

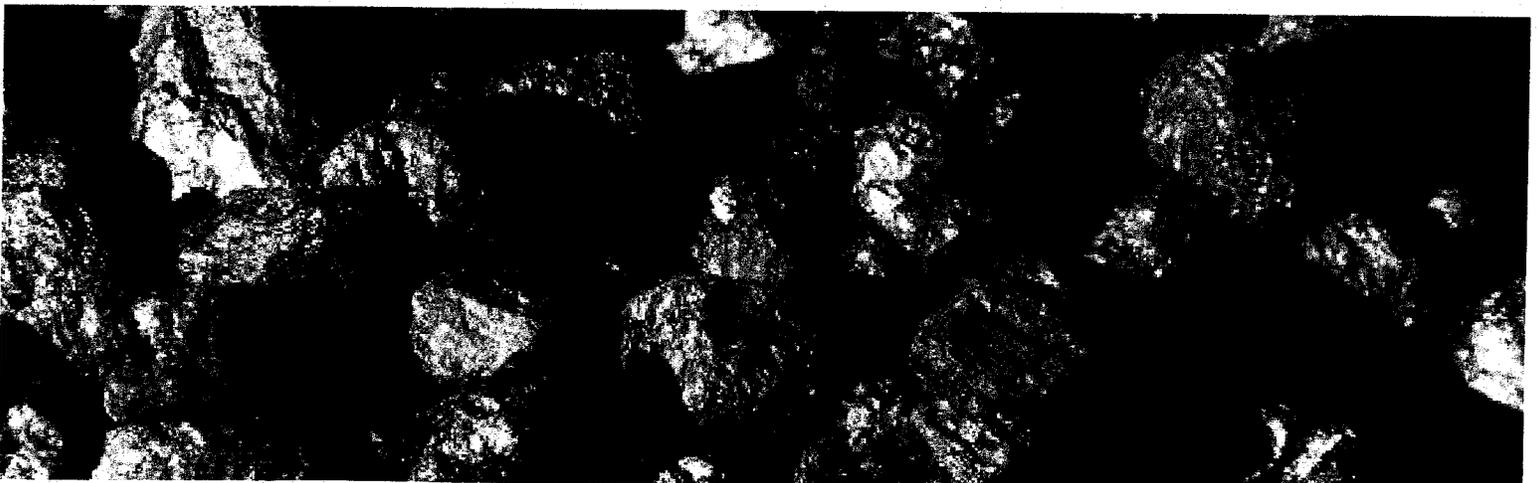


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The Impact of Otter Creek Coal Development on the Montana Economy



Bureau of Business
and Economic Research
The University of Montana
Missoula, MT 59812



SUMMARY

This is a study of the effects on the Montana economy of the development of Otter Creek coal in southeastern Montana. As described below, the Bureau of Business and Economic Research at The University of Montana, using a state-of-the-art policy analysis model and publicly available data describing the timing and type of investments involved, produced a detailed assessment that estimated the ultimate impact of coal development and operations, including the construction and operations of the railroad, on employment, income, output, and population in the Montana economy.

This study finds that as a result of Otter Creek coal development, the state economy is significantly larger, more prosperous, and more populous than would otherwise be the case. Specifically, we find that as a result of the development of the first of the three Otter Creek tracts, ultimately producing 20 million tons of coal, that:

- 2,648 jobs would be created during the peak year of the construction phase as the mine facilities and the railroad are built, with most new jobs created in eastern Montana;

- The impacts on income received by Montana households would be similarly substantial. \$103.5 million of new personal income, and \$87.7 million in after-tax income, would occur during the peak construction year statewide. In eastern Montana, total household earnings would increase more than 6 percent;
- As a result of the continuing operations of the mine, 1,740 new permanent, year-round jobs would be created in the Montana economy, increasing household income by \$125.4 million per year;
- Job increases would occur across a wide spectrum of industries, and, largely due to rail operations, in most regions of the state;
- Overall state population would be more than 2,800 higher, and school-aged population more than 560 higher, due to the operations of the mine.
- Mine operations would increase state and local tax revenue by more than \$91.6 million per year, due to both coal specific taxes as well as growth in the overall base for Montana's other taxes.

Impacts Summary

Category	Impacts by Phase	
	Construction	Operations
Total Employment	2,648 Jobs	1,740 Jobs
Private Sector	2,372 Jobs	1,338 Jobs
Personal Income	\$103.5 mill.	\$125.4 mill.
Disposable Personal Income	\$87.7 mill.	\$167.9 mill.
Population	1,025 people	2,843 people
State tax revenues (\$ millions)	\$23.5 mill.	\$91.6 mill.

BACKGROUND AND OVERVIEW

The Bureau of Business and Economic Research at The University of Montana (BBER) contracted with the Montana Contractors' Association to conduct an empirical study of how the development of the Otter Creek coal tracts in southeastern Montana would impact the economy of the state. Specifically, the BBER was tasked with (i) developing and detailing a scenario of coal development in Otter Creek, including land preparation, building, and other infrastructure preparation, and transportation improvements, including rail, (ii) developing a scenario of ongoing coal production from a new mine that reflected the capacity of the tracts, the likely limitations of a mining permit, and the conditions of the global coal marketplace, and (iii) incorporating these scenarios into an economic impact model which would fully describe how the state economy (and its subregions) would evolve should these events take place. This report presents the findings of this analysis.

This study asks and answers a simple question: How would be economies of Montana and its sub-regions react if Otter Creek

coal development takes place? To address this question, we construct two future economic scenarios – a baseline, no development scenario and a coal development scenario. The difference between these two alternative futures – in the number of jobs, the dollars of income, and the number of people who live in Montana -- is the ultimate impact of the development of coal.

The coal development scenario incorporated into this study was independently developed by the BBER using publicly available information from public filings, historical data, and the information available on other mining projects. The scenario is broadly consistent with the expected scale of the project and what is economically and operationally feasible. Thus the results reported here are representative of how the investments and operations associated with the coal (and railroad) development will affect statewide growth.

RESEARCH OVERVIEW

The core question posed by this study is: What would the Montana economy look like if Otter Creek coal development takes place? The question essentially involves analyzing two different futures for the Montana economy: the status quo, no-investment scenario where development does not occur and a coal development scenario which includes mining, transportation, and other associated infrastructure. The latter represents a stimulus which can set off other actions and reactions in the economy.

There are three essential components to estimating the ultimate impact of new investment. These are:

- the *direct impact* (e.g., spending) the investment itself represents,
- the *indirect impacts*, which are the spending of other entities (e.g., the railroad) which are carried out by others because of the original investments, and
- the *induced impacts* that occur as the spending represented by the direct and indirect impacts propagates through the economy.

Likewise there are two different stages of any project involving significant infrastructure development:

- the *permitting and construction phase* - a one-time boost in spending and investment to plan and build infrastructure, facilities and buildings that occurs in the beginning of a project, and
- the *operations phase* - commencing when construction is complete and ongoing operations can begin. The operations phase continues for the life of the project.

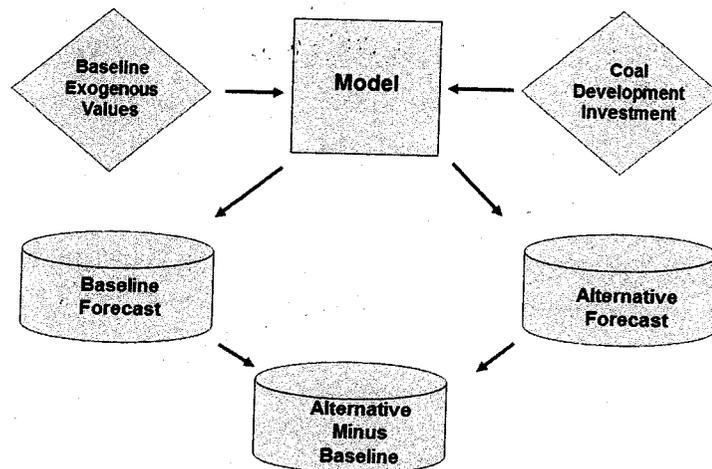
Although the precise timetable and scale of the investments that could take place as part of development of the Otter Creek coal tracts are not yet known, reasonable scenarios can be constructed based on development of similar coal seams elsewhere. This study has carefully constructed a development scenario that faithfully represents the major investments that would have to take place to develop and produce Otter Creek coal. The induced impacts, which take place as wage, vendor, and other payments are captured by Montana businesses and

RESEARCH OVERVIEW

households and are spent again in the state and local economies, are estimated using BBER's five-region economic impact model.

To quantify the impacts of events that influence the Montana economy, the BBER uses a mathematical model of the regional economy leased from Regional Economic Models, Inc. (REMI). The fundamental premise of the REMI model is that regions compete for investment, jobs, and people. Thus, when new events occur which change the competitiveness of one particular region – such as construction and development of mining operations – investment, employment, and demographic flows in and out of the region can be affected, ultimately producing new levels of economic activities. The model thus produces impact estimates by examining the economy before and after these new events take place.

The total contribution of Otter Creek development to the economy is the difference between these two scenarios, as shown diagrammatically in the figure below. The model is a means of



estimating the economy's new "resting point," which includes the changes in investment, employment, and spending that are induced by the project.

DIRECT AND INDIRECT ECONOMIC CONTRIBUTION OF OTTER CREEK COAL

The first step in the analysis is to specify the timing and the extent of spending by Arch Coal on developing the mine. Before a shovel full of Otter Creek coal can be mined, a number of regulatory, engineering, and logistical tasks must be carried out. The construction of all of the infrastructure of the mine, including land preparation, road, rail, and power distribution construction, equipment acquisition, construction of buildings and on-site processing facilities, and, finally, the excavation of the initial overburden, will take approximately two years at a cost of about \$600 million.

It is anticipated that when construction is completed that the Otter Creek mine will produce 20 million tons of coal annually, with approximately 300 full-time employees, plus an additional 50 contractors. We expect that the mine mouth value of this coal will be \$14 per ton. We anticipate that the dominant market for this coal will be Asia, with coal shipped by rail to the (new and existing) Pacific Northwest coal ports. Significant domestic customers are expected as well.

The development of the railroad represents by far the most significant indirect impact of mine development. While transporting coal by truck is possible, the economic competitiveness of the mine depends critically on access to the rail transportation network. Coincident with mine construction, we envision a new 89-mile rail spur north to connect to the main BNSF line near Miles City at a cost of about \$472 million. When operational, new and existing rail links – including those owned by both BNSF and Montana Rail Link (MRL) – within Montana will see approximately \$340 million in new demand for rail transportation services due to mining operations.

The timing of these investments is subject to a number of contingencies that are hard to predict in advance. We have developed estimates of economic impact based upon a scenario that calls for both railroad and mine construction to commence in year 2015. Coal production begins in 2017, ramping up to full production by year 2019. Unanticipated delays will affect the timing, but not the magnitude, of the economic impacts.

ECONOMIC IMPACT OF OTTER CREEK COAL

The Impact of Otter Creek
Coal Development on the
Montana Economy

The substantial amount of spending and production occurring in both the construction and operations phases of this project represents a tremendous new injection of revenue and income for Montana businesses and households. This sets off new investment, employment and demographic flows as secondary jobs and income are created. The investment ultimately produces a new level of economic activity with jobs and incomes affected across the spectrum of the economy. The difference between this new level of activity and the status quo projection represents the total economic impact of Otter Creek coal.

We can measure how Otter Creek direct and indirect impacts propagate through the Montana economy with the REMI model. Comparing the trajectory of the economy with and without coal development yields an estimate of the impact of Otter Creek over the next 20 years. As can be seen from the employment impacts graphed below, with the tremendous activity in the construction phase of the project, the impacts of the project in the beginning of the project are outsized, especially in the eastern Montana region. When the construction is complete and mining operations commence, the job impacts remain significant, growing slightly over the span of the next two decades.

Since the investment and spending patterns in the construction and operations phases of the project are distinct, we present the findings of the analysis for the two phases separately. In the discussion that follows, we define the construction phase impacts as the total impacts that occur in year 2016, the peak year. The operations impacts are defined as the impacts occurring in year 2019, when all construction impacts are finished. All dollar figures are inflation-corrected, expressed in terms of 2012 dollars.

Employment Impacts

The wide footprint of the mine's economic impacts can be seen very clearly from the distribution of new jobs by industry, shown in the table below. As would be expected, the majority of jobs in the construction phase are construction industry jobs, and in the operations phase a large number of new mining jobs are created. But in each phase there are significant ripple effects on other sectors of the economy. These include retail trade, health care, accommodations and food, and local government. The increases come about through a variety of mechanisms – some industries benefit directly from worker spending, some are due to other busi-

Employment Impacts

Industry	Job Impacts by Phase	
	Construction	Operations
Forestry, Fishing, Related Activities, and Other	0	0
Mining	(3)	346
Utilities	0	6
Construction	1,948	79
Manufacturing	4	3
Wholesale Trade	41	66
Retail Trade	129	235
Transportation and Warehousing	0	51
Information	1	3
Finance and Insurance	2	7
Real Estate and Rental and Leasing	12	45
Professional and Technical Services	30	44
Management of Companies and Enterprises	0	0
Administrative and Waste Services	25	43
Educational Services	1	7
Health Care and Social Assistance	69	165
Arts, Entertainment, and Recreation	5	20
Accommodation and Food Services	54	116
Other Services, except Public Administration	54	103
State Government	37	71
Local Government	240	331
TOTAL	2,648	1,740

nesses related through the supply chain, still others come about because of population increases as people migrate to the state due because of the new jobs.

The analysis shows that mine and other associated construction supports almost 2,650 new jobs statewide, and that mine operations creates more than 1,700 new permanent jobs in the Montana economy.

ECONOMIC IMPACT OF OTTER CREEK COAL

The Impact of Otter Creek
Coal Development on the
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Income Impacts

The impacts on Montanan's personal income as a result of Otter Creek coal investment stem from three separate mechanisms. First, income is created – both wage and salary income, as well as business proprietor income – as the new jobs described above are created. Secondly, as population increases due to increased Montana job opportunities, the total income of the state increases. The final way in which Otter Creek coal impacts after-tax income of Montanans has to do with the substantial tax revenues paid by the mine. How these revenues would be dealt with by the Legislature is unknown. The conservative assumption made in this study is that the increased revenues allow the Legislature to fund the same amount of services with lower tax rates. These lower rates increase the after-tax income of Montana households.

As shown in the table below, the personal income impacts of Otter Creek development are substantial – amounting to \$103.5 million in the construction phase and \$125.4 million in permanent increases during mine operation. For the reasons discussed above, the increase in after-tax income during coal operations exceeds the pre-tax increase, amounting to a \$167.9 million increase in Montana household purchasing power every year the mine is in operation.

Other Impacts

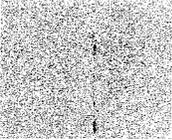
Mine operations, as well as construction, also have other significant impacts on the Montana economy, including:

- significant increases in population, in both eastern Montana as well as the entire state, as workers migrate into the state and region in pursuit of economic opportunities;
- an increase in the school-aged population as younger workers bring their young (or yet to be born children) into the state;
- increases in local government, primarily in local public schools, in response to population changes caused by the mine development and operation;
- increases in state and local tax revenues due to both (i) severance and other special taxes levied on coal, and (ii) an increase in the base of Montana's other major taxes.

Personal Income Impact, \$ Millions

Category	Income Impacts by Phase	
	Construction	Operations
Total Earnings by Place of Work	123.0	119.4
Total Wage and Salary Disbursements	81.9	88.1
Supplements to Wages and Salaries	21.0	25.5
Employer contributions for employee pension and insurance funds	13.5	16.3
Employer contributions for government social insurance	7.5	9.2
Proprietors' income with inventory valuation and capital consumption adjustments	20.2	5.8
Less: Contributions for government social insurance	15.8	18.3
Employee and self-employed contributions for government social insurance	8.3	9.1
Employer contributions for government social insurance	7.5	9.2
Plus: Adjustment for residence	-1.7	-1.2
Gross In	2.2	2.1
Gross Out	3.9	3.3
Equals: Net earnings by place of residence	105.6	99.9
Plus: Rent, Interest, and Dividends	5.8	19.0
Plus: Personal current transfer receipts	-7.8	6.6
Equals: Personal Income	103.5	125.4
Less: Personal current taxes	15.7	-42.4
Equals: Disposable personal income	87.7	167.9

* Total earnings data are derived from records of employers who are located in Montana. Since some Montana workers are employed by out-of-state firms, and some Montana firms employ workers from other states, the adjustment for residence nets out these two impacts to produce an estimate of Montana residents' income.



SUMMARY AND CONCLUSION

Through an analysis of the direct, indirect, and induced economic activity surrounding the development of Otter Creek coal, we find that the total economic contribution such an activity would make to the state economy to be substantial. The construction of the mine, the new railroad construction, and the other associated infrastructure represents a total investment approaching \$1 billion

and is expected to create almost 2,000 construction jobs in the peak building year. The operations of the mine are expected to create more than 1,700 permanent jobs in the Montana economy and add almost \$168 million in after-tax income. Those jobs would benefit all regions of the state as well as a broad spectrum of public and private sector businesses.



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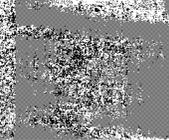
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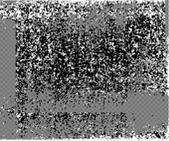
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RESEARCH OVERVIEW

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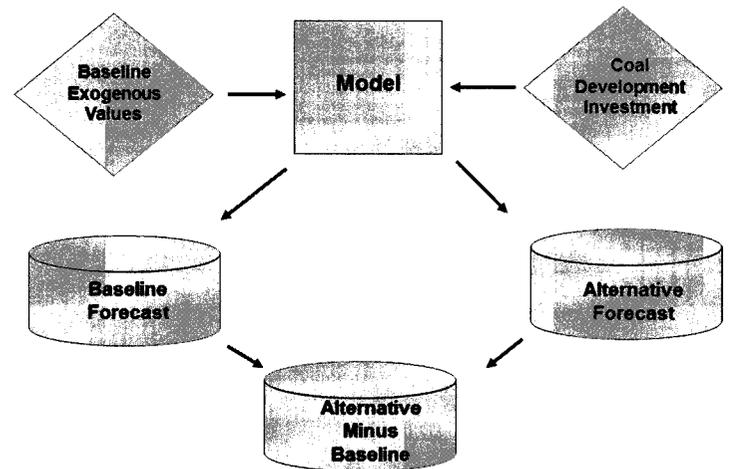
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RESEARCH OVERVIEW

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estimating the economy's new "resting point," which includes the changes in investment, employment, and spending that are induced by the project.

DIRECT AND INDIRECT ECONOMIC CONTRIBUTION OF OTTER CREEK COAL

The first step in the analysis is to specify the timing and the extent of spending by Arch Coal on developing the mine. Before a shovel full of Otter Creek coal can be mined, a number of regulatory, engineering, and logistical tasks must be carried out. The construction of all of the infrastructure of the mine, including land preparation, road, rail, and power distribution construction, equipment acquisition, construction of buildings and on-site processing facilities, and, finally, the excavation of the initial overburden, will take approximately two years at a cost of about \$600 million.

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The development of the railroad represents by far the most significant indirect impact of mine development. While transporting coal by truck is possible, the economic competitiveness of the mine depends critically on access to the rail transportation network. Coincident with mine construction, we envision a new 89-mile rail spur north to connect to the main BNSF line near Miles City at a cost of about \$472 million. When operational, new and existing rail links – including those owned by both BNSF and Montana Rail Link (MRL) – within Montana will see approximately \$340 million in new demand for rail transportation services due to mining operations.

The timing of these investments is subject to a number of contingencies that are hard to predict in advance. We have developed estimates of economic impact based upon a scenario that calls for both railroad and mine construction to commence in year 2015. Coal production begins in 2017, ramping up to full production by year 2019. Unanticipated delays will affect the timing, but not the magnitude, of the economic impacts.

ECONOMIC IMPACT OF OTTER CREEK COAL

The substantial amount of spending and production occurring in both the construction and operations phases of this project represents a tremendous new injection of revenue and income for Montana businesses and households. This sets off new investment, employment and demographic flows as secondary jobs and income are created. The investment ultimately produces a new level of economic activity with jobs and incomes affected across the spectrum of the economy. The difference between this new level of activity and the status quo projection represents the total economic impact of Otter Creek coal.

We can measure how Otter Creek direct and indirect impacts propagate through the Montana economy with the REMI model. Comparing the trajectory of the economy with and without coal development yields an estimate of the impact of Otter Creek over the next 20 years. As can be seen from the employment impacts graphed below, with the tremendous activity in the construction phase of the project, the impacts of the project in the beginning of the project are outsized, especially in the eastern Montana region. When the construction is complete and mining operations commence, the job impacts remain significant, growing slightly over the span of the next two decades.

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Employment Impacts

The wide footprint of the mine's economic impacts can be seen very clearly from the distribution of new jobs by industry, shown in the table below. As would be expected, the majority of jobs in the construction phase are construction industry jobs, and in the operations phase a large number of new mining jobs are created. But in each phase there are significant ripple effects on other sectors of the economy. These include retail trade, health care, accommodations and food, and local government. The increases come about through a variety of mechanisms – some industries benefit directly from worker spending, some are due to other busi-

Employment Impacts

Industry	Job Impacts by Phase	
	Construction	Operations
Forestry, Fishing, Related Activities, and Other	0	0
Mining	(3)	346
Utilities	0	6
Construction	1,948	79
Manufacturing	4	3
Wholesale Trade	41	66
Retail Trade	129	235
Transportation and Warehousing	0	51
Information	1	3
Finance and Insurance	2	7
Real Estate and Rental and Leasing	12	45
Professional and Technical Services	30	44
Management of Companies and Enterprises	0	0
Administrative and Waste Services	25	43
Educational Services	1	7
Health Care and Social Assistance	69	165
Arts, Entertainment, and Recreation	5	20
Accommodation and Food Services	54	116
Other Services, except Public Administration	54	103
State Government	37	71
Local Government	240	331
TOTAL	2,648	1,740

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The analysis shows that mine and other associated construction supports almost 2,650 new jobs statewide, and that mine operations creates more than 1,700 new permanent jobs in the Montana economy.

ECONOMIC IMPACT OF OTTER CREEK COAL

Income Impacts

The impacts on Montanan's personal income as a result of Otter Creek coal investment stem from three separate mechanisms. First, income is created – both wage and salary income, as well as business proprietor income – as the new jobs described above are created. Secondly, as population increases due to increased Montana job opportunities, the total income of the state increases. The final way in which Otter Creek coal impacts after-tax income of Montanans has to do with the substantial tax revenues paid by the mine. How these revenues would be dealt with by the Legislature is unknown. The conservative assumption made in this study is that the increased revenues allow the Legislature to fund the same amount of services with lower tax rates. These lower rates increase the after-tax income of Montana households.

As shown in the table below, the personal income impacts of Otter Creek development are substantial – amounting to \$103.5 million in the construction phase and \$125.4 million in permanent increases during mine operation. For the reasons discussed above, the increase in after-tax income during coal operations exceeds the pre-tax increase, amounting to a \$167.9 million increase in Montana household purchasing power every year the mine is in operation.

Other Impacts

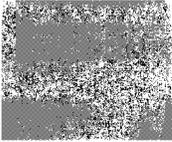
Mine operations, as well as construction, also have other significant impacts on the Montana economy, including:

- significant increases in population, in both eastern Montana as well as the entire state, as workers migrate into the state and region in pursuit of economic opportunities;
- an increase in the school-aged population as younger workers bring their young (or yet to be born children) into the state;
- increases in local government, primarily in local public schools, in response to population changes caused by the mine development and operation;
- increases in state and local tax revenues due to both (i) severance and other special taxes levied on coal, and (ii) an increase in the base of Montana's other major taxes.

Personal Income Impact, \$ Millions

Category	Income Impacts by Phase	
	Construction	Operations
Total Earnings by Place of Work	123.0	119.4
Total Wage and Salary Disbursements	81.9	88.1
Supplements to Wages and Salaries	21.0	25.5
Employer contributions for employee pension and insurance funds	13.5	16.3
Employer contributions for government social insurance	7.5	9.2
Proprietors' income with inventory valuation and capital consumption adjustments	20.2	5.8
Less: Contributions for government social insurance	15.8	18.3
Employee and self-employed contributions for government social insurance	8.3	9.1
Employer contributions for government social insurance	7.5	9.2
Plus: Adjustment for residence	-1.7	-1.2
Gross In	2.2	2.1
Gross Out	3.9	3.3
Equals: Net earnings by place of residence	105.6	99.9
Plus: Rent, Interest, and Dividends	5.8	19.0
Plus: Personal current transfer receipts	-7.8	6.6
Equals: Personal Income	103.5	125.4
Less: Personal current taxes	15.7	-42.4
Equals: Disposable personal income	87.7	167.9

* Total earnings data are derived from records of employers who are located in Montana. Since some Montana workers are employed by out-of-state firms, and some Montana firms employ workers from other states, the adjustment for residence nets out these two impacts to produce an estimate of Montana residents' income.



SUMMARY AND CONCLUSION

Montana Department of
Recreation and Parks
Division of Parks



Through an analysis of the direct, indirect, and induced economic activity surrounding the development of Otter Creek coal, we find that the total economic contribution such an activity would make to the state economy to be substantial. The construction of the mine, the new railroad construction, and the other associated infrastructure represents a total investment approaching \$1 billion

and is expected to create almost 2,000 construction jobs in the peak building year. The operations of the mine are expected to create more than 1,700 permanent jobs in the Montana economy and add almost \$168 million in after-tax income. Those jobs would benefit all regions of the state as well as a broad spectrum of public and private sector businesses.