and Local Governments	Per Benefit Household	See Note 4
Aid for Dependent Children	$4,209	
Medicaid	$3,714	
Food stamps	$225	

Notes:

1. Job, payroll income, and tax revenue loss estimates are based on 1993 price and productivity levels, using 1993 dollars.

2. Rail, port, and supporting estimates assume 30 percent in-state revenue retention.

3. Increased unemployment compensation and public assistance expenditure estimates are based on Table 8.

4. Only a fraction of unemployed workers are expected to apply for public assistance. Food stamp estimate assumes 2.5 year duration.

State and Local Tax Revenues

In the event of a Virginia coal production decline, the loss of state and local tax revenues would be proportionate to the decline in production tonnage. The $3.37-per-ton estimate shown in Table 6 is based on the $3.86-per-ton state and local tax-revenue estimate shown in Table 4, with the following adjustments:

1. A portion of the tax revenues generated by the rail- and port-activity revenues would be retained within the state, if traffic from out-of-state mines to markets currently served by Virginia producers pass through the state. The tax-revenue estimates shown in Table 6 reflect a 30 percent *pro-rata* port transportation revenue retention factor, as discussed above.

2. Real property and tangible personal-property taxes: In some cases, real property and tangible personal-property taxes would continue to be paid, even if the property owners were to lose their jobs due to a decline in Virginia coal mining; the estimates shown in Table 6 assume that localities outside of southwestern Virginia would retain these revenues. However, a substantial decline in coal production would be likely to cause a loss of these revenues in southwestern Virginia localities, because few alternative sources of employment are available. The figures shown in Table 6 assume that 50 percent of the real and tangible personal-property tax revenues supported by coal would be lost to southwestern Virginia localities in the event of a coal production decline. Under these assumptions, coal production declines are estimated to cause losses of real and tangible personal-property tax revenue at the rate of $0.17 per ton.

Return on CEDA Investment

One eighth of all Virginia severance taxes are devoted to the Coalfield Economic Development Authority (CEDA), which reinvests these funds in economic development of the coalfield region. The impacts of these reinvested funds have not been thoroughly analyzed, but it is clear that CEDA expenditures are bringing a high return on investment. CEDA personnel state that, through mid-1994, $7.7 million in loans and $4.4 million in grants had been allocated to projects which currently employ over 3,900 people. Over $360 million in private funds have also been invested in projects where CEDA has had involvement.

A decline in Virginia coal production would result in a decline in severance-tax revenues available to CEDA and, hence, in CEDA investment. No firm basis for estimating these impacts in recent years is available. Randolph (1989) used several assumptions to estimate that CEDA investments bring a 3-to-1 return.

Increased Unemployment Compensation Expenses

Due to a lack of alternative employment opportunities, there is a high likelihood that coal miners who are involuntarily separated from their jobs will receive unemployment compensation. According to the Virginia Employment Commission, over 1,600 former coal miners filed initial claims for unemployment compensation during the first nine months of 1994. Because coal mining is a high-wage occupation, unemployed coal miners tend to draw benefits at high levels. The Table 6 figure is based upon a $200-per-month estimate for the average unemployment benefit that would be received by an unemployed coal miner.

TABLE 7. Details Regarding Potential Unemployment Compensation and Public Assistance Costs to the State.

Unemployment Compensation, Lenowisco PDC

Average benefit, all workers	$149.33	per week
Average duration, all workers	11.8	weeks
Exhaustion rate, all workers	35.7%	

Unemployment Compensation, Cumberland Plateau PDC:

Average benefit, all workers	$169.58	per week
Average duration, all workers	12.9	weeks
Exhaustion rate, all workers	39.0%	

Unemployment Compensation, Statewide

Average benefit, all workers	$163.28	per week
Average duration, all workers	12.1	weeks
Exhaustion rate, all workers	32.9%	

Aid For Dependent Children, Statewide

Average benefit, per individual:	$100.23	per month
Average case	2.6	individuals
Average duration	2.5	years
State share of benefit cost	50%	
State & local share of administrative costs	$120	per household, per year

Food Stamps, Statewide

Average benefit, per individual	$67.82	per month
Average household receiving benefits	2.36	individuals
State share of benefit cost	0%	
State & local share of administrative costs	$90	per household, per year

Medicaid, Statewide

Average benefit, per child	$75.51	per month
Average benefit, per adult	$122.58	per month
Average household receiving benefits	1	adult, plus
	1.6	children
Average duration	2.35	years
State share of benefit cost	50%	
State & local share of administrative costs	$120	per household, per year

Notes:

1. Unemployment compensation figures are averages for the first 11 months of 1994, calculated from figures provided by Virginia Employment Commission.

2. AFDC, food-stamp, and Medicaid figures are current averages. Benefit figures were provided by personnel at the Department of Social Services office in Richmond. Administrative costs are based on the FY 1994 budget of one southwestern Virginia county, and reflect only the cost of administering the programs within that county. For all three programs: administrative costs are split 50/30/20 among federal, state, and local funding.

The average duration, or the period over which an unemployed coal miner would be likely to draw unemployment benefits, was unavailable within the time frame of this study. The figure in Table 6 is based on an approximated average duration of unemployment compensation benefits for the Lenowisco and Cumberland Plateau Planning District Commission regions, all occupations, for the first 11 months of 1994 (Table 7).

Declining coal production will also cause employees of supporting industries to become unemployed, especially in the coalfield counties where few alternative employment opportunities are available. The supporting industry unemployment compensation levels are approximate estimates based upon a review of VEC unemployment compensation figures (all occupations) for the coalfield counties.

Increased Costs of Public Assistance

Declining coal production would be likely to cause an increase in requests for public assistance in southwestern Virginia counties, where alternative employment opportunities are limited. Parties with whom we discussed this issue agree that the public assistance programs most likely to be accessed by persons unable to find employment would be food stamps, Aid For Dependent Children (AFDC), and/or Medicaid. They also agree that a recently unemployed person would be most likely to exhaust their unemployment benefits prior to any application for such programs; in southwestern Virginia's coal producing counties, 35 to 40 percent of the persons who become eligible for unemployment compensation exhaust those benefits before finding alternative employment (Table 7).

However, we found no basis for estimating the percentage of unemployed southwestern Virginia residents who, having exhausted unemployment compensation eligibility, would be likely to apply for public assistance. Some of the parties we spoke to about this issue stated the opinion that it is "very likely" that a southwestern Virginia resident in this circumstance would apply for public assistance, while others suggested such persons would be more likely to move away from the southwestern Virginia area.

Outmigration

Given the lack of alternative employment opportunities, declining coal production would be likely to cause outmigration from the coal producing counties. A declining population can be expected to create fiscal difficulties for local governments seeking to provide public services for remaining residents.

Conclusion and Summary

In 1993, the Virginia coal industry employed over 9,000 people and supported a $340 million payroll. However, the coal industry's economic impacts go well beyond these figure. Economic activity directly associated with Virginia coal mining -- including that of coal-industry suppliers, firms supported by expenditures by coal industry employees, and the economic impacts of transportation of Virginia coal -- was responsible for an estimated 36,000 jobs and over $1 billion in personal income statewide. We estimate that between 40 and 45 percent of the wage and salary payments received by residents of the coal-producing counties are generated, either directly or indirectly, by coal mining and coal transportation.

Each ton of coal produced in Virginia generates over $3.50 in state and local tax revenues. A variety of techniques were used to estimate taxation effects. The largest proportion of the tax-revenue estimates come from those effects -- payments by the coal industry, and income and sales-tax payments by households -- which can be estimated most directly.

If Virginia coal production continues to decline, fiscal impacts on the state of Virginia will be substantial. Declining employment, payroll income, and tax collections will occur. These impacts will be most severe in the southwestern Virginia's coal mining counties, where unemployment levels are already high and alternative employment opportunities are limited.

This study was conducted within a short time frame, and with limited resources. Given greater time and resource availability, more detailed and sophisticated methods of analysis might have been utilized. Nonetheless, we are confident that these figures accurately represent the in-state economic impacts of Virginia coal, and the potential impacts of a production decline. The economic impact figures should be interpreted as estimates, not as precise quantities. We used conservative assumptions in generating these estimates.

Acknowledgements

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Appendix A:
Alternate Method for Estimating
Coal-Generated State and Local Tax Payments

Table 8 estimates coal-generated state and local tax payments using an alternate method derived from Yochum and Agarwal, Appendix B. The results of the alternate method (Table 8) are compared to Table 4 for the purpose of verifying that analysis.

Alternate Estimating Method

Because the Table 4 figure for coal-industry state and local tax payments is based on primary data, the alternate method estimates coal industry tax payments at $36 million for 1993, using logic identical to that of Table 4.

Yochum and Agarwal estimate personal taxes based on a 1992 study by the Federal Advisory Commission on Intergovernmental Relations. This study reported that state and local tax payments by Virginia citizens during the 1989-90 fiscal year represented 10.10 percent of personal income. Given that state income and sales tax rates do not vary between localities, and given the previously cited figures regarding "tax effort" in southwestern Virginia localities, the alternate method estimates state and local taxes at 9.1 percent of the coal-generated, personal-income total, or $95 million.

Based on the VDED study reviewed by Yochum and Agarwal (1994, Appendix B), the alternate method estimates corporate taxes paid by non-coal mining at $380.98 per employee. In contrast to the $115.76-per-employee "other business" tax payment estimate shown in Table 4, which is also derived from the VDED study, the $390.98 figure includes corporate income taxes. The employment estimates shown in Table 2 are calculated to determine that approximately 21,100 employees of non-coal businesses are supported by the indirect effects of coal mining and by coal transportation, yielding a total non-coal business tax payment estimate of $8 million.

Totaling the above, the alternate method yields a coal-generated state-and-local tax payment estimate of $139 million, or $3.59 per ton.

Comparison of Table 4 Result to Alternate Method

The $139 million state and local tax payment estimate shown in Table 8 (top) is slightly below the $149 million estimate shown in Table 4. A comparison of the various components of the two estimates is instructive. The lower half of Table 8 summarizes that comparison.

As discussed above, coal industry tax payments are estimated in identical fashion by Table 4 and the alternate method.

The Table 4 estimates of non-coal business-tax payments include taxes paid by rail and port industries ($12.7 million), taxes other than corporate income paid by "other businesses" ($2.2 million), and corporate income taxes paid by "other businesses" ($5 million). This final figure was derived in reference to the VDED study cited by Yochum and Agarwal, which estimated the "average" business payments of corporate income taxes at $262.15 (in 1991 dollars) per employee. Thus, $5 million of the $20 million in taxes paid on non-payroll income (Table 4) is estimated to consist of corporate income taxes. Thus,

approximately $20 million of the $149 million tax estimate shown in Table 4 would be paid by non-coal businesses.

Following the same line of logic, state and local tax payments by households can be estimated at $93 million. This figure includes income and sales taxes, real and tangible personal-property taxes, and the portion of the taxes on non-payroll income that was not included in the $5 million corporate income-tax estimate.

A comparison shows that the two estimates of tax payments by households are very similar. There is a $12 million disparity between the two estimates of state and local tax payments by non-coal businesses.

Analysis

Both methods yield rough estimates; neither is precise. The fact that the two estimates are fairly close leads to the conclusion that the "true" level of state and local tax payments generated per ton of coal produced lies between $3.50 and $4.00 per ton.

The two household-tax payment estimates are remarkably similar, given the approximate nature of the two estimating methods. The close agreement between the two figures should not be interpreted as suggesting an extraordinary level of precision.

A major point of difference between the non-coal business tax estimates occurs because tax payments by rail and port industries may not be "typical" of the "average" Virginia business. Both industries are equipment- and real-estate-intensive. Therefore, one would expect that total state and local tax payments by these industries, when expressed on a per-employee basis, would exceed such payments by the "average" Virginia business. As stated above, the per-employee business-tax estimates are based on a 1981 study of Virginia's manufacturing industry.

TABLE 8. Alternate Method of Estimating Virginia State and Local Tax Payments Generated by Virginia Coal: Comparison to Table 4 Estimate.

Alternate Method	Factor	($ million)	Comment
Tax Payments by the coal industry (Table 4)		36.0	
Tax Payments by Households			
Total personal income generated by coal (Table 2)	$1,035,000,000		
Estimated percent of personal income paid as Virginia state and local tax payments	9.1%		See note 2
Estimated tax payments		0.0	
Tax Payments by Non-Coal Businesses			
Estimated tax payments per employee	$380.98		See note 3
Est. non-coal, non-government employees	21,093		
Estimated tax payments		8.0	
Tax Payment Total - Alternate Method		44.0	
Tax Payments - Alternate Method, per ton	$1.14		

Tax Payment Estimates of Table 4

	Factor	($ million)	Comment
Tax Payments by the Coal Industry		36.0	
Tax Payments by Non-Coal Businesses			
By rail and port industries		12.7	
By other businesses		2.2	See note 4
On non-payroll income		5.0	See note 5
Total - By non-coal businesses		19.9	
Tax Payments by Households			
By households - income and sales taxes		58.0	
By households - real & personal property		20.0	
On non-payroll income		15.0	See note 6
Total - by households		93.1	
Tax Payment Total - Table 4		148.9	
Tax Payements - Table 4, per ton	$3.86		

Notes:

1. "Alternate Method" tax factors estimated from Yochum and Agarwal (1994, Appendix B)

2. Source estimates Virginia state and local taxes to be 10.10% of personal income, 10.10% factor was adjusted to reflect SWVa "tax effort" (see text).

3. Includes corporate income tax factor.

4. Excludes corporate income tax factor.

5. Includes corporate income taxes estimated at $262.15 per non-coal, non-rail, non-port, non-government employee.

6. Calculated as a residual.

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In-State Economic Impacts of the Virginia Coal Industry and Potential Coal Production Declines is Virginia Tech publication no. VT/176/0595/100/953844.