Labovitz School
OF BUSINESS AND ECONOMICS
Bureau of Business and
Economic Research

Research Report

The Economic Impact of Ferrous and Non-Ferrous Mining On the State of Minnesota And on the Arrowhead Region and Douglas County, WI

March 2009

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For

MINNESOTA DEPARTMENT OF EMPLOYMENT AND ECONOMIC DEVELOPMENT

MINNESOTA POWER

NATURAL RESOURCES RESEARCH INSTITUTE, UNIVERSITY OF MINNESOTA

IRON RANGE RESOURCES

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The Economic Impact of Ferrous and Non-Ferrous Mining on the State of Minnesota, and on the Arrowhead Region and Douglas County, WI

Executive Summary

The University of Minnesota Duluth Labovitz School of Business and Economics' research bureau, the Bureau of Business and Economic Research (BBER), was asked to study and report the direct, indirect, and induced economic impacts of construction and operations activities of ferrous and non-ferrous mining in Northeast Minnesota, measured in employment, output, and value added. (This report defines impact terminology in Section II—Impact Procedures and Input Assumptions.) IMPLAN Version 2 software and data are used for the impact modeling. The study areas for the impact were designated as the State of Minnesota, and the counties of the Arrowhead Region and Douglas County, Wisconsin.

BBER also studied Minnesota's ferrous and non-ferrous mineral revenue collected as taxes, royalties, and fees, and distributed in Minnesota. BBER was also was asked to report a description of the Northeast Minnesota mining industries in terms of a global mining context, and to study suppliers to the mining industries in Northeast Minnesota.

All "ferrous" modeling in this analysis uses iron ore mining to represent Minnesota ferrous mining; all "non-ferrous" modeling in this analysis uses copper, nickel, lead, and zinc mining to represent Minnesota non-ferrous mining.* Also, the following mining impacts do not include other IMPLAN sectors classified as mining and described as "Stone mining and quarrying," and "Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying."

In this report, ferrous mining activities are referred to as "Iron ore mining," following the IMPLAN industry description. In the same way, non-ferrous mining activities are referred to as "Copper, nickel, lead, and zinc mining." Although lead and zinc mining are not significant in Minnesota, this model sector captures the copper and nickel impacts which are significant. The activities of the non-ferrous IMPLAN sector follows the NAICS definition for this industry and includes establishments primarily engaged in developing the mine site, mining, and preparing and concentrating ores valued chiefly for their copper, nickel, lead, or zinc content.

The most recent IMPLAN data available is for the year 2007. (IMPLAN data uses various federal sources, and inputs to the modeling were provided by industry representatives, as described in the report.) A baseline model for mining operations in 2007 was created to show the impact of current ferrous and non-ferrous mining in the State and region. Further models were built to estimate the additional impact of proposed expansions to current operations as well as the impact of new projects. (All impacts are reported in 2007 dollars.)

* Inputs for the non-ferrous group projects were gathered from industry representatives from Duluth Metals, Encampment Minerals, Franconia, Kennecott, PolyMet, and Teck-Cominco.

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- **What are the key results from this impact study?**

The results of the impact study, totaling expansions and new projects in addition to all on-going operations in Minnesota, for ferrous and non-ferrous mining, are as follows.

Ferrous and Non-ferrous Operations Impacts on Minnesota, Baseline 2007, and Proposed Expansions and New Projects, in 2007 Dollars†

			Minnesota			
Source: IMPLAN, BBER			*Direct*	*Indirect*	*Induced*	*Total*
1)	**MN 2007 Ferrous (Baseline)**	Value Added	$927,154,752	$362,400,042	$240,155,466	$1,529,710,260
		Output	$2,043,372,032	$700,498,753	$425,716,545	$3,169,587,330
		Employment	3,621	2,939	3,633	10,193
2)	**MN 2007 Non-ferrous (Baseline)**	Value Added	$182,172,848	$39,805,440	$35,294,635	$257,272,923
		Output	$271,453,664	$64,880,211	$62,565,734	$398,899,609
		Employment	531	342	534	1,407
3)	**Ferrous Expansions and New Projects**	Value Added	$839,794,322	$328,253,181	$217,527,005	$1,385,574,508
		Output	$1,850,704,140	$634,494,811	$385,603,735	$2,870,802,686
		Employment	1,216	987	1,219	3,422
4)	**Non-Ferrous New Projects**	Value Added	$1,048,543,824	$229,110,688	$203,147,559	$1,480,802,071
		Output	$1,562,423,032	$373,435,136	$360,113,549	$2,295,971,717
		Employment	2,115	1,361	2,127	5,602
5)	**Total Ferrous (Expansions, New Projects, and 2007 Baseline Operations)**	Value Added	$1,766,949,074	$690,653,223	$457,682,471	$2,915,284,768
		Output	$3,894,076,172	$1,334,993,564	$811,320,280	$6,040,390,016
		Employment	4,837	3,926	4,852	13,615
6)	**Total Non-ferrous (New Projects and 2007 Baseline Operations)**	Value Added	$1,230,716,672	$268,916,128	$238,442,194	$1,738,074,994
		Output	$1,833,876,696	$438,315,347	$422,679,283	$2,694,871,326
		Employment	2,646	1,702	2,661	7,009
7)	**Total Ferrous and Non-ferrous (Expansions, New Projects, and 2007 Baseline Operations)**	Value Added	$2,997,665,746	$959,569,351	$696,124,665	$4,653,359,762
		Output	$5,727,952,868	$1,773,308,911	$1,233,999,563	$8,735,261,342
		Employment	7,483	5,628	7,513	20,624

The above table shows that total economic impacts, from the largest possible increase in ferrous and non-ferrous mining production for the State of Minnesota, is a Value Added total of more than $4.6 billion, an Output total of more than $8.7 billion, and an Employment total of more than 20,600 jobs.

† Definitions for interpreting this table are as follows.

Three measures: **Value Added**–A measure of the impacting industry's contribution to the local community in wages, rents, interest, and profits; **Output**–Represents the value of local production required to sustain activities; **Employment**–Estimates are in terms of full and part time jobs, not in terms of full-time equivalent employees.

Three impact effects: **Direct**–Initial spending in the study area resulting from the project; **Indirect**–The additional inter-industry spending from the direct impact; **Induced**–The impact of additional household expenditure resulting from the direct and indirect impact.

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- **What does the existing <u>ferrous</u> mining industry add to Minnesota's economy?**

Iron ore mining:	Minnesota Direct, Indirect and Induced Total Effect			Arrowhead and Douglas County, WI Direct, Indirect and Induced Total Effect		
Operations	*Value added*	*Output*	*Employment*	*Value added*	*Output*	*Employment*
2007 Baseline	$1,529,710,272	$3,169,440,771	10,193	$1,367,158,975	$2,915,919,065	9,112

  - Using the base year of 2007, the IMPLAN model Value Added total impact shows that Iron ore mining contributed more than $1.5 billion in wages, rents, and profits to Minnesota's economy. The Value Added total represents the direct value of the wages, etc., plus the additional inter-industry spending that resulted from these wages, plus any additional household spending that resulted from the direct wages and inter-industry spending.

  - The Output total shows that Iron ore mining produced more than $3 billion in local production as part of Minnesota's economy. The Output total represents the direct value of local production, plus the additional inter-industry transactions that resulted from local production, plus any additional household spending that resulted from inter-industry production.

  - The Employment total of more than ten thousand jobs represents the direct employment in the industry sector, plus other jobs dependent on, but not part of, the Iron ore mining sector, plus any jobs created by the additional household spending and activity linked to direct and indirect jobs in the Iron ore mining industry.

The IMPLAN input-output model also provides an opportunity to calculate a multiplier value associated with each of these measures (Value Added, Output, and Employment). For example, the employment multiplier for Iron ore mining in the State of Minnesota of 2.8 estimates that for every job in the Iron ore mining industry, another 1.8 jobs are created as the indirect and induced effect of the mining industry's job. In the same way, the model estimates that for every dollar of wages, rents, interest and profits, another $0.65 is generated through indirect and induced effects throughout the economy of the State.

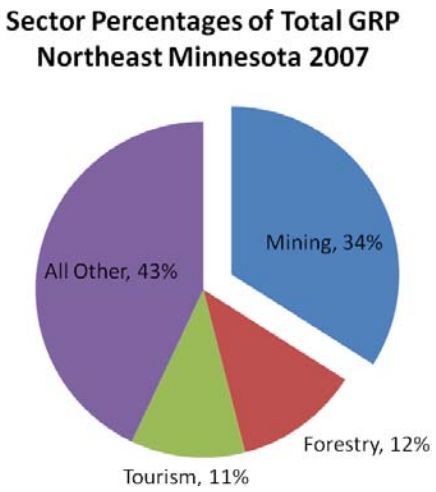
The impact of mining employment and the payroll associated with these jobs may be the most obvious impacts. However an Output measure can show contribution to the region and to the State, through production taxes, royalties, and fees on the exported ore.

Although the total economic impacts for the State are always greater than the impacts for the region (Arrowhead counties and Douglas County, WI), the importance of the mining sector to the region's economy is proportionately greater.

From a regional point of view, for the period from 2001 to 2007, compared to other sectors of the economy in Northeast Minnesota, mining has led all other sectors contributing to Gross Regional Product (GRP) by as much as a factor of three. (See the report for details.)

NE Minnesota Percentage Gross Regional Product (GRP) by Industry Sector

Source: IMPLAN, BBER



- **What *could* the proposed <u>ferrous</u> mining expansions and new projects add to the State's economy, if and when full operations are reached?**

Source: IMPLAN, BBER

Iron ore mining:	Minnesota Direct, Indirect and Induced Total Effect			Arrowhead and Douglas County, WI Direct, Indirect and Induced Total Effect		
Operations	*Value added*	*Output*	*Employment*	*Value added*	*Output*	*Employment*
2007 Baseline	$1,529,710,272	$3,169,440,771	10,193	$1,367,158,975	$2,915,919,065	9,112
Expansions, new projects YR2013	$1,385,574,508	$2,870,802,686	3,422	$1,229,136,415	$2,610,441,873	3,030

For the following impacts, it is assumed that all currently proposed expansions and new projects in the ferrous mining industry sector are brought to full operations. These impacts are in addition to regular ferrous mining operations (but do not include construction impacts).

— The Value Added total impact shows that Iron ore mining expansions and new projects could contribute almost $1.4 billion in wages, rents, and profits annually as an addition to Minnesota's economy.

— The Output total impact shows that Iron ore mining expansions and new projects could contribute almost $2.9 billion annually in local production as an addition to Minnesota's economy.

— The Employment total impact shows that Iron ore mining expansions and new projects could contribute more than thirty-four hundred additional direct, indirect and induced jobs (including temporary, part time or short term) in Minnesota employees by the impact year 2013.

Again, the total economic impacts for the State are always greater than the impacts for the region, although the importance of the mining sector to the region's economy is proportionately greater.

Construction in the Iron ore mining sector is estimated to occur between 2008 and 2013. The economic impact of the construction phase of all currently proposed expansions and new projects in the ferrous mining industry sector could contribute the following impacts for Minnesota:

Ferrous Mining Construction, Including 2008 and Projected 2009–2013 Totals

Source: IMPLAN	Value Added	Output	Employment
2008	$718,195,017	$1,468,214,834	6,599
2009	$388,597,975	$794,903,239	3,856
2010	$352,724,938	$720,781,971	3,371
2011	$432,712,175	$885,048,567	3,023
2012	$426,147,121	$872,108,841	2,939
2013	$242,207,594	$495,677,121	1,229

— For peak year construction (2008), the Value Added total impact shows that Iron ore mining construction could contribute more than $718 million in wages, rents, and profits to Minnesota's economy.

— For peak year construction, the Output total shows that Iron ore mining construction could contribute almost $1.5 billion in local production as part of Minnesota's economy.

— For peak year construction, the Employment measure shows that Iron ore mining construction could employ nearly sixty-six hundred employees in direct, indirect, and induced jobs (including temporary, part time or short term) in Minnesota.

During 2008 (calendar year), Minnesota's iron mines paid $148.8 million in Production Tax, Occupation Tax, Sales and Use Tax, Income Tax, Various Ad Valorem and Property Taxes, and Royalties and Rentals on State minerals.

Ferrous Mining Mineral Receipts, Minnesota, 2008

Source: MN Depart. of Revenue, MN DNR	
Taconite Production Tax	$94,185,674
Occupation Tax	$10,358,000
Sales and Use Tax	$6,603,598
Income Tax (withholding on private royalties)	$334,975
Various Ad Valorem and Property Taxes	$1,154,509
Royalties and Rentals on State Iron Ore	
School Trust lands	$25,233,666
University Trust lands	$9,984,561
Tax Forfeit	$626,320
Other state accounts	$323,800
Total	$148,805,103

The 2007 taconite production tax of more than $94 million is payable the following year.

In order to interpret tax tables in this report, readers should note that taxes are distributed between the General Fund, local units of government, and education. A further detail on interpreting the occupation tax is to note that this tax is split according to ten percent for the University of Minnesota, forty percent to Elementary and Secondary Education, and fifty percent to the General Fund. (A further breakdown of this $94 million in Production tax is found in Appendix A.)

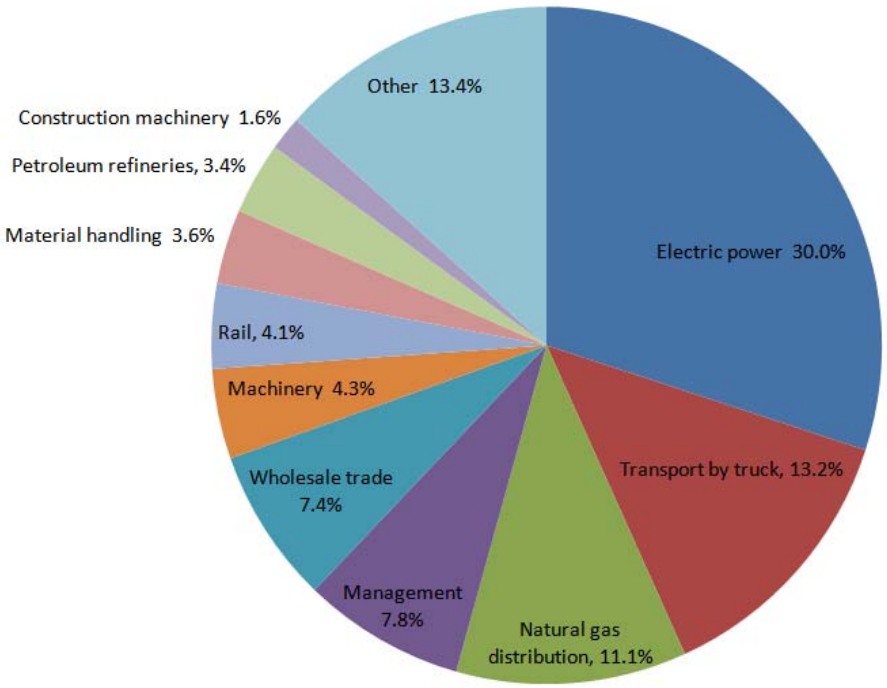
Ferrous mining tax impacts have special importance for the support of schools and higher education in Minnesota. During 2008 (calendar year), Minnesota's iron mining industry paid $56.9 million towards Minnesota's education, through a percentage of production taxes, royalties and rents, and occupation taxes.

Ferrous Mining Mineral Receipts Specifically in Support of Education, Minnesota, 2008

Source: MN DNR	School	University	Total Education
School district component of Production Tax	$16,495,306		$16,495,306
State iron ore royalties and rent	$25,233,666	$9,984,561	$35,218,227
Occupation Tax	$4,143,200	$1,035,800	$5,179,000
Total	$45,872,172	$11,020,361	$56,892,533

- **Which industries are <u>ferrous</u> mining's main suppliers, and how much do they contribute to mining's production?**

Based on the model's regional inputs from the industry balance sheet, these are the ferrous mining industry's local purchases from suppliers. Support for these industries translates into development of the State's mining industry.



Source: IMPLAN; BBER

- **What does existing <u>non-ferrous</u> mining add to Minnesota's economy?**

Source: IMPLAN, BBER

Copper, nickel, lead and zinc mining:	Minnesota Direct, Indirect and Induced Total Effect			Arrowhead and Douglas County, WI Direct, Indirect and Induced Total Effect		
Operations	*Value added*	*Output*	*Employment*	*Value added*	*Output*	*Employment*
2007 Baseline	$257,272,921	$398,899,615	1,407	$244,273,243	$374,497,022	1,308

— Using the 2007 base year model (operations in the year 2007), the Value Added total impact shows that Copper, nickel, lead, and zinc mining contributed more than $257 million in wages, rents, and profits to Minnesota's economy.

— The Output total impact shows Copper, nickel, lead, and zinc mining produced almost $399 million in local production as part of Minnesota's economy.

— The Employment total impact shows that Copper, nickel, lead, and zinc mining directly and indirectly employed more than fourteen hundred employees (including temporary, part time or short term jobs) in Minnesota.

- **What could proposed <u>non-ferrous</u> mining expansions and new projects operations add to the State's economy, if and when full operations are reached?**

Source: IMPLAN, BBER

Copper, nickel, lead and zinc mining:	Minnesota Direct, Indirect and Induced Total Effect			Arrowhead and Douglas County, WI Direct, Indirect and Induced Total Effect		
Operations	*Value added*	*Output*	*Employment*	*Value added*	*Output*	*Employment*
2007 Baseline	$257,272,921	$398,899,615	1,407	$244,273,243	$374,497,022	1,308
Expansions, new projects YR2013	$1,480,802,071	$2,295,971,717	5,602	$1,415,434,189	$2,194,707,126	5,307

For the following impacts, it is assumed that all currently proposed new projects in the non-ferrous mining industry sector are brought to full operations. These impacts are in addition to regular non-ferrous mining operations (but do not include construction impacts).

— The Value Added total impact shows that Copper, nickel, lead, and zinc mining new projects could contribute almost $1.5 billion in wages, rents, and profits annually as an addition to Minnesota's economy.

— The Output total impact shows that Copper, nickel, lead, and zinc mining new projects could contribute almost $2.3 billion annually in local production as an addition to Minnesota's economy.

— The Employment total impact shows that Copper, nickel, lead, and zinc mining new projects could contribute more than fifty-six hundred additional direct, indirect, and induced jobs (including temporary, part time or short term) in Minnesota by the impact year 2013.

The economic impact of the construction phase of all currently proposed new projects in the non-ferrous mining industry sector could contribute the following impacts:

Non-Ferrous Mining Construction, Including 2008 and Projected 2009–2013 Totals

Source: IMPLAN	Value Added	Output	Employment
2008	—	—	—
2009	—	—	—
2010	$868,708,020	$1,777,808,417	11,327
2011	$785,947,945	$1,608,440,153	11,196
2012	$872,910,369	$1,786,408,519	12,007
2013	—	—	—

- For peak year construction (2012), the Value Added total impact shows that Copper, nickel, lead, and zinc mining construction could contribute almost $873 million in wages, rents, and profits to Minnesota's economy.

- For peak year construction (2012), the Output total impact shows that Copper, nickel, lead, and zinc mining construction could contribute almost $1.8 billion in production as part of Minnesota's economy.

- For peak year construction (2012), the Employment total impact shows that Copper, nickel, lead, and zinc mining construction could employ more than twelve thousand employees in direct, indirect, and induced jobs (including temporary, part time or short term) in Minnesota.

In order to report non-ferrous taxes in Minnesota, BBER followed the Minnesota DNR's Mineral Receipts by Account for 2007 and 2008. Compared to ferrous mining, non-ferrous mining contributes much less to the State. However, we note growth in the tax impacts for non-ferrous mining, showing that the sector contributed more than $355,000 in 2007, and increased to almost $557,000 in 2008.

- **What if only some <u>ferrous and non-ferrous</u> proposed expansions and new projects reach full operations?**

BBER considered the possibility that only some of the proposed projects will progress to full operations status. The following table presents impact results assuming 75% of Value Added, 75% of Output, and 75% of Employment is achieved by year 2013. The table also shows values for assuming 50% of projects are achieved, and for the baseline operations in 2007 (for comparison).

Ferrous and Non-Ferrous Mining Impact on Minnesota: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
Ferrous and Non-ferrous Proposed projects, YR 2013		Minnesota	
100% full implementation	$2,866,376,579	$5,166,774,403	9,025
75% implementation	$2,149,782,434	$3,875,080,802	6,768
50% implementation	$1,433,188,290	$2,583,387,202	4,512
Baseline YR 2007:	$1,786,983,183	$3,568,486,939	11,600

Note: Although the current economic downturn may affect the estimates of start dates and other time line assumptions, BBER assumes in this study, following indications from industry, that these projects are proceeding as planned, and that the proposed projects are attempting to emerge from the downturn without losing years of momentum.

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The Economic Impact of Ferrous and Non-Ferrous Mining on the State of Minnesota, and on the Arrowhead Region and Douglas County, WI

I. Project Description

This project assesses the economic impact of ferrous and non-ferrous mining in Northeast Minnesota on the economy of the State of Minnesota, and on the Arrowhead Region and Douglas County, Wisconsin. This project also describes the Northeast Minnesota ferrous and non-ferrous mining industries in terms of their global position, and describes Minnesota's mineral revenue collected from these industries.

The UMD Labovitz School of Business and Economics' research bureau, the Bureau of Business and Economic Research (BBER), studied and estimated the economic impacts of ferrous and non-ferrous mining construction and operations in Northeast Minnesota. The BBER has previously studied and reported the economic impact of the mining industry in such projects as The Economic Impacts of PolyMet's NorthMet Project and Other Industrial Projects of Minnesota's East Range Communities 2006, The Economic Impact of Constructing and Operating Minnesota Steel Industries LLC in Itasca County, Minnesota, 2006, and Mesaba Metals Copper and Nickel Mining in Northeast Minnesota, 2003.

The economic modeling data and software used was IMPLAN, version 2. The study used IMPLAN's economic multiplier analysis and input/output modeling, created in Minnesota by the Minnesota IMPLAN Group, Inc. Data were the most recent IMPLAN data, which is for year 2007. Results of modeling are presented here in a written report.

The research objectives of the study included:

- To study the recent economic activity of ferrous and non-ferrous mining industries in Northeast Minnesota, including employment and production in unit tons.
- To model construction and operations impacts using three measures and three effects of mining activity. This will include the measures of employment, output, and value added, and will also model direct, indirect, and induced economic effects in the economies of the State of Minnesota, and the Arrowhead Region including Douglas County, Wisconsin.
- To describe Minnesota's mineral revenue collected from ferrous and non-ferrous mining industries in Northeast Minnesota, including 1) production taxes, 2) occupation taxes and royalties, 3) sales and use taxes, and 4) a discussion of how mineral revenue is being spent by the State of Minnesota.
- To assess the global position of the ferrous and non-ferrous mining industries of Northeast Minnesota.
- To draft the findings of the impact analysis into a report.

Modeling

BBER needed inputs from companies involved in mining construction and estimates for construction project start dates and estimates of full operations.

Models were created to include projects such as U.S. Steel's expansion at Keetac, Essar's (Minnesota Steel) plant construction, and the Mesabi Nugget project as well as individual non-ferrous proposed projects. The construction impact model years were designated to begin with 2008. BBER's modeling used the completion date supplied by companies involved for any new project.

Operations models were created to include mining impacts from years beginning with 2008. The full operations year, when construction is complete and all projects are fully operational, was determined to be possible for 2013.

Some IMPLAN modeling issues associated with small study areas like that in this report of county-level impacts, as noted in the IMPLAN User's Guide,[‡] include the following:

A small area will have a high level of leakage. Leakages are any payments made to imports or value added sectors which do not in turn re-spend the dollars within the region.

Also, it can be expected that input-output multipliers are larger when more economic activity is incorporated into the local transactions matrix. The more imports are internalized, the larger the calculated multipliers become. At the state level all counties are incorporated, and for the state, the greatest level of internalized economic activity is attained. Theoretically, therefore, the state IMPLAN multipliers will always be greater than multipliers for any individual or subset of counties. But, as with most theories, this one has exceptions. It is possible, for example, for the same impact run on both a state and county models to yield lower impact results in the state model compared to the county model. It does not happen that frequently, but it is possible.

Deliverables

1) BBER will report the direct, indirect, and induced economic impacts of construction and operations activities of ferrous and non-ferrous mining in Northeast Minnesota, measured in employment, output, and value added.
2) BBER will report a description of the Northeast Minnesota mining industries in terms of a global mining context.
3) BBER will report Minnesota's mineral revenue collected from ferrous and non-ferrous mining industries in Northeast Minnesota, including 1) production taxes, 2) occupation taxes and royalties, and 3) sales and use taxes.
4) BBER will report ferrous and non-ferrous mineral revenue spent by the State of Minnesota.
5) BBER will draft a final written report that will present the findings and analysis.
6) BBER will offer an oral PowerPoint presentation of the BBER findings, if so requested.

[‡] Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide"; Minnesota IMPLAN Group, Inc., 1725 Tower Drive West, Suite 140, Stillwater, MN 55082, www.implan.com

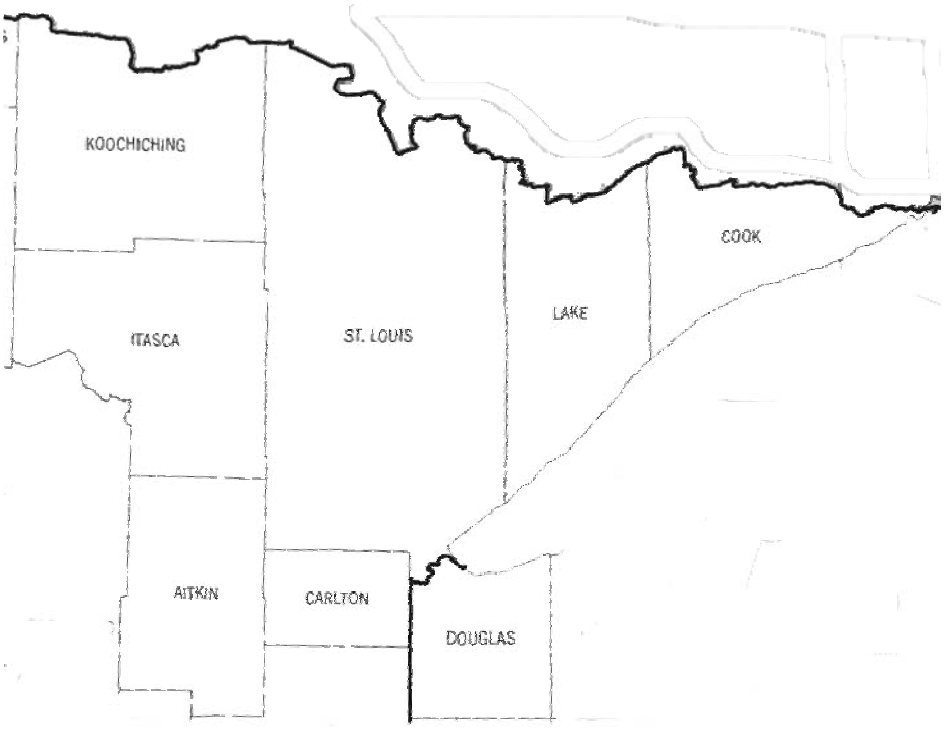
Study Area

The geographic scope for this economic impact analysis is proposed to be the Arrowhead counties of Minnesota, Douglas County in Wisconsin, and the State of Minnesota. The Arrowhead Region of Northeast Minnesota includes Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis, Counties.

The BBER worked closely with mining companies, the Iron Range Resources agency, the Minnesota Department of Employment and Economic Development, the Minnesota Department of Natural Resources—Lands and Minerals Division, and the University of Minnesota Natural Resources Research Institute, as well as the Iron Mining Association of Minnesota and the Minnesota Exploration Association, and others, in determining key assumptions in the development of the IMPLAN models. Inputs required for these models include average employment for each year during any construction periods, and dollar cost on a year by year basis for such construction periods. Operating assumptions required for the models include employment estimates, local purchases, and operations dollar value of sales or output production. Selected industry suppliers will need to estimate export sales outside the Northeast Minnesota region.

Regional data for the impact models for value added, employment, and output measures will be supplied by IMPLAN for this impact. Employment assumptions were provided to the researchers to enable construction of the impact model. From these data, Social Accounts, Production, Absorption, and Byproducts information were generated from the national level data, and were incorporated into the model. All region study definitions and impact model assumptions were agreed on before work with the models began.

Figure 1. Counties of Minnesota's Arrowhead Region, and Douglas County, WI



As background, BBER estimated a simplified industry sector percentage of Gross Regional Product (GRP) for the major sectors of the Northeast Minnesota economy. Mining in the Arrowhead Region and for the Duluth Metropolitan Statistical Area has been the leading industrial sector of the economy. (Note that when measured by GRP, for the State of Minnesota, GRP from mining totals around 5% for 2007.) However, comparing Northeast Minnesota economic activity by sector, Gross Regional Product for mining shows that over time, mining has been the leading industrial sector, and that the mining industry has increased in relative importance.

Table 1. Sector Percentages of Total GRP in Billions, Northeast Minnesota 2007

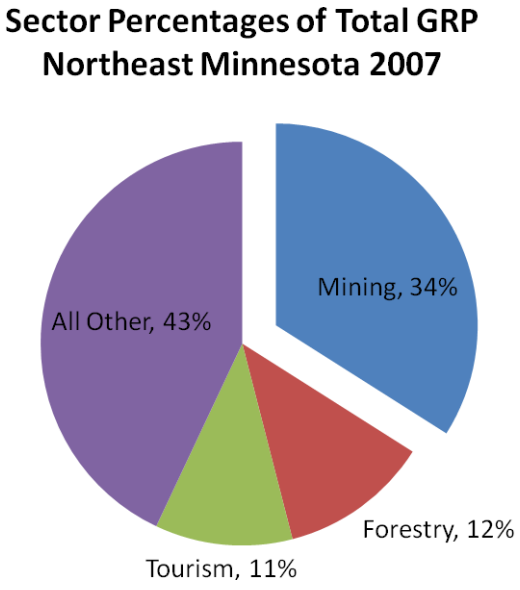
Industry	*2001*	*% of Total*	*2004*	*% of Total*	*2006*	*% of Total*	*2007*	*% of Total*
Mining	$2.3	23%	$3.1	26%	$3.9	30%	$4.7	34%
Forestry	$1.8	18%	$1.9	16%	$1.8	14%	$1.6	12%
Tourism	$1.2	12%	$1.3	11%	$1.4	11%	$1.5	11%
All Other	$4.8	48%	$5.6	47%	$5.2	45%	$5.9	43%
Total	$10.1	100%	$11.9	100%	$12.3	100%	$13.7	100%

Source: J. Skurla, UMD Labovitz School of Business and Economics, Bureau of Business and Economic Research. See also U.S. BEA at http://www.bea.gov/bea/regional/gsp/

Note: Tourism is estimated from Amusements, gambling, and recreation, and Accommodation and food services. Also note: The above estimated GRP for an industry sector (for example, mining) includes estimations for indirect and induced effects (such as healthcare) provided to the industry.

For the period from 2001 to 2007, compared to other sectors of the economy, in Northeast Minnesota, mining has led all other sectors contributing to GDP by as much as a factor of three.

Figure 2. NE Minnesota Percentage Gross Regional Product (GRP) by Industry Sector



Bureau of Business and Economic Research
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II. Impact Procedures and Input Assumptions

IMPLAN Models

There are two components to the IMPLAN system, the software and databases. The databases provide all information to create regional IMPLAN models. The software performs the calculations and provides an interface for the user to make final demand changes. IMPLAN software version 2 was used in this analysis.

Comprehensive and detailed data coverage of the IMPLAN study areas by county, and the ability to incorporate user-supplied data at each stage of the model building process, provides a high degree of flexibility both in terms of geographic coverage and model formulation, in this case definition of the State of Minnesota, the Arrowhead Region study area, and the definition of specific models for construction and operations, with adjusted production functions to reflect the proposed plant expansion. Using the IMPLAN software and data, BBER identified the industry's proposed expenditures in terms of the sectoring scheme for the model, in producer prices, in historical dollars based on the year of the model, and applied those dollars spent within the study area definition given for the impact analysis.

Data

IMPLAN data files use federal government data sources including:

- US Bureau of Economic Analysis Benchmark I/O Accounts of the US
- US Bureau of Economic Analysis Output Estimates
- US Bureau of Economic Analysis REIS Program
- US Bureau of Labor Statistics County Employment and Wages (CEW) Program
- US Bureau of Labor Statistics Consumer Expenditure Survey
- US Census Bureau County Business Patterns
- US Census Bureau Decennial Census and Population Surveys
- US Census Bureau Economic Censuses and Surveys
- US Department of Agriculture Crop and Livestock Statistics

IMPLAN data files consist of the following components: employment, industry output, value added, institutional demands, national structural matrices and inter-institutional transfers.

Impacts for this model use the most recent IMPLAN data available which is for the year 2007. The impact is reported in 2007 dollars.

Economic impacts are made up of direct, indirect, and induced impacts. The following cautions are suggested assumptions for accepting the impact model:

- IMPLAN input-output is a production based model.
- Local or export based purchases that represent transfers from other potential local purchases are not counted.
- The numbers (from U.S. Department of Commerce secondary data) treat both full and part time individuals as being employed.
- Assumptions need to be made concerning the nature of the local economy before impacts can be interpreted.

- The IMPLAN model was constructed for the year 2007 (most recent data available).

Definitions Used in This Report

The IMPLAN models for both operations and construction use the following definitions for the three measures and three effects of the impact reports:

Measures

Value Added – A measure of the impacting industry's contribution to the local community; it includes wages, rents, interest and profits.

Output–Represents the value of local production required to sustain activities.

Employment – Estimates are in terms of jobs, not in terms of full-time equivalent employees. Hence, these may be temporary, part time or short term jobs.

Effects

Direct – Initial spending in the study area resulting from the project

Indirect – The additional inter-industry spending from the direct impact

Induced – The impact of additional household expenditure resulting from the direct and indirect impact.

Industry Definitions

IMPLAN models for this study used the industrial sector 22 (Iron ore mining) to model the impact of ferrous mining. IMPLAN provides a bridge table which identifies the corresponding Bureau of Economic Analysis (BEA) sector, as well as the North American Industry Classification (NAICS) code equivalents.

Table 2. Ferrous Mining Industry Definition

IMPLAN Sector	*Description*	*BEA*	*NAICS*
22	Iron ore mining	21221	21221

IMPLAN models for this study used the industrial sector 23 (Copper, Nickel, lead, and zinc mining) to model the impact of non-ferrous mining.

Table 3. Non-Ferrous Industry Definition

IMPLAN Sector	*Description*	*BEA*	*NAICS*
23	Copper, nickel, lead, and zinc mining	21223	21223

IMPLAN sector 24 corresponds to NAICS codes 21222 for mining non-ferrous metals gold and silver, and 21229 for Other Metal Ore Mining (including uranium-radium-vanadium ores, molybdenum ores, antimony ores, columbium ores, illmenite ores, magnesium ores, tantalum ores and tungsten ores) which are not currently included in the business models for projects proposed for Minnesota, and are therefore not included in the non-ferrous sector for this study.

Mining impacts in this report have been sectored for analysis as ferrous and non-ferrous, and do not include other IMPLAN sectors classified as mining, such as "Stone mining and quarrying," and "Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying." Excluded sectors include such activities as Stone mining and quarrying, Dimension stone mining and quarrying, Crushed and broken limestone mining, Crushed and broken granite mining, Other crushed and broken stone mining, Sand, gravel, clay, and refractory mining, Construction sand and gravel mining, Industrial sand mining, and Clay, ceramic, and refractory minerals mining.

Note that ferrous mining activities in this report are modeled a IMPLAN sector 22, and the sector is referred to as "Iron ore mining," in the text, following the designation of the IMPLAN industry description. The same is true for non-ferrous mining activities, which are referred to in this report by the IMPLAN sector description "Copper, nickel, lead, and zinc mining." Although lead and zinc mining is not significant in Minnesota, the model sector "Copper, nickel, lead, and zinc mining" captures the copper and nickel impacts which are significant.

The impact of mining exploration and drilling, identified under NAICS industry code 213 (Support Activities for Mining), are not the focus of this impact, although these activities are accounted for in the IMPLAN model, specifically through IMPLAN sector 27 (Other nonmetallic mineral mining and quarrying) and sector 30 (Support activities for other mining).

Finally, the IMPLAN sector "Mining gold silver and other metal ore" was not found directly relevant to the business models for projects proposed in this impact study, and therefore this sector was not included in the non-ferrous impacts of this study.

Model Assumptions

- Although the current economic downturn may affect the estimates of start dates and other time line assumptions, BBER assumes in this study, following indications from industry, that these projects are proceeding as planned, and that the proposed projects are attempting to emerge from the downturn without losing years of momentum.
- Construction years for various projects are staggered between 2008 and 2013. Construction impacts are reported by years 2008, 2009, 2010, 2011, 2012, 2013, and include all projects active during the reporting year.
- Operations year for all 2013 (full capacity year). This impact study recognizes the broadest number of possible ferrous expansion projects as well as start-ups in ferrous and non-ferrous mining.
- All impacts are reported in 2007 dollars.

Special considerations for interpreting these impact numbers include the following cautions:

Regional indirect and induced effects are driven by assumptions in the model. One problem is that the assumptions can mask the true multiplier. This is especially true of the assumption of constant returns to scale: This assumption most affects induced effects and says that if I drink coffee, and my income increases, I will drink proportionally more than before. The amount of weight placed on the induced effects (the percentage of the total induced effect you would want to use) could be further analyzed with an in-depth impact study, involving much more specific data collection and more detailed analysis.

BBER suggests caution in regard to the interpretation of the tax impacts from these projects: Tax law changes frequently and will be difficult to forecast through the years proposed as operations for these projects. Also, taxes impacts in this report are based on different formulations, for instance, it has been suggested that occupation taxes could be expected to decrease.

Readers should also note that estimated changes in production technology and employee productivity for industry sectors can differ. For instance, a difference in output per worker for differing industry

sectors when production modeling includes Iron ore mining and Iron and steel mills.

Finally, and most importantly, the relationship of Output to Employment has been set for the model by data provided by the project managers to the BBER; the modeling in this study is driven by inputs provided to the models by the best estimates of engineers and managers involved in each project. It can be noted that, for purposes of research and with more resources, the modeling methodology can be driven by data collected from surveys and post-construction values. This survey data can provide greater accuracy in regional impact assessments for the linkage between core and peripheral labor market areas, and deliver better estimates of local vs. regional purchases.

Project Time Lines and Selection of Impact Year

A time line was used in order to select an appropriate year for the industry sector's full operations impact (YR 2013). A significant factor influencing assumptions about construction and operations start dates is the time necessary to complete the Environmental Impact Statement and all permitting activity that must be completed before construction can begin. BBER has not attempted to forecast how long each project's permitting might require to complete. Also note, for purposes of display in this report, BBER has grouped the non-ferrous start-ups to indicate the earliest construction and operations start date that might be assumed.

Figure 3. BBER's Assumptions for Project Time Lines and Selection of Impact Year 2013*

* As noted above, this time line was used in order to select an appropriate year for the industry sector's full operations impact (YR 2013). A significant factor influencing assumptions about construction and operations start dates is the time necessary to complete the Environmental Impact Statement and all permitting activity that must be completed before construction can begin. BBER has not attempted to forecast how long each project's permitting might require to complete. Also note, for purposes of display in this report, BBER has grouped the non-ferrous start-ups to indicate the earliest construction and operations start date that might be assumed.

III. Findings: Ferrous Mining Impacts

In this section, BBER reports the direct, indirect, and induced economic impacts of construction and operations activities of ferrous mining in Northeast Minnesota, measured in employment, output, and value added. Impacts are modeled for both the State of Minnesota, and the immediate region, including the counties of the Arrowhead Region and the counties of the Duluth Metropolitan Statistical Area, which includes Douglas County, Wisconsin.

To provide a baseline reference, and to answer the question "What Does the Ferrous Mining Industry Add to the State's Economy?" BBER modeled the impact on the State's economy that might be felt if ferrous mining and all its transactions had been removed from the State of Minnesota. BBER uses IMPLAN's most recent data, which is for year 2007, for this impact model.

Next, using employment and output projections from the mining industry, as well as assistance from representatives of the State, BBER modeled the economic impact of proposed expansions and projects in the ferrous mining industry sector. A special sub-section of the Findings covers the results of modeling ferrous mining tax impacts.

Finally, BBER considered the possibility that not all projects will be viable and will progress to full operations status. Therefore impacts for two development scenarios are presented, to show impact results if only half or only three quarters of projects currently proposed succeed. The 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios.

What Does the Ferrous Mining Industry Add to the State's Economy?

IMPLAN provides a model of the economy of the State of Minnesota, including ferrous mining (identified as sector 22 Iron ore mining), as presented in the section "Industry Definitions," above. The values in the tables below are estimated from sources associated with the IMPLAN model and also identified above.

In the tables below, the Value Added total measure shows that Iron ore mining contributed more than $1.5 billion in wages, rents, and profits to Minnesota's economy. The Value Added total represents the direct value of the wages, etc., plus the additional inter-industry spending that resulted from these wages, plus any additional household spending that resulted from the direct wages and inter-industry spending.

The Output total measure shows that Iron ore mining produced more than $3 billion in local production as part of Minnesota's economy. The Output total represents the direct value of local production, plus the additional inter-industry transactions that resulted from local production, plus any additional household spending that resulted from inter-industry production.

The Employment measure shows that Iron ore mining directly employed more than thirty-six hundred employees (jobs—including temporary, part time or short term) in Minnesota. The Employment total of more than ten thousand jobs represents the direct employment in the industry sector, plus other jobs dependent on, but not part of, the Iron ore mining sector, plus any jobs created by the additional household spending and activity linked to direct and indirect jobs in the Iron ore mining industry.

The IMPLAN input-output model also provides an opportunity to calculate a multiplier value associated with each of these measures. For example, the employment multiplier for Iron ore mining in the State of Minnesota of 2.8 indicates that for every job in the Iron ore mining industry, another 1.8 jobs are created as the indirect and induced effect of the mining industry's job. In the same way, the model estimates that for every dollar of wages, rents, interest and profits, another $0.65 is generated through indirect and induced effects throughout the economy of the State.

The impact of mining employment and the payroll associated with these jobs may be the most obvious impact, however the Output measure also shows contribution to the region and to the State through production taxes, royalties, and fees on the exported ore.

Although the total economic impacts for the State are almost always greater than the impacts for the Arrowhead Region and Douglas County, WI, the importance of mining sector to the region's economy is proportionately greater.

The following tables show the baseline impact (current operations as of 2007) of ferrous mining on the State of Minnesota and the region, in 2007 dollars.

Table 4. Minnesota Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$927,154,752	$362,400,042	$240,155,466	$1,529,710,260
Output	$2,043,372,032	$700,498,753	$425,716,545	$3,169,587,330
Employment	3,621	2,939	3,633	10,193

Note direct effects for Value Added, Output, and Employment result in different totals for the State and the region. The regional economy does not enjoy the same level of added indirect and induced effects. This implies, for instance, that Iron ore mining creates over a thousand jobs in the Metro and other parts of the State, dependent on the mining jobs in the Arrowhead Region.

Table 5. Arrowhead and Douglas County, WI Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$927,154,816	$275,670,776	$164,333,356	$1,367,158,948
Output	$2,043,372,032	$568,345,233	$304,348,497	$2,915,065,762
Employment	3,621	2,417	3,074	9,112

The top twenty Minnesota indirect and induced jobs dependent on Iron ore mining come from the following supporting industries:

Table 6. Top Twenty Industrial Job Sectors (Including Indirect and Induced) Dependent on Iron Ore Mining Employment in Minnesota, Baseline 2007

Industry	*Direct*	*Indirect*	*Induced*	*Total*
Mining iron ore	3,621	0	0	3,621
Transport by truck	0	585	36	621
Food services and drinking places	0	64	406	470
Wholesale trade businesses	0	264	136	400
Electric power generation transmission and distribution	0	257	11	268
Management of companies and enterprises	0	195	19	214
Real estate establishments	0	50	152	202
Offices of physicians dentists and other health	0	0	174	174
Private hospitals	0	0	172	172
Employment services	0	104	67	171
Retail Stores General merchandise	0	17	136	153
Retail Stores Food and beverage	0	15	126	142
Nursing and residential care facilities	0	0	133	133
Retail Nonstores Direct and electronic sales	0	11	94	105
US Postal Service	0	86	18	104
Maint & repair construct of nonresident structures	0	80	19	99
Retail Stores Motor vehicle and parts	0	12	85	97
Private household operations	0	0	92	92
Services to buildings and dwellings	0	51	41	92
Civic social professional and similar organizations	0	22	62	84
As well as 2,781 jobs in another 303 various sectors of the economy . . .				2,781
Total				10,194

Jobs created as the impact of taxes are included in the model's calculations.

The Economic Impact of Proposed Ferrous Mining Expansions and New Projects

BBER modeled the economic impact of proposed expansions and projects in the ferrous mining industry sector. For this report, impact findings from individual projects are aggregated in the Iron ore mining sector, and present an estimation of the impact of all currently proposed ferrous mining expansions and new start-up projects. BBER relied on industry representatives and State of Minnesota representatives for its inventory of possible projects. The timeline in figure 3 shows BBER's rationale for choosing the year 2013 as the first possible full operations year in which all projects might be operational.

BBER also modeled the economic impact of the total sector activity, which combines the proposed expansions and projects with the on-going industry in the State. Tables described as "all operations"

present the impacts of Iron ore mining in year 2013 (in 2007 dollars) as if all proposed expansions and new projects were at full operations and are added to the continuing impact of current (2007) Iron ore mining operations.

Minnesota Construction: Proposed Ferrous Mining Expansions and New Projects

These projects include investment in facilities improvement and maintenance. Project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013. Note that unlike operations impacts, construction impacts do not present annual recurring totals. Each construction year's wages, production, and employment should be considered a snap-shot of a single year impact. Typically, construction is more labor- and investment-intensive at the start of a project than in the final stages. In addition, although the construction investment adds up over time, employment does not; consider, for instance, that a construction project truck driver employed during 2008 may be continuing in the same job in 2009.

Table 7. Ferrous Mining Construction's Value Added, Output, and Employment Impacts on the State of Minnesota 2008–2013, Proposed Expansions and New Projects

Source: IMPLAN	Value Added	Output	Employment
2008	$718,195,017	$1,468,214,834	6,599
2009	$388,597,975	$794,903,239	3,856
2010	$352,724,938	$720,781,971	3,371
2011	$432,712,175	$885,048,567	3,023
2012	$426,147,121	$872,108,841	2,939
2013	$242,207,594	$495,677,121	1,229

Minnesota Operations: Proposed Ferrous Expansions and Mining Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all proposed expansions and new projects to be in year 2013.

Table 8. Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the State of Minnesota, 2013, Proposed Expansions and New Projects

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$839,794,322	$328,253,181	$217,527,005	$1,385,574,508
Output	$1,850,704,140	$634,494,811	$385,603,735	$2,870,802,686
Employment	1,216	987	1,219	3,422

Minnesota Operations: All Proposed and Continuing Ferrous Mining, 2013

The table below shows the estimated impact of full operations for all proposed expansions and new projects and all continuing industry operations not considered a start-up or expansion of production capacity, for year 2013.

Table 9. Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the State of Minnesota, 2013, All Operations

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,766,949,074	$690,653,223	$457,682,471	$2,915,284,768
Output	$3,894,076,172	$1,334,993,564	$811,320,280	$6,040,390,016
Employment	4,837	3,926	4,852	13,615

Region Construction: Proposed Ferrous Mining Expansions and New Projects

As with the impacts for the State, these projects include investment in facilities improvement and maintenance. Project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and does not forecast the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013.

Table 10. Ferrous Mining Construction's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, 2008–2013

Source: IMPLAN	Value Added	Output	Employment
2008	$583,192,668	$1,300,800,898	6,016
2009	$315,085,648	$702,813,736	3,509
2010	$286,095,114	$637,084,363	3,072
2011	$350,971,457	$782,901,670	2,750
2012	$345,543,487	$771,428,405	2,672
2013	$196,108,484	$437,329,536	1,111

Region Operations: Proposed Ferrous Mining Expansions and New Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all proposed expansions and new projects to be in year 2013.

Table 11. Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, Expansions and New Projects, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$839,794,430	$243,195,179	$146,146,806	$1,229,136,415
Output	$1,850,704,140	$491,788,657	$267,949,076	$2,610,441,873
Employment	1,216	792	1,021	3,029

Region Operations: All Proposed and Continuing Ferrous Mining, 2013

The table below shows the estimated impact of full operations for all proposed expansions and new projects and all continuing industry operations not considered a start-up or expansion of production capacity, for year 2013.

Table 12. Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, 2013, Expansions and All Operations

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,766,949,246	$518,865,955	$310,480,162	$2,596,295,363
Output	$3,894,076,172	$1,060,133,890	$572,297,573	$5,526,507,635
Employment	4,837	3,209	4,095	12,141

Ferrous Mining Tax impacts

Ferrous Mining Tax Impacts on Minnesota and the Region

During 2008 (calendar year) Minnesota's iron mines paid $148.8 million in Production Tax, Occupation Tax, Sales and Use Tax, Income Tax, Various Ad Valorem and Property Taxes and Royalties and Rentals on state minerals.

The 2007 taconite production tax of more than $94 million is payable the following year. As we note below, and in order to reconcile totals for subsequent tax impacts, readers must note that $102 million in Production, Sales and Use, Income and Various Ad Valorem Taxes were accrued in 2007. These taxes are spread between the General Fund, local units of government and schools. $16.5 million of this was support to local school districts. (See Table 14.) A further detail on interpreting the Occupation tax is to note that the occupation tax is split according to ten percent for the University of Minnesota, forty percent to Elementary and Secondary Education, and fifty percent to the General Fund (or $5,179,000 in 2007). A further breakdown of this $94 million is found in Appendix A.

Table 13. Minnesota's Iron Mines Direct Support for the State

Source: MN Depart. of Revenue, MN DNR	*2007 taxes payable in 2008*
Taconite Production Tax	$94,185,674
Occupation Tax	10,358,000
Sales and Use Tax	6,603,598
Income Tax (withholding on private royalties)	334,975
Various Ad Valorem and Property Taxes	1,154,509
Royalties and Rentals on State Iron Ore	
School Trust lands	25,233,666
University Trust lands	9,984,561
Tax Forfeit	626,320
Other state accounts	323,800
	$148,805,103

Notes for table above:

All taxes are according to the Department of Revenue's *Minnesota Mining Tax Guide, October 2008* (for 2007 taxes payable in 2008).

Royalties and rentals on state iron ore are from Department of Natural Resources Mineral receipts by Account for Calendar Year 2008. Iron ore and taconite income is 97% of the State's total mineral receipts.

Royalties (2007): $87.1 million in Royalties were paid in 2007 by iron mining industry (Royalties include state and private-owned royalties.)

$27.8 million was paid on state royalties that benefitted the School Trust (K-12), University Trust, Tax Forfeit minerals, and DNR mineral management activities.

$59.3 million was paid on private mineral royalties, of which $334,975 was withheld for state tax obligations.

Royalty costs per ton have increased 132% in the last five years. (The 2002 royalty cost of $1.10/ton increased to $2.55/ton by 2007).

Occupation taxes: Occupation taxes have increased from $1.5 million in 2000 to $10.3 million in 2007.

Production and other taxes: $102 million in Production, Sales and Use, Income and various ad Valorem Taxes were paid in 2007. These taxes are spread between the General Fund, local units of government and schools. $16.5 million of this was support to local school districts.

Value to wages and communities: Mining wages have increased from an average hourly wage from $18.23 in 2000, to $26.38 in 2007, while the number of employees has decreased about 500.

More detail on Minnesota's Iron Mining industry's support for education, and according to the Minnesota Department of Natural Resources and the Minnesota Department of Revenue, during 2008 (calendar year) Minnesota's iron mining industry paid $56.9 million towards Minnesota's education.

Table 14. Minnesota's Iron Mining Industry Support for Education

Source: MN Depart. of Revenue, MN DNR	*School*	*University*	*Total Education*
School district component of Production Tax	$16,495,306		$16,495,306
State iron ore royalties and rent	$25,233,666	$9,984,561	$35,218,227
Occupation Tax	$4,143,200	$1,035,800	$5,179,000
	$45,872,172	$11,020,361	$56,892,533

Notes:

School district component of Production Tax is according to the Department of Revenue's *Minnesota Mining Tax Guide, October 2008* (for 2007 taxes payable in 2008).

School Trust and University royalties are from Department of Natural Resources Mineral receipts by Account for Calendar Year 2008. Iron ore and taconite income is 97% of the State's total mineral receipts.

Notes (cont.):

Occupation Tax is according to the Department of Revenue's *Minnesota Mining Tax Guide, October 2008*. Total tax is $10,358,000 of which 40% went to elementary and secondary education and 10% went to the University of Minnesota.

Ad valorem and property tax according to the Department of Revenue's *Minnesota Mining Tax Guide, October 2008*, totaled $1,154,509, which benefited cities and townships, school districts, counties, and Indian Affairs Council. However, no detail of the fraction to school districts was provided.

The following table, taken from the Department of Natural Resources Mineral Receipts by Account Calendar Years 2007 and 2008, shows royalties and rental receipts to the State as distributed for ferrous mining. Royalties and rental receipts are payments by the mining companies to use the State mineral resources that are non-renewable.

Table 15. Minnesota Ferrous Mineral Royalties and Rentals Receipts, 2007 and 2008

Source: MN DNR, BBER

Account	2007 Iron-Ore Taconite	2008 Iron-Ore Taconite
School Trust Fund	$11,971,191	$20,186,933
School Trust Fund (Minerals Mgmt)	$2,992,798	$5,046,733
University Trust Fund	$7,794,141	$7,987,649
University Trust Fund (Minerals Mgmt)	$1,948,535	$1,996,912
Tax Forfeit	$782,262	$501,056
Tax Forfeit(Minerals Mgmt)	$195,565	$125,264
. . .		
Filing Fees		$100
. . .		
Advance Royalty Account	$388,653	$323,699
TOTAL:	$26,073,146	$36,168,347

Ferrous Mining Development Scenarios

BBER considered the possibility that only some of the proposed projects will progress to full operations status. The following table presents impact results assuming 75% of Value Added, 75% of Output, and 75% of Employment is achieved by year 2013. The table also shows values for assuming 50% of projects are achieved, and for the baseline operations in 2007 (for comparison).

Also, given the variety of projects and the sensitivity of detail surrounding the commercial ventures being proposed, speculation about which projects are most likely to become operational requires treating the subject of ferrous mining development as an aggregated industry of many firms. The following tables present impact results for percentage success rates for expansion and startup projects. Possible 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios. This calculation is based on decreasing the total hypothetical impacts of value added, output and employment by 75% and 50%.

75% or 50% Impact of Possible Ferrous Mining Projects Completed, Minnesota and the Region

Table 16. Ferrous Mining Impact on Minnesota: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$1,385,574,508	$2,870,802,686	3,422
75%	$1,039,180,881	$2,153,102,015	2,567
50%	$692,787,254	$1,435,401,343	1,711

Table 17. Ferrous Mining Impact on the Arrowhead Region and Douglas County, WI: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$1,229,136,415	$2,610,441,873	3,029
75%	$921,852,311	$1,957,831,405	2,272
50%	$614,568,208	$1,305,220,937	1,515

IV. Findings: Non-Ferrous Mining Impacts

In this section, BBER reports the direct, indirect, and induced economic impacts of construction and operations activities of non-ferrous mining in Northeast Minnesota, measured in employment, output, and value added. Impacts are modeled for both the State of Minnesota, and the immediate region, including the counties of the Arrowhead Region and the counties of the Duluth Metropolitan Statistical Area, which includes Douglas County, Wisconsin.

To provide a baseline reference, and to answer the question What Does the Non-Ferrous Mining Industry Add to the State's Economy? BBER modeled the impact on the State's economy that might be felt if non-ferrous mining and all its transactions had been removed from the State of Minnesota. BBER uses IMPLAN's most recent data, which is for year 2007, for this impact model.

Next, using employment and output projections from the mining industry, as well as assistance from representatives of the State, BBER modeled the economic impact of proposed new projects in the non-ferrous mining industry sector. A special sub-section of the Findings covers the results of modeling non-ferrous mining tax impacts.

Finally, BBER considered the possibility that not all projects will be viable and will progress to full operations status. Therefore impacts for two development scenarios are presented, to show impact results if only half or only- three quarters of projects currently proposed succeed. The 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios.

What Does Non-Ferrous Mining Add to the State's Economy?

IMPLAN provides a model of the economy of the State of Minnesota, including non-ferrous mining (identified as sector 23 Copper, nickel, lead, and zinc mining), as presented in the section "Industry Definitions," above. The values in the tables below are estimated from sources associated with the IMPLAN model and also identified above.

In the tables below, the Value Added total measure shows that Copper, nickel, lead, and zinc mining contributed more than $250 million in wages, rents, and profits to Minnesota's economy. The Value Added total represents the direct value of the wages, etc., plus the additional inter-industry spending that resulted from these wages, plus any additional household spending that resulted from the direct wages and inter-industry spending.

The Output total measure shows that Copper, nickel, lead, and zinc mining produced almost $400 million in local production as part of Minnesota's economy. The Output total represents the direct value of local production, plus the additional inter-industry transactions that resulted from local production, plus any additional household spending that resulted from inter-industry production.

The Employment measure shows that Copper, nickel, lead, and zinc mining directly employed more than five hundred employees (jobs—including temporary, part time or short term) in Minnesota. The Employment total of more than fourteen hundred jobs represents the direct employment in the industry sector, plus other jobs dependent on, but not part of, the Copper, nickel, lead, and zinc mining sector, plus any jobs created by the additional household spending and activity linked to direct and indirect jobs in the Copper, nickel, lead, and zinc mining industry.

The IMPLAN input-output model also provides an opportunity to calculate a multiplier value associated with each of these measures. For example, the employment multiplier for Copper, nickel, lead, and zinc mining in the State of Minnesota of 2.6 indicates that for every job in the Copper, nickel, lead, and zinc mining industry, another 1.6 jobs are created as the indirect and induced effect of the mining industry's job. In the same way, the model estimates that for every dollar of wages, rents, interest and profits paid to non-ferrous mining employees and companies, another $0.41 is generated through indirect and induced effects throughout the economy of the State.

The impact of mining employment and the payroll associated with these jobs may be the most obvious impact, however the Output measure also shows contribution to the region and to the State through production taxes, royalties, and fees on the exported ore.

Although the total economic impacts for the State are almost always greater than the impacts for the Arrowhead Region and Douglas County, WI, the importance of mining sector to the region's economy is proportionately greater.

The following tables show the (current operations as of 2007) impact of non-ferrous mining on the State of Minnesota and the region, in 2007 dollars.

Table 18. Minnesota Non-Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$182,172,848	$39,805,440	$35,294,635	$257,272,923
Output	$271,453,664	$64,880,211	$62,565,734	$398,899,609
Employment	531	342	534	1,407

Note direct effects for Value Added, Output, and Employment results in different totals for the State and the region. The regional economy does not enjoy the same level of added indirect and induced effects. This implies, for instance, that Copper, nickel, lead, and zinc mining creates a hundred jobs in the Metro and other parts of the State, dependent on the mining jobs in the Arrowhead Region.

Table 19. Arrowhead and Douglas County, WI Non-Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$182,172,848	$37,804,228	$24,296,166	$244,273,242
Output	$271,453,664	$60,163,975	$42,879,398	$374,497,037
Employment	531	318	458	1,307

The top twenty Minnesota indirect and induced jobs dependent on Copper, nickel, lead, and zinc mining come from the following supporting industries:

Table 20. Top Twenty Industrial Sector Jobs (Including Indirect and Induced) Dependent on Non-Ferrous Mining Employment in Minnesota, Baseline 2007

Industry	*Direct*	*Indirect*	*Induced*	*Total*
Mining copper- nickel- lead- and zinc	531	12	0	543
Custom computer programming services	0	109	0	109
Food services and drinking places	0	8	60	68
Real estate establishments	0	9	22	31
Wholesale trade businesses	0	7	20	27
Architectural- engineering- and related services	0	25	1	26
Offices of physicians- dentists- and other health	0	0	26	26
Private hospitals	0	0	25	25
Management of companies and enterprises	0	20	3	23
Employment services	0	12	10	22
Electric power generation- transmission- and distribution	0	20	2	22
Retail Stores - General merchandise	0	0	20	20
Nursing and residential care facilities	0	0	20	20
Retail Stores - Food and beverage	0	0	19	19
Services to buildings and dwellings	0	8	6	14
Retail Nonstores - Direct and electronic sales	0	0	14	14
Transport by truck	0	8	5	13
Civic- social- professional- and similar organization	0	4	9	13
Private household operations	0	0	13	13
Securities- commodity contracts- investments- and	0	7	6	13
As well as jobs in various other sectors of the economy . . .				346
Total				1,407

Jobs created as the impact of taxes are included in the model's calculations.

The Economic Impacts of Non-Ferrous Mining Proposed Projects

BBER modeled the economic impact of proposed expansions and projects in the non-ferrous mining industry sector. Findings from individual projects are aggregated in the tables below, and present an estimation of the impact of all currently proposed new start-up projects. BBER relied on industry representatives and State of Minnesota representatives for its inventory of possible projects. The timeline in figure 3 shows BBER's rationale for choosing the year 2013 as the first possible full operations year in which all projects might be operational.

BBER also modeled the economic impact of the total sector activity, which combines the proposed new projects with the on-going industry in the State. Tables described as "all operations" present the impacts

of Copper, nickel, lead, and zinc mining in year 2013 as if all new projects were at full operations and are added to the continuing impact of current (2007) Copper, nickel, lead, and zinc mining operations.

Minnesota Construction: Proposed Non-Ferrous Mining Projects

Project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013.

Table 21. Non-Ferrous Mining Construction's Value Added, Output, and Employment Impacts on the State of Minnesota 2008–2013, New Projects, Aggregated

Source: IMPLAN	Value Added	Output	Employment
2008	—	—	—
2009	—	—	—
2010	$868,708,020	$1,777,808,417	11,327
2011	$785,947,945	$1,608,440,153	11,196
2012	$872,910,369	$1,786,408,519	12,007
2013	—	—	—

Minnesota Operations: Proposed Non-Ferrous Mining Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all proposed expansions and new projects to be in year 2013.

Table 22. Non-Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the State of Minnesota, New Projects, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,048,543,824	$229,110,688	$203,147,559	$1,480,802,071
Output	$1,562,423,032	$373,435,136	$360,113,549	$2,295,971,717
Employment	2,115	1,361	2,127	5,603

Minnesota Operations: All Proposed and Continuing Non-Ferrous Mining, 2013

The table below shows the estimated impact of full operations for all proposed new projects and all continuing industry operations for year 2013.

Table 23. Non-Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the State of Minnesota, 2013, All Operations

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,230,716,672	$268,916,128	$238,442,194	$1,738,074,994
Output	$1,833,876,696	$438,315,347	$422,679,283	$2,694,871,326
Employment	2,646	1,702	2,661	7,009

Region Construction: Proposed Non-Ferrous Mining Projects

As with the impacts for the State, project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and does not forecast the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013.

Table 24. Non-Ferrous Mining Construction's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, New Projects, Aggregated, 2008–2013

Source: IMPLAN	Value Added	Output	Employment
2008	—	—	—
2009	—	—	—
2010	$705,788,412	$1,578,028,591	10,332
2011	$638,549,360	$1,427,692,955	10,213
2012	$709,202,647	$1,585,662,264	10,993
2013	—	—	—

Region Operations: Proposed Non-Ferrous Mining Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all new projects to be in year 2013.

Table 25. Non-Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, New Projects, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,048,543,824	$220,314,385	$146,575,980	$1,415,434,189
Output	$1,562,423,032	$360,830,594	$271,453,500	$2,194,707,126
Employment	2,115	1,295	1,897	5,307

Region Operations: All Proposed and Continuing Non-Ferrous Mining, 2013

The table below shows the estimated impact of full operations for all proposed new projects and all continuing industry operations, for year 2013.

Table 26. Non-Ferrous Mining Operation's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, 2013, All Operations

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,230,716,672	$258,118,613	$170,872,146	$1,659,707,431
Output	$1,833,876,696	$420,994,569	$314,332,898	$2,569,204,163
Employment	2,646	1,613	2,356	6,615

Non-Ferrous Tax impacts

Non-Ferrous Mining Tax Impacts on Minnesota and the Region

In order to estimate non-ferrous tax impacts on Minnesota, BBER followed the Minnesota DNR's Mineral Receipts by Account for 2007 and 2008. Compared to ferrous mining, non-ferrous mining contributes much less to the State. As displayed in the following table, (again, according to the Department of Natural Resources Mineral Receipts by Account Calendar Year 2007 and 2008) non-ferrous tax impacts (or Non-Ferrous Metallic Minerals) accounted for less than 2% of all mineral tax receipts totals for 2008. However, it is also significant to note growth in the tax impacts for non-ferrous mining from 2007 to 2008. Table 27 shows that the sector contributed more than $355,000 in 2007, and increased to almost $557,000 in 2008.

Table 27. Minnesota Non-Ferrous Mineral Royalties and Rentals Receipts, 2007 and 2008

Source: MN DNR

Account	*2007 Non-Ferrous Metallic Minerals*	*2008 Non-Ferrous Metallic Minerals*
School Trust Fund	$132,118	$167,911
School Trust Fund (Minerals Mgmt)	$33,030	$41,978
University Trust Fund		
University Trust Fund (Minerals Mgmt)		
Tax Forfeit	$106,155	$190,193
Tax Forfeit(Minerals Mgmt)	$26,539	$47,548
Consolidated Conservation	$30,150	$54,719
Consolidated Conservation (Minerals Mgmt)	$7,537	$13,680
Volstead Lands		$1,050
Volstead. Lands (Minerals Mgmt)		$262
Game & Fish Fund	$4,560	$8,160
Game & Fish Fund (Minerals Mgmt)	$1,140	$2,040
General Fund	$11,283	$17,638
Filing Fees	$400	$7,000
State Forest		
General Fund (Minerals Mgmt)	$2,821	$4,409
Natural Resources Fund		
Advance Royalty Account		
TOTAL:	$355,733	$556,589

Non-ferrous Development Scenarios

BBER considered the possibility that only some of the proposed projects will progress to full operations status. The following table presents impact results assuming 75% of Value Added, 75% of Output, and 75% of Employment is achieved by year 2013. The table also shows values for assuming 50% of projects are achieved, and for the baseline operations in 2007 (for comparison).

Also, given the variety of projects and the sensitivity of detail surrounding the commercial ventures being proposed, speculation about which projects are most likely to become operational requires treating the subject of non-ferrous mining development as an aggregated industry of many firms. The following tables present impact results for percentage success rates for expansion and startup projects. Possible 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios.

75% and 50% Impact of Possible Non-Ferrous Mining Projects Completed, Minnesota and the Region

Table 28. Non-Ferrous Mining Impact on Minnesota: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$1,480,802,071	$2,295,971,717	5,603
75%	$1,110,601,553	$1,721,978,788	4,202
50%	$740,401,036	$1,147,985,859	2,802

Table 29. Non-ferrous Mining Impact on the Arrowhead Region and Douglas County, WI: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$1,415,434,189	$2,194,707,126	5,307
75%	$1,061,575,642	$1,646,030,345	3,980
50%	$707,717,095	$1,097,353,563	2,654

V. Findings: Ferrous and Non-Ferrous Mining Impacts

In this section, BBER reports the direct, indirect, and induced economic impacts of construction and operations activities of both ferrous and non-ferrous mining in Northeast Minnesota, measured in employment, output, and value added. Impacts are modeled for both the State of Minnesota, and the immediate region, including the counties of the Arrowhead Region and the counties of the Duluth Metropolitan Statistical Area, which includes Douglas County, Wisconsin.

To provide a baseline reference, and to answer the question What Does the Ferrous and Non-Ferrous Mining Industry Add to the State's Economy? BBER modeled the impact on the State's economy that might be felt if ferrous and non-ferrous mining and all their transactions had been removed from the State of Minnesota. BBER uses IMPLAN's most recent data, which is for year 2007, for this impact model.

Next, using employment and output projections from the mining industry, as well as assistance from representatives of the State, BBER modeled the economic impact of proposed expansions and new projects in the ferrous and non-ferrous mining industry sectors. A special sub-section of the Findings covers the results of modeling ferrous mining tax impacts.

Finally, BBER considered the possibility that not all projects will be viable and will progress to full operations status. Therefore impacts for two development scenarios are presented, to show impact results if only half or only three quarters of projects currently proposed succeed. The 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios.

What Do the Ferrous and Non-Ferrous Mining Industries Add to the State's Economy?

IMPLAN provides a model of the economy of the State of Minnesota, including ferrous mining (identified as sector 22 Iron ore mining) and non-ferrous mining (identified as sector 23 Copper, nickel, lead, and zinc mining), as presented in the section "Industry Definitions," above. The values in the tables below are estimated from sources associated with the IMPLAN model and also identified above.

In the tables below, the Value Added total measure shows that ferrous and non-ferrous mining contributed almost than $1.8 billion in wages, rents, and profits to Minnesota's economy. The Value Added total represents the direct value of the wages, etc., plus the additional inter-industry spending that resulted from these wages, plus any additional household spending that resulted from the direct wages and inter-industry spending.

The Output total measure shows that ferrous and non-ferrous mining produced more than $3.5 billion in local production as part of Minnesota's economy. The Output total represents the direct value of local production, plus the additional inter-industry transactions that resulted from local production, plus any additional household spending that resulted from inter-industry production.

The Employment measure shows that ferrous and non-ferrous mining directly employed more than forty-one hundred employees (jobs—including temporary, part time or short term) in Minnesota. The Employment total of eleven thousand six hundred jobs represents the direct employment in the industry sector, plus other jobs dependent on, but not part of, the ferrous and non-ferrous sectors, plus any jobs created by the additional household spending and activity linked to direct and indirect jobs in the Iron ore mining, and Copper, nickel, lead, and zinc mining industries.

The IMPLAN input-output model also provides an opportunity to calculate a multiplier value associated with each of these measures. For example, the employment multiplier for ferrous and non-ferrous mining in the State of Minnesota of almost 2.8 indicates that for every job in the ferrous and non-ferrous mining industries, another 1.8 jobs are created as the indirect and induced effect of the mining industries' job. In the same way, the model estimates that for every dollar of wages, rents, interest and profits paid to mining employees and companies, another $0.61 is generated through indirect and induced effects throughout the economy of the State.

The impact of mining employment and the payroll associated with these jobs may be the most obvious impact, however the Output measure also shows contribution to the region and to the State through production taxes, royalties, and fees on the exported ore and production activity.
Although the total economic impacts for the State are almost always greater than the impacts for the Arrowhead Region and Douglas County, WI, the importance of mining sector to the region's economy is proportionately greater.

The following tables show the baseline impact (current operations as of 2007) of ferrous and non-ferrous mining on the State of Minnesota and the region, in 2007 dollars.

Table 30. Minnesota Ferrous and Non-Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,109,327,600	$402,205,482	$275,450,101	$1,786,983,183
Output	$2,314,825,696	$765,378,964	$488,282,279	$3,568,486,939
Employment	4,152	3,281	4,167	11,600

Note direct effects for Value Added, Output, and Employment results in different totals for the State and the region. The regional economy does not enjoy the same level of added indirect and induced effects. This implies, for instance, that ferrous and non-ferrous mining creates over eleven hundred jobs in the Metro and other parts of the State, dependent on the mining jobs in the Arrowhead Region.

Table 31. Arrowhead and Douglas County, WI Ferrous and Non-Ferrous Mining Economic Impacts, Baseline 2007

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,109,327,664	$313,475,004	$188,629,522	$1,611,432,190
Output	$2,314,825,696	$628,509,208	$347,227,895	$3,290,562,799
Employment	4,152	2,735	3,532	10,419

The top twenty Minnesota indirect and induced jobs dependent on ferrous and non-ferrous mining come from the following supporting industries:

Table 32. Top Twenty Industrial Sector Jobs (Including Indirect and Induced) Dependent on Ferrous and Non-Ferrous Mining Employment in Minnesota, Baseline 2007

Industry	*Direct*	*Indirect*	*Induced*	*Total*
Mining iron ore	3,621	0	0	3,621
Transport by truck	0	585	36	621
Mining copper- nickel- lead- and zinc	531	12	0	543
Food services and drinking places	0	64	406	470
Wholesale trade businesses	0	264	136	400
Electric power generation transmission and distribution	0	257	11	268
Management of companies and enterprises	0	195	19	214
Real estate establishments	0	50	152	202
Offices of physicians dentists and other health	0	0	174	174
Private hospitals	0	0	172	172
Employment services	0	104	67	171
Retail Stores General merchandise	0	17	136	153
Retail Stores Food and beverage	0	15	126	142
Nursing and residential care facilities	0	0	133	133
Custom computer programming services	0	109	0	110
Retail Nonstores Direct and electronic sales	0	11	94	105
US Postal Service	0	86	18	104
Maint & repair construct of nonresident structures	0	80	19	99
Retail Stores Motor vehicle and parts	0	12	85	97
Private household operations	0	0	92	92
As well as jobs in various other sectors of the economy . . .				3,709
Total				11,600

As with the ferrous mining sector, indirect and induced jobs created as the impact of taxes are included in the model's calculations.

The Economic Impacts of Proposed Projects

BBER modeled the economic impact of proposed expansions and projects in the ferrous and non-ferrous mining industry sector. Findings from individual projects are aggregated in the tables below, and present an estimation of the impact of all currently proposed ferrous and non-ferrous mining expansions and new start-up projects. BBER relied on industry representatives and State of Minnesota representatives for its inventory of possible projects. The timeline in figure 3 shows BBER's rationale for choosing the year 2013 as the first possible full operations year in which all projects might be operational.

BBER also modeled the economic impact of the total combined sectors' activity, which combines the proposed expansions and new projects with the on-going industries in the State. Tables described as "all operations" present the impacts of ferrous and non-ferrous mining in year 2013, as if all proposed expansions and new projects were at full operations and are added to the continuing impact of current (2007) mining operations.

Minnesota Construction: Expansions and Proposed Ferrous and New Non-Ferrous Mining Projects

These projects include investment in facilities improvement and maintenance. Project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013.

Table 33. Ferrous and Non-ferrous Mining Construction's Value Added, Output, and Employment Impacts on the State of Minnesota 2008–2013 (Aggregated, all projects)

Source: IMPLAN	Value Added	Output	Employment
2008	$718,195,017	$1,468,214,834	6,599
2009	$388,597,975	$794,903,239	3,856
2010	$1,221,432,958	$2,498,590,388	14,698
2011	$1,218,660,120	$2,493,488,720	14,219
2012	$1,299,057,490	$2,658,517,360	14,946
2013	$242,207,594	$495,677,121	1,229

Minnesota Operations: Expansions and Proposed Ferrous and Non-Ferrous Mining Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all proposed expansions and new projects to be in year 2013.

Table 34. Ferrous and Non-ferrous Mining Expansions and New Projects Operation's Value Added, Output, and Employment Impacts on the State of Minnesota, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,888,338,146	$557,363,869	$420,674,564	$2,866,376,579
Output	$3,413,127,172	$1,007,929,947	$745,717,284	$5,166,774,403
Employment	3,331	2,348	3,346	9,025

Minnesota Operations: All Ferrous and Non-Ferrous Mining Operations

The table below shows the estimated impact of full operations for all proposed expansions and new projects and all continuing industry operations for year 2013.

Table 35. Minnesota Ferrous and Non-ferrous Mining Economic Impacts: Expansions, Startups, and All Other Operations, Aggregated, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$2,997,665,746	$959,569,351	$696,124,665	$4,653,359,762
Output	$5,727,952,868	$1,773,308,911	$1,233,999,563	$8,735,261,342
Employment	7,483	5,628	7,513	20,624

Region Construction: Expansions and Proposed Ferrous and Non-Ferrous Mining Projects

As with the impacts for the State, these projects include investment in facilities improvement and maintenance. Project totals have been aggregated by year. As noted earlier, the timeline for project construction is dependent on environmental permitting and does not forecast the months or years such permitting requires for approval. Construction impacts associated with possible projects are modeled as yearly totals from 2008 to 2013.

Table 36. Ferrous and Non-ferrous Mining Construction's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, 2008–2013 (Aggregated, all projects)

Source: IMPLAN	Value Added	Output	Employment
2008	$583,192,668	$1,300,800,898	6,016
2009	$315,085,648	$702,813,736	3,509
2010	$991,883,526	$2,215,112,954	13,404
2011	$989,520,817	$2,210,594,625	12,963
2012	$1,054,746,134	$2,357,090,669	13,665
2013	$196,108,484	$437,329,536	1,111

Region Operations: Ferrous and Non-Ferrous Expansions and Proposed Projects

Following the assumptions made for the time line of projects, operations impacts assume full production for all proposed expansions and new projects to be in year 2013.

Table 37. Ferrous and Non-Ferrous Mining Expansions and New Projects Operation's Value Added, Output, and Employment Impacts on the Arrowhead Region and Douglas County, WI, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$1,888,338,254	$463,509,564	$292,722,786	$2,644,570,604
Output	$3,413,127,172	$852,619,251	$539,402,576	$4,805,148,999
Employment	3,331	2,087	2,919	8,337

Region Operations: All Ferrous and Non-Ferrous Mining Operations

The table below shows the estimated impact of full operations for all proposed expansions and new projects and all continuing industry operations for year 2013.

Table 38. Arrowhead and Douglas County, WI Ferrous and Non-Ferrous Mining Economic Impacts: Expansions, Startups, and All Other Operations, Aggregated, 2013

Source: IMPLAN	*Direct Effect*	*Indirect Effect*	*Induced Effect*	*Total*
Value Added	$2,997,665,918	$776,984,568	$481,352,308	$4,256,002,794
Output	$5,727,952,868	$1,481,128,459	$886,630,471	$8,095,711,798
Employment	7,483	4,822	6,451	18,756

Ferrous and Non-Ferrous Tax impacts

As with the ferrous and the non-ferrous tax impact discussions above, the following tables, taken from the Department of Natural Resources Mineral Receipts by Account Calendar Years 2007 and 2008, show how tax receipts to the State are distributed for both ferrous and non-ferrous mining.

Table 39. Minnesota Ferrous and Non-Ferrous Royalties and Rentals Receipts, 2007 and 2008

Source: MN DNR, BBER	*Ferrous*	*Non-Ferrous*
Account	*Iron-Ore Taconite*	*Metallic Minerals*
	2007	
School Trust Fund	$11,971,191	$132,118
School Trust Fund (Minerals Mgmt)	$2,992,798	$33,030
University Trust Fund	$7,794,141	
University Trust Fund (Minerals Mgmt)	$1,948,535	
Tax Forfeit	$782,262	$106,155
Tax Forfeit(Minerals Mgmt)	$195,565	$26,539
Consolidated Conservation		$30,150
Consolidated Conservation (Minerals Mgmt)		$7,537
Volstead Lands		
Volstead. Lands (Minerals Mgmt)		
Game & Fish Fund		$4,560
Game & Fish Fund (Minerals Mgmt)		$1,140
General Fund		$11,283
Filing Fees		$400
General Fund (Minerals Mgmt)		$2,821
Natural Resources Fund		
Advance Royalty Account	$388,653	
TOTAL:	$26,073,146	$355,733
	2008	
School Trust Fund	$20,186,933	$167,911
School Trust Fund (Minerals~ Mgmt)	$5,046,733	$41,978
University Trust Fund	$7,987,649	
University Trust Fund (Minerals Mgmt)	$1,996,912	
Tax Forfeit	$501,056	$190,193
Tax Forfeit(Minerals Mgmt)	$125,264	$47,548
Consolidated Conservation		$54,719
Consolidated Conservation (Minerals Mgmt)		$13,680
Volstead Lands		$1,050
Volstead. Lands (Minerals Mgmt)		$262
Game & Fish Fund		$8,160
Game & Fish Fund (Minerals Mgmt)		$2,040
General Fund		$17,638
Filing Fees	$100	$7,000
State Forest		
General Fund (Minerals Mgmt)		$4,409
Natural Resources Fund		
Advance Royalty Account	$323,699	
TOTAL:	$36,168,347	$556,589

Readers are referred to the Appendix A of this report for more on ferrous and non-ferrous tax information. BBER offers in this appendix sources for ferrous and non-ferrous tax values, more detail on tax impacts and Minnesota's School Trust Lands and Permanent University Funds (PUF), and impact modeling using IMPLAN to estimate Federal, and State and Local taxes. This appendix also shows

IMPLAN tax impact comparisons for ferrous and non-ferrous mining in Minnesota and the Arrowhead Region and Douglas County, WI.

Ferrous and Non-Ferrous Development Scenarios

BBER considered the possibility that only some of the proposed projects will progress to full operations status. The following table presents impact results assuming 75% of Value Added, 75% of Output, and 75% of Employment is achieved by year 2013. The table also shows values for assuming 50% of projects are achieved, and for the baseline operations in 2007 (for comparison).

Also, given the variety of projects and the sensitivity of detail surrounding the commercial ventures being proposed, speculation about which projects are most likely to become operational requires treating the subject of ferrous and non-ferrous mining development as aggregated industries of many firms. The following tables present impact results for percentage success rates for expansion and startup projects. Possible 75% and 50% impacts are shown in relation to the baseline data and full implementation scenarios.

75% and 50% Impact of Possible Ferrous and Non-Ferrous Mining Projects Completed, Minnesota and the Region

Table 40. Ferrous and Non-Ferrous Mining Impact on Minnesota: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$2,866,376,579	$5,166,774,403	9,025
75%	$2,149,782,434	$3,875,080,802	6,768
50%	$1,433,188,290	$2,583,387,202	4,512

Table 41. Ferrous and Non-Ferrous Mining Impact on the Arrowhead Region and Douglas County, WI: 75% and 50% Impact of Completion of All Proposed Expansions and New Projects

Source: IMPLAN	*Value Added*	*Output*	*Employment*
100%	$2,644,570,604	$4,805,148,999	8,337
75%	$1,983,427,953	$3,603,861,749	6,252
50%	$1,322,285,302	$2,402,574,500	4,168

VI. Mining Suppliers

Ferrous Mining Suppliers

The values in the table below, referred to as "direct requirements coefficients," are in ratio format and show the dollar amount of a commodity required directly by an industry to produce a dollar of the industry's output.

For the ferrous mining industry in Minnesota, in our baseline year 2007, the suppliers to the direct requirements of the Iron ore mining industry included the following sectors:

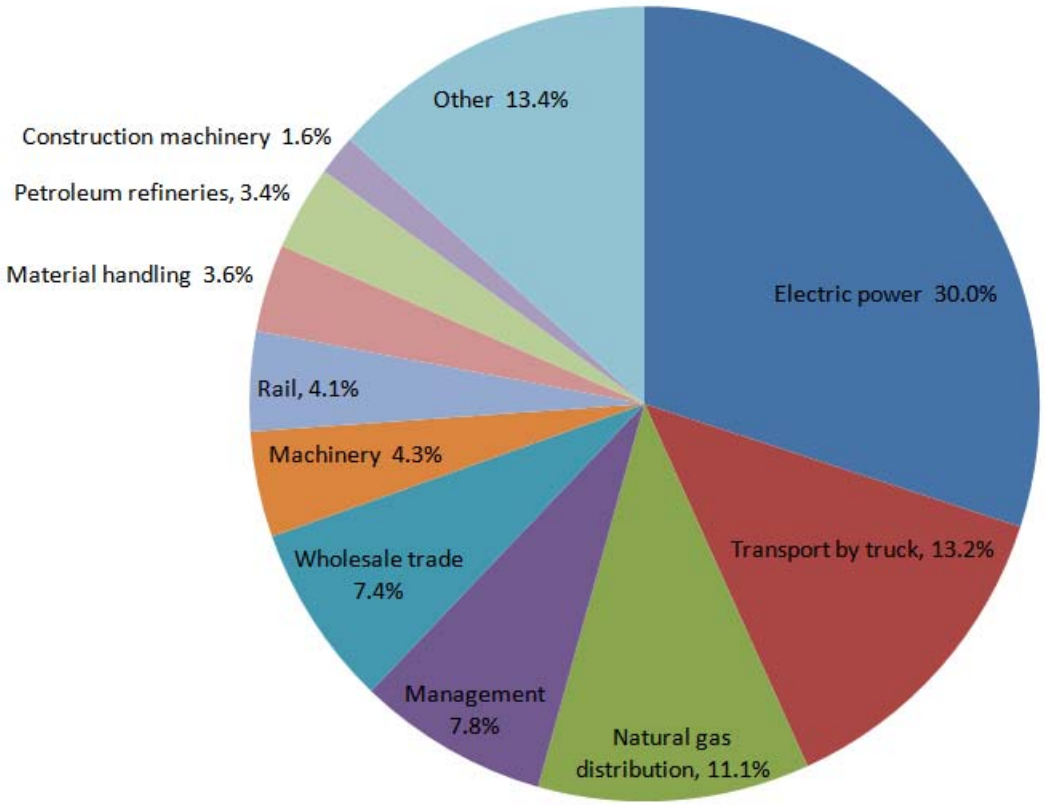
Table 42. Industry Balance Sheet, Commodity by Demand, Ferrous Mining in Minnesota, Baseline 2007, Largest Supplying Sectors

Source: IMPLAN

Supplier Sector	*Commodities supplying more than one cent per dollar of input*
Electric power generation transmission and distribution	$0.11
Iron and steel mills and ferroalloy manufacturing	$0.04
Transport by truck	$0.04
Natural gas distribution	$0.04
All other forging stamping and sintering	$0.03
Support activities for other mining	$0.03
Management of companies and enterprises	$0.03
Mining and quarrying sand gravel clay	$0.02
Ferrous metal foundries	$0.02
Wholesale trade businesses	$0.02
Construction machinery manufacturing	$0.02
Material handling equipment manufacturing	$0.02
Commercial and industrial machinery and equipment	$0.02
Petroleum refineries	$0.02
Tire manufacturing	$0.01
Transport by rail	$0.01
The above list shows suppliers greater than $0.1. The remaining $0.52 of every dollar of input is supplied by remaining sectors of the economy.	$0.52
	$1.00

Based on the model's regional inputs from the industry balance sheet, these are the ferrous mining industry's local purchases from suppliers.

Figure 4. Commodity Demand from Iron Ore Mining in Minnesota, Baseline 2007, by IMPLAN Sector Percentage



Source: IMPLAN; BBER

Non-ferrous Mining Suppliers

For the non-ferrous mining industry in Minnesota, in our baseline year 2007, the suppliers to the direct requirements of this industry included the following sectors:

Table 43. Industry Balance Sheet, Commodity by Demand, Non-ferrous Mining in Minnesota, Baseline 2007, and Largest Supplying Sectors

Source: IMPLAN

Supplier Sector	*Commodities supplying more than one cent per dollar of input*
Mining gold silver and other metal ore	$0.07
Electric power generation transmission and	$0.06
Custom computer programming services	$0.06
Support activities for other mining	$0.03
Management of companies and enterprises	$0.02
Natural gas distribution	$0.02
Architectural engineering and related services	$0.01
Commercial and industrial machinery and equip	$0.01
Securities commodity contracts investments	$0.01
Monetary authorities and depository credit in	$0.01
The above list shows suppliers greater than $0.1. The remaining $0.70 of every dollar of input is supplied by remaining sectors of the economy.	$0.70
More . . . (full table includes smaller suppliers).	
	$1.00

VII. Conclusions

In the summary tables below, the sector totals increase as the impact moves from the base year (numbers 1 and 2) through the impact of addition of expansions and new projects (numbers 3 through 6), to the hypothetical total (number 7) with includes all impacts.

The IMPLAN model's employment multiplier value associated with impact number 7 below, is 2.8. This multiplier estimates that for this grand total impact, for every job in the mining industry, another 1.8 jobs are created as the indirect and induced effect of the mining industry's job. In the same way, for this impact, the model estimates that for every dollar of wages, rents, interest and profits, another $0.55 is generated through indirect and induced effects throughout the economy of the State.

Table 44. Summaries: Ferrous and Non-ferrous Operations Impacts on Minnesota, Baseline 2007, and Proposed Expansions and New Projects, in 2007 Dollars

			Minnesota			
Source: IMPLAN, BBER			*Direct*	*Indirect*	*Induced*	*Total*
1)	**MM 2007 Ferrous (Baseline)**	Value Added	$927,154,752	$362,400,042	$240,155,466	$1,529,710,260
		Output	$2,043,372,032	$700,498,753	$425,716,545	$3,169,587,330
		Employment	3,621	2,939	3,633	10,193
2)	**MN 2007 Non-ferrous (Baseline)**	Value Added	$182,172,848	$39,805,440	$35,294,635	$257,272,923
		Output	$271,453,664	$64,880,211	$62,565,734	$398,899,609
		Employment	531	342	534	1,407
3)	**Ferrous Expansions and New Projects**	Value Added	$839,794,322	$328,253,181	$217,527,005	$1,385,574,508
		Output	$1,850,704,140	$634,494,811	$385,603,735	$2,870,802,686
		Employment	1,216	987	1,219	3,422
4)	**Non-Ferrous New Projects**	Value Added	$1,048,543,824	$229,110,688	$203,147,559	$1,480,802,071
		Output	$1,562,423,032	$373,435,136	$360,113,549	$2,295,971,717
		Employment	2,115	1,361	2,127	5,602
5)	**Total Ferrous (Expansions, New Projects, and 2007 Baseline Operations)**	Value Added	$1,766,949,074	$690,653,223	$457,682,471	$2,915,284,768
		Output	$3,894,076,172	$1,334,993,564	$811,320,280	$6,040,390,016
		Employment	4,837	3,926	4,852	13,615
6)	**Total Non-ferrous (New Projects and 2007 Baseline Operations)**	Value Added	$1,230,716,672	$268,916,128	$238,442,194	$1,738,074,994
		Output	$1,833,876,696	$438,315,347	$422,679,283	$2,694,871,326
		Employment	2,646	1,702	2,661	7,009
7)	**Total Ferrous and Non-ferrous (Expansions, New Projects, and 2007 Baseline Operations)**	Value Added	$2,997,665,746	$959,569,351	$696,124,665	$4,653,359,762
		Output	$5,727,952,868	$1,773,308,911	$1,233,999,563	$8,735,261,342
		Employment	7,483	5,628	7,513	20,624

For the Arrowhead Region and Douglas County, Wisconsin, the IMPLAN input-output model's employment multiplier, for this grand total impact, is 2.5. This multiplier estimates that for every job in the ferrous and non-ferrous mining industries, another 1.5 jobs are created as the indirect and induced effect of the mining industry's job.

In the same way, for this impact, the model estimates that for every dollar of wages, rents, interest and profits, another $0.42 is generated through indirect and induced effects throughout the economy of the Region.

Table 45. Summaries: Ferrous and Non-ferrous Operations Impacts on the Arrowhead Region and Douglas County, WI, Baseline 2007, and Proposed Expansions and New Projects, in 2007 Dollars

Source: IMPLAN, BBER		Arrowhead and Douglas *Direct*	*Indirect*	*Induced*	*Total*
1) **MM 2007 Ferrous (Baseline)**	Value Added	$927,154,816	$275,670,776	$164,333,356	$1,367,158,948
	Output	$2,043,372,032	$568,345,233	$304,348,497	$2,916,065,762
	Employment	3,621	2,417	3,074	9,112
2) **MN 2007 Non-ferrous (Baseline)**	Value Added	$182,172,848	$37,804,228	$24,296,166	$244,273,242
	Output	$271,453,664	$60,163,975	$42,879,398	$374,497,037
	Employment	531	318	458	1,307
3) **Ferrous Expansions and New Projects**	Value Added	$839,794,430	$243,195,179	$146,146,806	$1,229,136,415
	Output	$1,850,704,140	$491,788,657	$267,949,076	$2,610,441,873
	Employment	1,216	792	1,021	3,030
4) **Non-Ferrous New Projects**	Value Added	$1,048,543,824	$220,314,385	$146,575,980	$1,415,434,189
	Output	$1,562,423,032	$360,830,594	$271,453,500	$2,194,707,126
	Employment	2,115	1,295	1,897	5,307
5) **Total Ferrous (Expansions, New Projects, and 2007 Operations)**	Value Added	$1,766,949,246	$518,865,955	$310,480,162	$2,596,295,363
	Output	$3,894,076,172	$1,060,133,890	$572,297,573	$5,526,507,635
	Employment	4,837	3,209	4,095	12,142
6) **Total Non-ferrous (New Projects and 2007 Baseline Operations)**	Value Added	$1,230,716,672	$258,118,613	$170,872,146	$1,659,707,431
	Output	$1,833,876,696	$420,994,569	$314,332,898	$2,569,204,163
	Employment	2,646	1,613	2,356	6,615
7) **Total Ferrous and Non-ferrous (Expansions, New Projects, and 2007 Baseline Operations)**	Value Added	$2,997,665,918	$776,984,568	$481,352,308	$4,256,002,794
	Output	$5,727,952,868	$1,481,128,459	$886,630,471	$8,095,711,798
	Employment	7,483	4,822	6,451	18,756

Although the total economic impacts for the State are almost always greater than the impacts for the Arrowhead Region and Douglas County, WI, the importance of mining sector to the region's economy is proportionately greater.

The following graphic representations show comparisons between the 2007 base line impacts and the hypothetical full operations with additional expansions and new projects. These graphics also compare Minnesota and the Arrowhead Region and Douglas County, WI, as well as comparisons between Ferrous and Non-Ferrous mining economic impacts.

Figure 5. Total Economic Impact of Ferrous and Non-ferrous Mining Payrolls (Value Added)

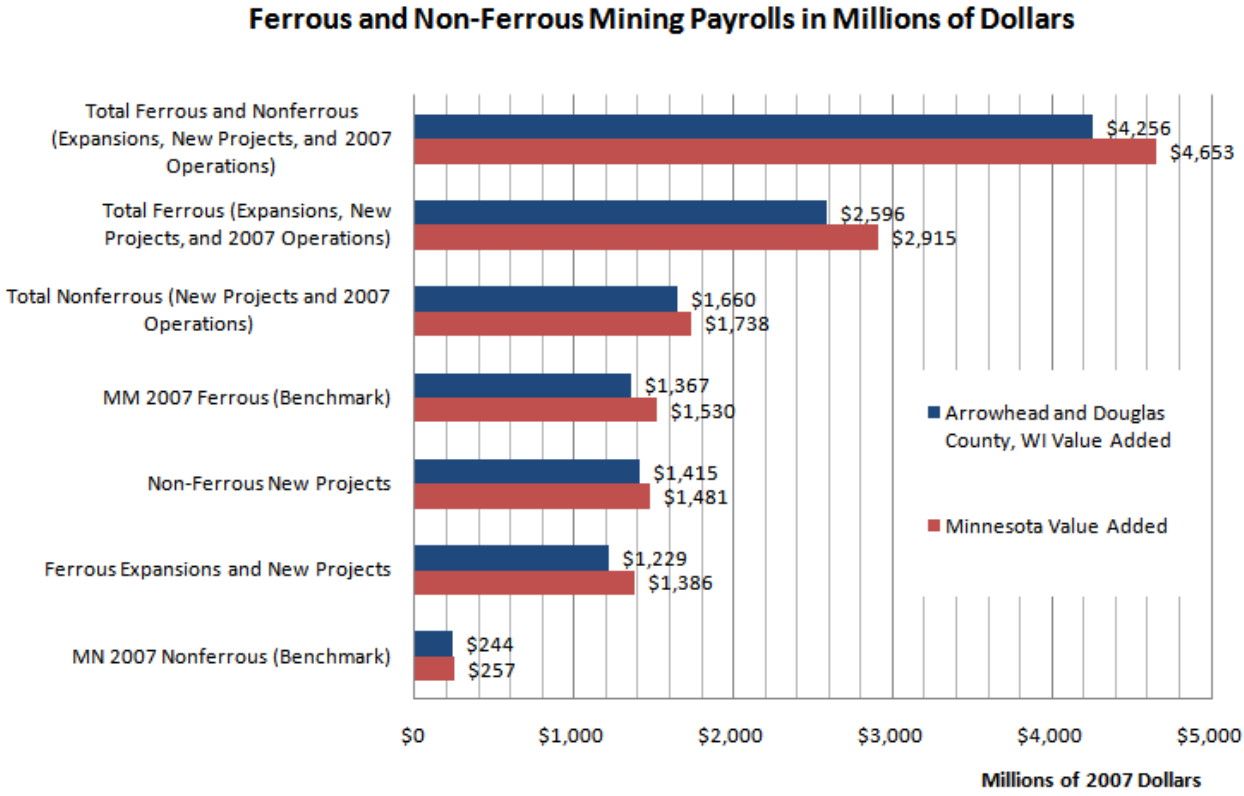


Figure 6. Total Economic Impact of Ferrous and Non-ferrous Mining Payrolls (Value Added) Compared

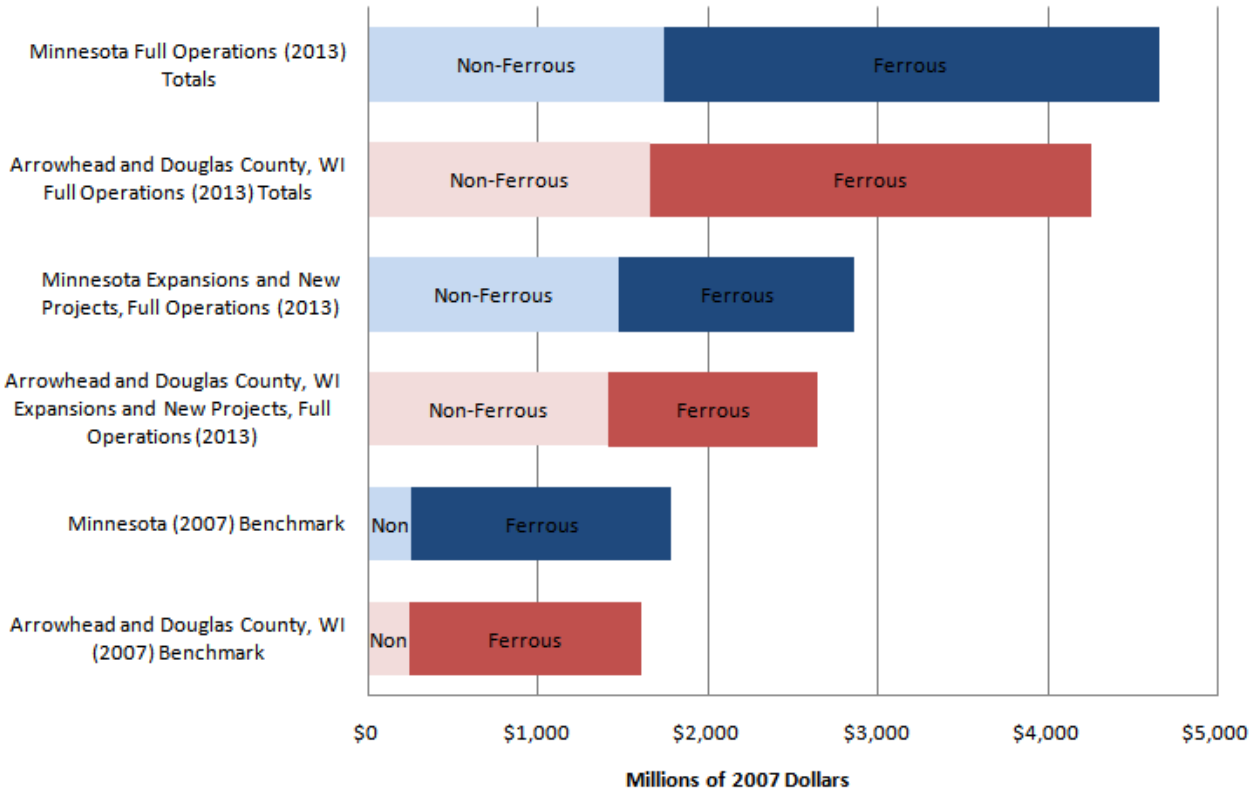


Figure 7. Total Economic Impact of Ferrous and Non-ferrous Mining Production (Output)

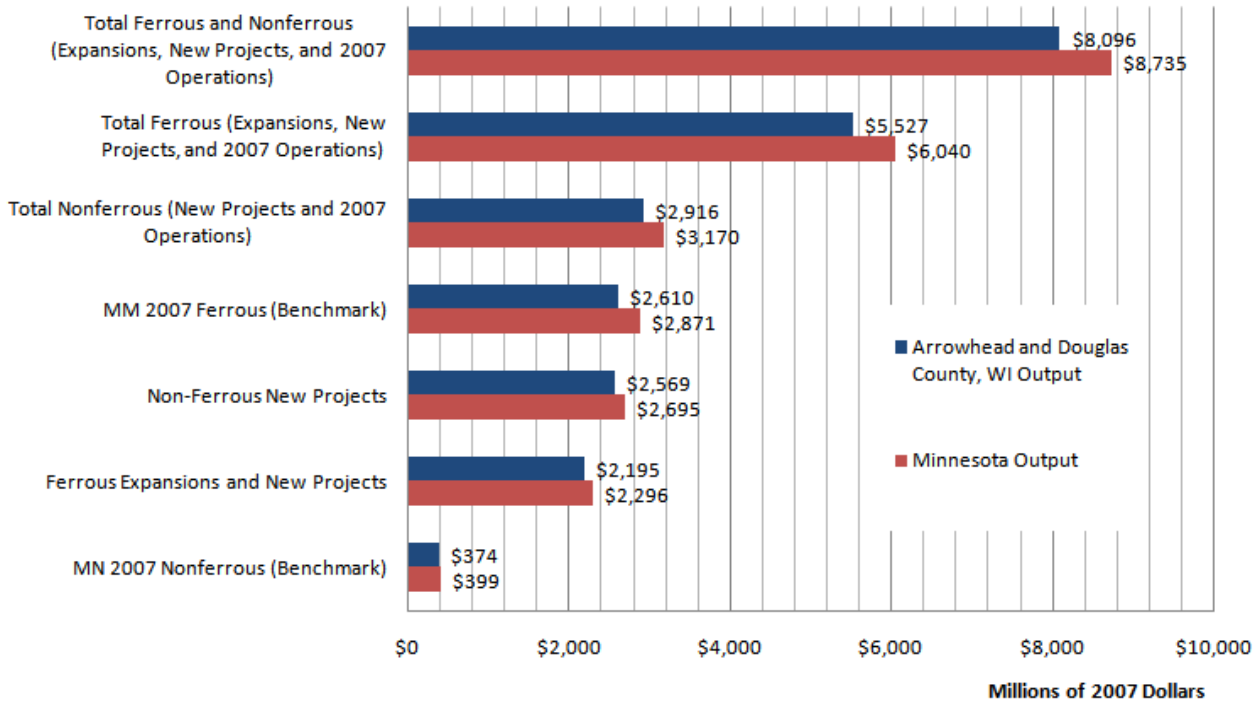
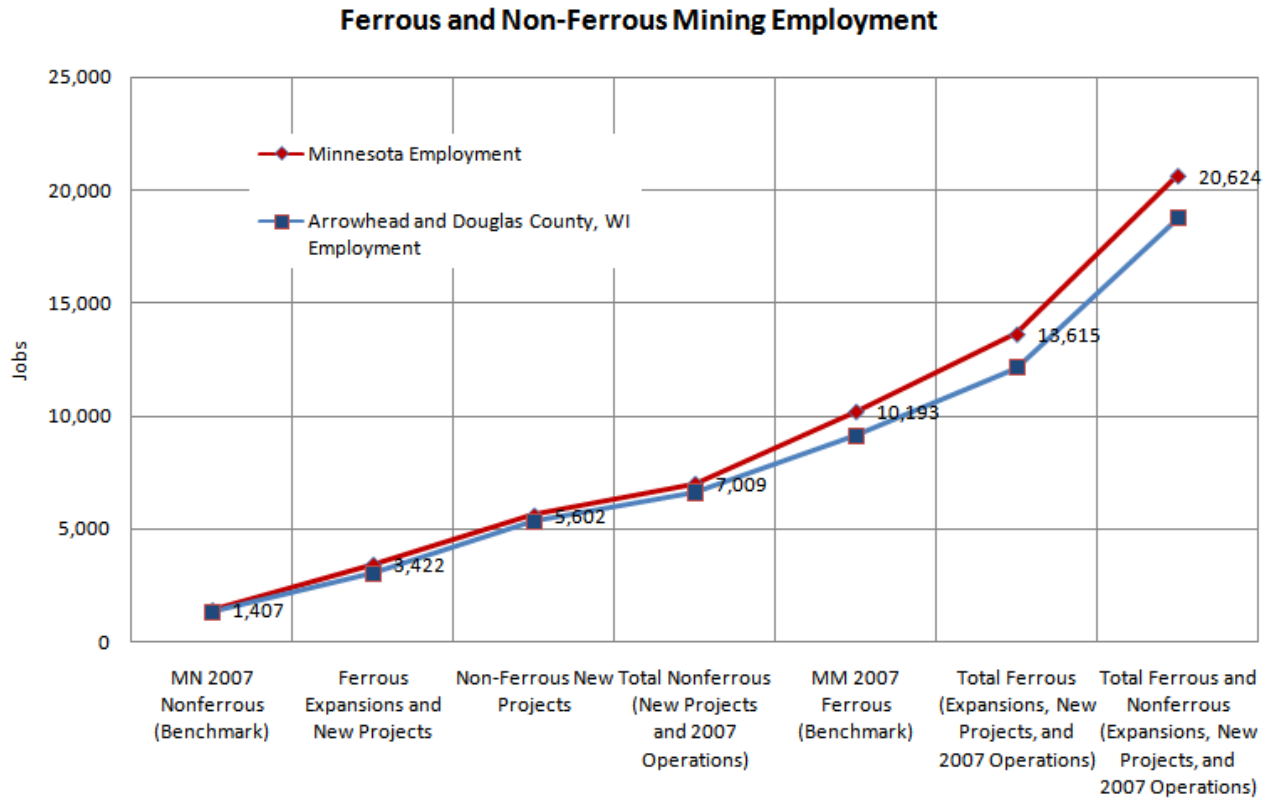


Figure 8. Total Economic Impact of Ferrous and Non-ferrous Mining Employment



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Appendices

Appendix A: Taxes, School Support, and State of Minnesota's Mineral Revenue
Appendix B: Other Costs and Benefits

Appendix A: Taxes, School Support, and the State of Minnesota's Mineral Revenue

This appendix reproduces secondary data sources for tax impact findings presented in the report, including sources for:

1) Taconite Production Tax

   A tax equal to 2 percent of the net proceeds from mining in Minnesota applies to all mineral and energy resources except sand, silica sand, gravel, building stone, all clays, crushed rock, limestone, granite, dimension stone, horticultural peat, soil, iron ore and taconite.

2) Occupation Tax

   All mining companies, ferrous or non-ferrous, are subject to the Minnesota Occupation tax.

3) Sales and Use Tax

   All firms involved in the mining or processing of minerals are subject to the 6.5 percent sales and use tax on all purchases, except those qualifying for the industrial production exemption.

4) Income Tax (withholding on private royalties)

   All persons or companies paying royalties are required to withhold Minnesota income tax from royalty payments (6.25 percent) and remit the withholding tax and applicable information to the Minnesota Department of Revenue.

5) School district component of production tax

6) Various ad Valorem and property taxes

   Ad Valorem Tax (M.S. 272-273): The 1991 legislature amended the definition of real property in M.S. 272.03, Subd. 1, (c)(i), to specifically exclude mine shafts, tunnels, and other underground openings used to extract ores and minerals taxed under Chapter 298.

This appendix also includes background information on

7) Minnesota's School Trust Lands, and Permanent University Funds (PUF)

Finally, this appendix includes a tax impact study from the IMPLAN model for purposes of comparison.

8) IMPLAN model tax impact comparisons for ferrous and non-ferrous mining in Minnesota and the Arrowhead Region and Douglas County, WI.

1) Taconite Production Tax

Source: Figure 9, page 17, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Taconite Production Tax Distribution*

Production year	2002	2003	2004	2005	2006	2007
City and township	$1,827,187	$1,858,302	$2,045,317	$2,047,900	$2,091,131	$2,053,321
Taconite municipal aid	5,773,656	5,843,362	6,453,011	6,454,084	6,588,041	6,484,790
Mining effects	1,580,353	1,607,243	1,766,911	1,769,593	1,806,224	1,773,075
School district — regular	0	1,399,421	1,524,414	1,512,883	1,567,083	1,553,181
School district fund	0	5,301,098	5,797,758	5,928,663	6,134,022	5,932,765
Taconite Referendum Fund	4,844,944	4,688,992	4,469,529	4,218,742	3,985,816	3,636,432
County	9,625,883	9,690,602	10,084,303	9,984,746	10,112,692	9,934,767
County road and bridge	2,541,361	2,558,701	2,663,977	2,637,217	2,671,467	2,623,622
Taconite Property Tax Relief	10,835,555	11,227,023	13,518,201	13,719,754	33,269	10,635,240
IRRRB ($.03 Indexed)	2,655,112	2,724,158	3,033,394	3,071,150	3,289,341	3,327,352
Range Association of Municipalities and Schools	93,379	94,695	104,390	104,092	137,886	136,469
Taconite railroad (fixed)	1,375,519	2,482,454	2,482,454	2,482,454	2,482,454	2,482,454
IRRRB (fixed)	1,252,520	1,252,520	1,252,520	1,252,520	1,252,520	1,252,520
School bond payments	4,734,031	4,755,935	4,634,733	4,767,129	3,747,420	4,265,993
Taconite Environmental Protection Fund	6,171,626	7,009,851	9,929,923	9,417,968	11,537,116	11,003,226
Producer Grant & Loan Fund	–	–	3,115,619	3,098,810	3,177,818	3,157,554
Douglas J. Johnson Economic Protection Trust Fund	7,990,160	836,345	3,140,064	2,864,404	4,001,532	3,682,303
IRR Educational Revenue Bonds	–	–	–	–	1,415,106	1,411,525
Iron Range Higher Education Acct	–	–	–	–	–	1,896,471
Biomass Energy Project Loan	–	–	–	–	–	3,882,294
Taconite Economic Development Fund	9,425,759	9,771,605	11,684,231	11,520,660	12,257,357	8,503,411
Producer grants	1,531,259	–	–	–	–	–
Hockey Hall of Fame	–	–	–	–	76,669	75,860
Transfer from schools to cities**	–	314,121	177,026	–	11,444	157,095
Balkan Township	–	100,000	–	–	–	–
Public Works & Local Economic Development Fund	–	–	–	–	14,720,531	4,323,954
Total	**$72,358,304**	**$73,416,428**	**$87,422,758**	**$86,852,769**	**$93,096,939**	**$94,185,674**

* The production tax is collected and distributed in the year following production. For example, the 2007 production tax was collected and distributed during 2008.

** This is excess school levy reduction money that will be used to reduce levies of cities and townships within the school district.

2) Occupation Tax

Source: Figure 25, page 33, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Occupation Tax Paid by Company								
Taconite	**2000 (000's)**	**2001 (000's)**	**2002 (000,s)**	**2003 (000's)**	**2004 (000's)**	**2005 (000's)**	**2006 (000's)**	**2007 (000's)**
Hibbing Tac	$309	$0	$0	$7	$1,141	$1,525	$2,175	$2,260
Arcelor-Mittal	0	0	15	35	124	240	130	680
National Steel*	0	0	26	0	0	0	0	0
Northshore	0	0	0	0	41	25	280	832
United Tac	0	0	0	0	354	770	151	1,086
USS - Minntac	1,032	0	1,300	1,400	3,104	4,000**	5,000**	5,500**
USS - Keetac	0	0	0	0	147			
Taconite total	**$1,341**	**$0**	**$1,341**	**$1,442**	**$4,911**	**$6,560**	**$7,736**	**$10,358**
Natural ore	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Auburn	$168	$60	$0	$0	$0	$0	$0	$0
Natural ore total	**$0**	**$168**	**$60**	**$0**	**$0**	**$0**	**$0**	**$0**
Total tax paid	**$1,509**	**$60**	**$1,341**	**$1,442**	**$4,911**	**$6,560**	**$7,736**	**$10,358**

*The former National Steel is now USS-Keewatin Taconite (Keetac).
** USS-Minntac & USS-Keetac file a combined return.

3) Sales and Use Tax

Source: Figure 34, page 42, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Use Tax Paid			
Year	Use tax	Refund claims*	Net use tax collected
1992	$11,702,398	$447,370	$11,255,028
1993	11,991,300	328,139	11,663,161
1994	14,200,022	1,063,242	13,136,780
1995	15,929,989	1,435,835	14,494,154
1996	16,821,715	4,841,228	11,980,487
1997	18,535,506	6,615,055	11,920,451
1998	17,361,851	9,175,324	8,186,527
1999	16,806,784	12,394,610	4,412,174
2000	18,829,904	12,698,510	6,131,394
2001	14,123,142	15,775,844	(1,652,702)
2002	13,694,774	12,850,487	844,287
2003	12,435,693	11,238,116	1,197,577
2004	17,139,316	8,624,502	8,514,814
2005	20,219,218	12,393,334	7,825,884
2006	23,191,259	14,446,391	8,744,868
2007	25,795,536	19,191,938	6,603,598

* These are capital equipment refund claims allowed, not including interest, for new or expanding businesses and for repair and replacement parts.

4) Income Tax (withholding on private royalties)

Source: Figure 31, page 39, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Iron Ore Ad Valorem Tax Payable

Year assessed	Market value	Payable	Year estimated tax payable			Total
			Crow Wing	Itasca	St. Louis	
1993	5,476,900	1994	20,900	47,400	254,600	322,900
1994	5,071,600	1995	14,000	34,800	262,400	311,200
1995	4,823,000	1996	12,100	32,600	237,600	282,300
1996	4,448,800	1997	10,900	34,900	226,200	272,000
1997	4,175,400	1998	10,400	23,500	244,900	278,800
1998	4,020,900	1999	8,200	18,900	188,100	215,200
1999	3,781,800	2000	4,200	20,200	181,800	206,200
2000	3,765,800	2001	3,900	18,600	159,400	181,900
2001	3,637,400	2002	3,500	17,600	147,200	168,300
2002	2,720,400	2003	3,500	16,900	107,200	127,600
2003	2,734,200	2004	3,300	15,400	101,600	120,300
2004	2,529,200	2005	2,700	14,100	87,300	104,100
2005	2,355,700	2006	2,700	13,300	77,400	93,400
2006	2,350,100	2007	2,500	12,700	79,100	94,300
2007	2,255,300	2008	2,300	11,600	68,400	82,300
2008	2,345,800	2009				

5) School district component of production tax

Source: Figure 11, page 19, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Taconite Production Tax Distributions to School Districts - 2008

School districts	$.0343 Taconite School Fund	$.1372 Regular School Fund	Taconite railroad	$.213 Taconite Referendum	Total
001 Aitkin	–	$164,524	–	$26,800	$191,324
166 Cook County	$21,087	50,568	$264,977	0	336,632
182 Crosby-Ironton	–	193,168	–	0	193,168
316 Greenway	32,431	597,642	–	281,077	911,150
318 Grand Rapids	–	654,600	–	379,997	1,034,597
319 Nashwauk-Keewatin	116,299	257,178	–	132,094	505,571
381 Lake Superior	97,547	341,929	342,720	240,337	1,022,533
695 Chisholm	–	465,848	–	213,366	679,214
696 Ely	–	70,363	–	101,048	171,411
701 Hibbing	326,981	950,124	–	607,135	1,884,240
706 Virginia	86,269	591,831	–	337,641	1,015,741
712 Mtn. Iron-Buhl	454,397	189,757*	–	212,618	856,772
2142 St. Louis County	152,685	414,092	284,841	404,878	1,256,496
2154 Eveleth-Gilbert	82,148	622,390	–	333,061	1,037,599
2711 Mesabi East	183,337	368,751	214,397	366,380	1,132,865
Totals	**$1,553,181**	**$5,932,765**	**$1,106,935**	**$3,636,432**	**$12,229,313**

*After $157,095 was transferred to cities/townships within school district for levy reduction.

Source: Figure 12, page 19, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Taconite Production Tax School Bond Payments

School districts		Year authorized[1]	Final payment year[2]	Payment[3]	Outstanding balance[4]
166	Cook County[5]	1996	2016	$503,020	$3,780,000
316	Greenway	1990	2009	65,298	75,333
316	Greenway	1996	2008	44,700	132,000
316	Greenway	2000	2019	153,876	1,396,000
318	Grand Rapids	1996	2010	479,226	1,292,000
381	Lake Superior	2000	2022	397,979	4,185,127
695	Chisholm	2000	2020	305,347	2,975,671
696	Ely	1996	2015	62,404	456,000
701	Hibbing	1996	2011	208,849	760,000
706	Virginia	1996	2016	869,966	4,204,883
712	Mt. Iron-Buhl	1998	2017	324,332	2,552,000
2154	Eveleth-Gilbert	1990	2009	76,000	79,095
2154	Eveleth-Gilbert	1996	2017	214,502	2,436,000
2711	Mesabi East	1996	2011	60,494	220,000
2711	Mesabi East	2008	2016	500,000	--
Totals:				$4,265,993	$24,544,109

1 Legislative year in which taconite funding was enacted.
2 Production year from which final bond payment will be deducted.
3 Payments for 2007 production year.
4 Estimated portion of outstanding bond balance to be paid by taconite funds (not including interest).
5 All taconite bonds funded at 80 percent taconite, 20 percent local effort, unless otherwise noted: Cook County – 1996, 70 percent
Mesabi East – 2008, $500,000

6) Various ad Valorem and property taxes

Source: Figure 37, page 48, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Iron Ore Ad Valorem Tax Payable

Year assessed	Market value	Payable	Year estimated tax payable			Total
			Crow Wing	Itasca	St. Louis	
1993	5,476,900	1994	20,900	47,400	254,600	322,900
1994	5,071,600	1995	14,000	34,800	262,400	311,200
1995	4,823,000	1996	12,100	32,600	237,600	282,300
1996	4,448,800	1997	10,900	34,900	226,200	272,000
1997	4,175,400	1998	10,400	23,500	244,900	278,800
1998	4,020,900	1999	8,200	18,900	188,100	215,200
1999	3,781,800	2000	4,200	20,200	181,800	206,200
2000	3,765,800	2001	3,900	18,600	159,400	181,900
2001	3,637,400	2002	3,500	17,600	147,200	168,300
2002	2,720,400	2003	3,500	16,900	107,200	127,600
2003	2,734,200	2004	3,300	15,400	101,600	120,300
2004	2,529,200	2005	2,700	14,100	87,300	104,100
2005	2,355,700	2006	2,700	13,300	77,400	93,400
2006	2,350,100	2007	2,500	12,700	79,100	94,300
2007	2,255,300	2008	2,300	11,600	68,400	82,300
2008	2,345,800	2009				

Source: Figure 38, page 49, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Taconite Railroad Ad Valorem Tax Assessed

Year payable	Assessed	St. Louis County	Lake County	Cook County	Total tax
1992	1991	53,409	80,720	5,064	139,193
1993	1992	38,454	99,919	4,706	143,079
1994	1993	48,655	87,248	4,938	140,841
1995	1994	78,281	140,300	14,454	233,034
1996	1995	64,516	116,143	14,456	195,115
1997	1996	49,283	61,107	13,292	123,682
1998	1997	46,250	66,114	10,330	122,694
1999	1998	43,891	68,874	8,648	121,413
2000	1999	42,340	65,444	8,542	116,326
2001	2000	35,467	64,295	8,500	108,262
2002	2001	27,323	37,336	7,202	71,861
2003	2002	6,746	17,890	0	24,636
2004	2003	4,519	15,964	0	20,483
2005	2004	3,896	13,312	0	17,208
2006	2005	3,366	10,921	0	14,287
2007	2006	3,054	10,081	0	13,135
2008	2007	3,212	9,063	0	12,275

Source: Figure 39, page 50, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Tax Collection and Distribution

Period ending	80% retained by local government	20% payment to Indian Business Loan Account	Total collections of affected counties
Dec. 31, 1999	606,560	151,640	758,200
Dec. 31, 2000	468,068	117,017	585,085
Dec. 31, 2001	201,952	50,488	252,440
Dec. 31, 2002	707,716	176,929	884,645
Dec. 31, 2003	461,456	115,364	576,820
Dec. 31, 2004	342,468	85,617	428,085
Dec. 31, 2005	542,524	135,631	678,155
Dec. 31, 2006	341,884	85,471	427,355
Dec. 31, 2007	451,904	112,976	564,880

Source: Figure 35, page 46, *Minnesota Mining Tax Guide, October 2008*, Minnesota Department of Revenue.

Unmined Taconite Tax Paid

(Year payable)

County	2001	2002	2003	2004	2005	2006	2007	2008
Itasca	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
St. Louis	397,428	316,140	317,033	300,173	273,601	261,687	532,102	495,033
Totals	**$397,428**	**$316,140**	**$317,033**	**$300,173**	**$273,601**	**$261,687**	**$532,102**	**$495,033**

7) Permanent University Funds (PUF)

Source: Minnesota's School Trust Lands, Biennial Report, Fiscal Years 2006-2007, Minnesota Department of Natural Resources, October 2008

The Minnesota Department of Natural Resources (DNR) administers more than 12 million acres of state-owned mineral rights. As of February 2007, there are 25,891 total acres of permanent university fund lands, with an additional 20,988 acres of mineral rights. The minerals management account was designed to create a $3 million principal that could be drawn upon in the event that future income generation drops. The $3 million level was reached in Fiscal Year 2007. At the end of each fiscal year the amount exceeding $3 million is distributed to the Permanent School Fund and Permanent University Fund in proportion to the revenue contributed to the minerals management account by these two land types. For Fiscal Year 2007, the Permanent University Fund will receive $1,059,644 transfer from the minerals management account. [1]

FY 2007 Proceeds to be transferred to the PUF

Mineral lease revenue to DNR's Permanent University Account	$7,967,805.66
Transfer from minerals management account	$1,059,644.00
Forest, Suspense Account, Land Sale, and real estate lease revenue to DNR's Permanent University Account	$243,833.39
TOTAL transferred to Permanent University Fund	$9,271,283.05

FY 1992-2007 Mineral Lease Revenue Distribution by Account

FY	Endowed Mineral Research Account	Endowed Scholarship Account	Total
1992	$1,485,903.50	$1,485,903.50	$2,971,807.00
1993	$2,003,975.50	$2,003,975.50	$4,007,951.00
1994	$1,931,548.50	$1,931,548.50	$3,863,097.00
1995	$2,636,377.00	$2,636,377.00	$5,272,754.00
1996	$2,712,847.14	$2,712,847.14	$5,425,694.28
1997 *	$1,217,628.85	$1,217,628.85	$2,435,257.70
1998	$806,960.06	$806,960.06	$1,613,920.12
1999	$673,229.62	$673,229.62	$1,346,459.23
2000	$416,364.08	$416,364.08	$832,728.15
2001	$1,020,555.16	$1,020,555.16	$2,041,110.31
2002 **	$930,779.53	$930,779.53	$1,861,559.06
2003	$2,759,933.17	$2,759,933.17	$5,519,866.33
2004	$2,342,521.57	$2,342,521.57	$4,685,043.14
2005	$3,774,828.09	$3,774,828.09	$7,549,656.17
2006***	$2,835,833.00	$2,835,833.00	$5,671,666.00
2007****	$4,513,724.83	$4,513,724.83	$9,027,449.66
TOTAL	$32,063,009.58	$32,063,009.58	$64,126,018.66

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals

[1] Kathy A. Lewis, Minnesota Department of Natural Resources, Division of Lands and Minerals March 25, 2008 http://files.dnr.state.mn.us/lands_minerals.

The Endowed Scholarship Account, which started receiving revenue from mining of permanent university fund lands in Fiscal Year 1993, has resulted in the University of Minnesota's largest endowed scholarship program. The first scholarships were awarded in Fiscal Year 1994. Now over 20 percent of the University of Minnesota's new freshmen who are Minnesota residents receive an Iron Range Scholarship.[2]

FY 1994-2007 Distribution of Endowed Scholarship Account Income

FY**	UM - Twin Cities	UM – Duluth	UM – Morris	UM – Crookston	TOTAL
1994	$58,635.00	$19,517.00	$4,922.00	$1,782.00	$84,856.00
1995	$116,080.00	$38,637.00	$9,743.00	$3,528.00	$167,988.00
1996	$232,573.00	$79,341.00	$21,112.00	$7,491.00	$340,517.00
1997	$323,094.00	$111,072.00	$29,820.00	$11,173.00	$475,159.00
1998	$458,013.00	$158,751.00	$41,883.00	$16,888.00	$675,535.00
1999	$572,418.00	$198,404.00	$51,501.00	$21,951.00	$844,274.00
2000	$715,901.00	$247,050.00	$60,879.00	$27,333.00	$1,051,163.00
2001	$853,500.28	$293,515.94	$71,125.02	$32,056.35	$1,250,197.60
2002	$895,541.15	$308,186.23	$75,045.35	$34,020.56	$1,312,793.28
2003	$824,531.76	$284,183.28	$69,044.53	$31,020.01	$1,208,779.57
2004	$789,287.74	$272,099.19	$66,024.07	$30,010.94	$1,157,421.94
2005	$832,139.00	$286,734.00	$69,548.00	$31,724.00	$1,220,145.00
2006	$886,643.51	$305,515.01	$74,103.64	$33,801.67	$1,300,063.83
2007	$951,555.92	$327,882.11	$79,528.88	$36,276.35	$1,395,243.26
TOTALS	$8,509,913.36	$2,930,887.76	$724,279.49	$319,055.88	$12,484,136.48

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals

Distribution of Collected Royalties:

Minnesota Mineral Revenue (in thousands)

FY	*School Trust Lands*	*University Trust Lands*	*Tax-Forfeited Lands and Minerals*	*Other Land Classes*	*Special Advance Royalties*	*Total Revenue*
2007	$16,549	$9,960	$1,611	$93	$320	$28,533
1998-2007	$72,858	$42,888	$14,329	$411	$3,311	$133,797

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals

[2] Kathy A. Lewis, Minnesota Department of Natural Resources, Division of Lands and Minerals March 25, 2008 http://files.dnr.state.mn.us/lands_minerals.

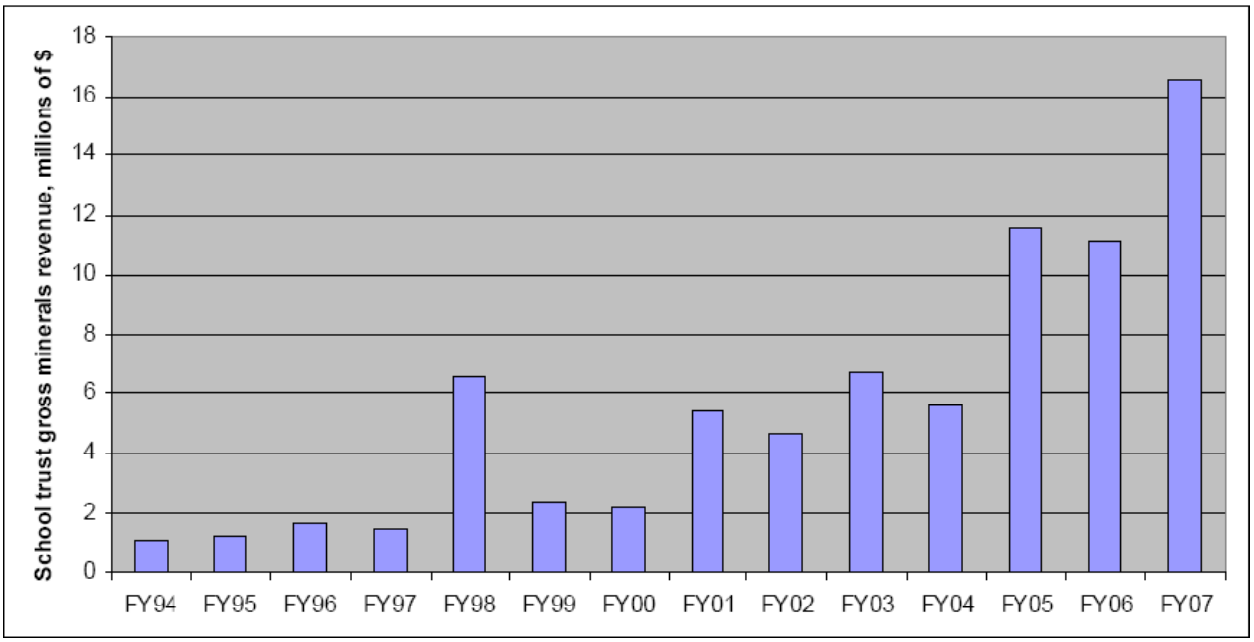
FY06 and FY07 Gross Revenue Generated from Minerals Activities on School Trust Lands

	FY06	FY07
Taconite and Iron ore rents/royalties	$10,808,098	$16,246,028
Non-ferrous metallic minerals	$119,519	$167,270
Stockpiling/Surface leases	$34,082	$11,030
Peat	$54,916	$85,528
M-leases	$143,027	$39,424
Transferred back from the Minerals Management Fund	$0	$1,728,892
Total	**$11,159,642**	**$18,278,172**

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals

School trust gross minerals revenue, 1994 to 2007

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals



8) IMPLAN tax modeling

Source: IMPLAN, BBER

The following tax impact values are based on the existing relationships of the data found in the IMPLAN database. The general sources for that data include National Income and Product Accounts (NIPA) from the Bureau of Economic Analysis (BEA); the Bureau of the Census's annual Consumer Expenditure Survey (CES), and the Bureau's Annual Survey of State and Local Government Finances, as well as the BEA's Regional Economic Information System (REIS).

IMPLAN tracks tax impacts through "Employee Compensation, Proprietary Income, Household Expenditure, Enterprises (Corporations), and Indirect Business Taxes." Federal tax impacts include "Corporate Profits Tax, Indirect Bus Tax: Custom Duty, Indirect Bus Tax: Excise Taxes, Indirect Bus Tax: Fed NonTaxes, Personal Tax: Estate and Gift Tax, Personal Tax: Income Tax, Personal Tax: NonTaxes (Fines- Fees, Social Ins Tax- Employee Contribution, and Social Ins Tax- Employer Contribution."

According to the IMPLAN model, state tax impacts include "Corporate Profits Tax, Dividends, Indirect Bus Tax: Motor Vehicle Lic, Indirect Bus Tax: Other Taxes, Indirect Bus Tax: Property Tax, Indirect Bus Tax: S/L NonTaxes, Indirect Bus Tax: Sales Tax, Indirect Bus Tax: Severance Tax, Personal Tax: Estate and Gift Tax, Personal Tax: Income Tax, Personal Tax: Motor Vehicle License, Personal Tax: NonTaxes (Fines-Fees, Personal Tax: Other Tax (Fish/Hunt), Personal Tax: Property Taxes, Social Ins Tax- Employee Contribution, and Social Ins Tax- Employer Contribution."

> Readers are cautioned that comparisons with the foregoing Minnesota Department of Revenue and Minnesota Department of Natural Resources tax accounting do not compare easily with results from the IMPLAN model. However, the ability of IMPLAN to model tax impacts is demonstrated in the following comparisons for ferrous and non-ferrous mining in Minnesota and the Arrowhead Region and Douglas County, WI.

The IMPLAN tax impact is presented below for Federal and State totals.

Ferrous Mining Tax Impact on Minnesota, 2013

	Employee Compensation	*Proprietary Income*	*Household Expenditure*	*Enterprises (Corporations)*	*Indirect Business Taxes*	*Total*
Federal Government NonDefense	$27,969,499	$2,322,176	$22,721,672	$22,741,677	$8,204,833	$83,959,856
State/Local Govt NonEducation	$640,284	$0	$10,108,649	$9,155,471	$52,452,864	$72,357,268
Total	$28,609,783	$2,322,176	$32,830,321	$31,897,148	$60,657,697	$156,317,124

This table shows state and local taxes of over $72 million. This amount includes taxes that are not directly attributable to production.

The totals compile the direct, indirect, and induced effects of business and household spending. With the exception of indirect business taxes and sales and use taxes, these are additional taxes paid by business and workers to state and local government.

Tax Impact Totals, Including Proposed Expansions and New Projects as Well as On-Going Ferrous and Non-Ferrous Operations, 2013

Source: IMPLAN, BBER	Minnesota	Arrowhead and Douglas County, WI
Iron ore mining:		
Federal Government NonDefense	$83,959,856	$71,498,003
State/Local Govt NonEducation	$72,357,268	$64,353,768
Total	$156,126,713	$135,851,771
Copper, nickel, lead and zinc mining:		
Federal Government NonDefense	$159,180,707	$148,594,991
State/Local Govt NonEducation	$148,203,872	$144,663,992
Total	$307,384,579	$293,258,983
Ferrous and non-ferrous mining:		
Federal Government NonDefense	$243,140,563	$220,092,994
State/Local Govt NonEducation	$220,561,140	$209,017,760
Total	$463,511,292	$429,110,754

Appendix B: Costs and Benefits

Readers are encouraged to remember the BBER is providing an economic impact analysis. Policy recommendations should be based on the "big picture" of total impact, and a cost-benefit analysis would be needed to assess the environmental, social, and governmental impacts of ferrous and non-ferrous mining in the State.

Although a detailed cost-benefit analysis is beyond the scope of this report, a short discussion of salient points currently surrounding ferrous and non-ferrous mining activity in Minnesota and the Arrowhead and Douglas Counties can be provided. Some of the issues included in this appendix are:

1) Employment trends for mining in the State, and a description of the relative importance of the mining sector to the economy of the State, the Arrowhead Region, and St. Louis County, MN.
2) Compliance costs for companies proposing expansion or start-up projects.
3) Environmental costs to the citizenry of the State, and BBER's response to a recent critique of further development of the mining industry.
4) Direct and indirect benefits from the mining industry to Duluth and the Metro Area.
5) Implications of Minnesota mining in a global context.

1) Employment trends

Employment data show the continuing importance of the mining sector.

Minnesota Mining Employment and Payroll, NAICS Sector 21 2007

Source: MN DEED CEW

Year	Average Number of Employees	Annual Wages
2000	7,204	$350,473,934
2001	5,923	$294,987,664
2002	5,517	$273,016,618
2003	5,139	$279,122,837
2004	5,219	$295,623,992
2005	5,132	$311,659,581
2006	5,147	$335,058,894
2007	5,224	$342,887,555
2008	5,611	n/a

(2008 figure is second quarter data only)

As a measurement of how important mining is to the Arrowhead Region, mining employment in the Region can be compared to the State. Location quotients identify the significance of an economic sector to the economic base of the state or region. When location quotients are sorted, those above 1.0 are usually considered part of the economy's base, and exporting industries. Those less than 1.0 are supporting industries, and net importers. When sorted for importance, the mining sector in the Arrowhead Region leads all other sectors, showing mining activity in the Region to be at least ten times more important than any other sector in the economy, compared to the State.

Location Quotients, Arrowhead Region, Compared to the State of Minnesota, 2007

Source: MN DEED; UMD/LSBE/BBER	2007		
	MN	Arrowhead	Location Quotient
Total, All Industries	2,688,782	142,428	
Mining	5,224	3,743	13.5
Natural Resources and Mining	22,989	4,478	3.7
Utilities	13,481	1,638	2.3
Public Administration	122,238	10,367	1.6
Public Administration	122,238	10,367	1.6
Health Care and Social Assistance	396,945	30,854	1.5
Education and Health Services	604,013	42,509	1.3
Leisure and Hospitality	263,899	18,077	1.3
Retail Trade	301,715	18,304	1.1
Educational Services	207,067	11,655	1.1
Service-Providing Domain	2,196,960	120,433	1.0
Construction	127,259	6,728	1.0
Trade, Transportation and Utilities	548,367	26,895	0.9
Goods-Producing Domain	491,822	21,996	0.8
Agriculture, Forestry, Fishing & Hunting	17,765	735	0.8
Transportation and Warehousing	99,526	3,746	0.7
Manufacturing	341,574	10,789	0.6
Wholesale Trade	133,644	3,208	0.5
Management of Companies and Enterprises	66,886	985	0.3

The mining sector is even more important to St. Louis County, compared to the State. Location quotients for this county where most mining takes place, from 2000 to 2007 compared to the State, show this sector continues to lead all other industry sectors by a wide margin. Location quotients for mining in St. Louis County compared to the State range from 18.7 in 2000 to 15.1 in 2007.

2) Compliance costs

For all of the proposed expansions and projects in this study, before any construction starts, companies pay costs for, and the State benefits from, processing Environmental Impact Statements (EIS). A recent study from the University of Minnesota, attempted to "benchmark" the EIS process. Comparing costs for states from the mining industry, U of MN researchers find that "Who pays the cost of environmental review and permitting was an area where states differed in their delivery but were generally similar in their approach. One of the mining case study states represented in the focus group indicated the project sponsor is charged an application fee in addition to the cost of preparing the EIS and necessary permits. . . . In Minnesota the applicant bears the full cost of preparing an EIS."[1]

[1] *Benchmarking Minnesota's Environmental Review and Permitting Processes for Forestry and Mining Industries: A Comparative Assessment*, Prepared By: Ryan J. Aylesworth Dennis R. Becker Michael A. Kilgore June 30, 2008 Department of Forest Resources College of Food, Agricultural, and Natural

Another recent study presents general estimates for the cost of an EIS which range from $100,000 to $3 million. The study notes that a consulting firm is often hired to complete the EIS, and the study states the findings that "Given the time and money involved, it is not surprising that many proposers withdraw their request for a permit rather than undertake an EIS."[2]

Representatives of the recent mining project indicated that "The company has spent more than $40 million so far proving the feasibility of mining the 800-foot-deep ore formation that geologists call the "Duluth Complex." About $15 million of that has gone toward a three-year environmental review coordinated by state, federal and tribal regulators who are working to complete a draft environmental impact statement as soon as this month [October 18, 2008]." [3]

Possible compliance costs and benefits are also indicated in a proposed new regulation on sulfide mining, currently being discussed in Minnesota. This bill would ban the practice, dubbed "perpetual water treatment," such as that proposed by the PolyMet non-ferrous mining project. [4]

3) Environmental Costs

A fully analyzed cost-benefit study would include a complete inventory of costs and benefits for both the mining industry and the citizens of Minnesota. The economic sustainability of mining continues to be of interest to both citizens and industry. Analyses of the mining industry in Minnesota from an environmental perspective have featured assumptions about zero sum growth and the possible substitution of industries.

The outline for a cost-benefit analysis would include economic sector percentages. Unless a cost-benefit analysis is done, and the study of alternatives is presented, the percentage of total activity in this report is not immediately relevant to decisions about mining investment. Also of interest would be to examine the development strategy which suggests income for the impact region might be transfers – both government and private. Is the alternative to industrial development a strategy to attract more poor and retired people?

Economic development in Minnesota recognizes that although resource-based industry may be sustainable, diversification is also necessary. The mining industry, for example, is still very important to the region and the State. The importance of mining, for example, can be shown by measures such as location quotient and shift-share. Mining is still important to the economy of the State and the region. [6]

Resource Sciences, University of Minnesota.

[2] Examining a State Agency: Minnesota Pollution Control Agency, League of Women Voters Minnesota, January 2007http://www.lwvmn.org/EdFund/LWVMNMPCAStudyReport.pdf

[3] Hope, and fears, on the Range, Larry Oakes, Star Tribune, October 18, 2008. See http://www.startribune.com/local/31232594.html?page=2&c=y

[4] Lawmakers to mull restrictions on sulfide mining, Bob Kelleher, Minnesota Public Radio, February 19, 2009 http://minnesota.publicradio.org/display/web/2009/02/19/mining/

[6] A cost-benefit analysis would be many times more expensive, for instance, as would be an industry by industry analysis, or a general equilibrium model. One can argue that a cost-benefit would be a better study for government decision making. However, such a study is also subject to assumptions and calculations. It is very easy to manipulate cost-benefit analysis to have a desired outcome. Neither the environmental lobby nor business groups should conduct such a study; the state should fund it, and

Other significant stakeholders in a cost-benefit analysis would be industries from the mining suppliers identified in the "Suppliers" section of this report, and education stakeholders identified in the tax accounting from the Minnesota Department of Natural Resources and the Minnesota Department of Revenue.

4) Direct and indirect benefits from the mining industry to Duluth and the Twin Cities Metro Area.

One way to examine the indirect and induced impacts from direct jobs in mining in St. Louis County, for example, is to show other jobs in the economy of the Region and of the State that are dependent on mining but not necessarily situated in the mining venues. This list implies occupations in industries supplying mining workers with transportation, eating and drinking establishments, healthcare providers, housing, and infrastructure, for the county, the region, and the State. In the report itself, a discussion is offered for comparing indirect and induced jobs in the region and the state, and thereby demonstrating the number of jobs supporting mining are outside the region but in the State.

Indirect and Induced Jobs Dependent on Iron Ore Mining Employment in Minnesota, 2007

Industry	*Direct*	*Indirect*	*Induced*	*Total*
Mining iron ore	3,621	0	0	3,621
Transport by truck	0	585	36	621
Food services and drinking places	0	64	406	469
Wholesale trade businesses	0	264	136	400
Electric power generation transmission and distribution	0	257	11	268
Management of companies and enterprises	0	195	19	214
Real estate establishments	0	50	152	202
Offices of physicians dentists and other health	0	0	174	174
Private hospitals	0	0	172	172
Employment services	0	104	67	172
Retail Stores General merchandise	0	17	136	153
Retail Stores Food and beverage	0	15	126	142
Nursing and residential care facilities	0	0	133	133
Retail Nonstores Direct and electronic sales	0	11	94	105
US Postal Service	0	86	18	104
Maint & repair construct of nonresident structures	0	80	19	99
Retail Stores Motor vehicle and parts	0	12	85	97
Private household operations	0	0	92	92
Services to buildings and dwellings	0	51	41	91
Civic social professional and similar organizations	0	22	62	84
As well as 2,781 jobs in another 303 various sectors of the economy . . .				2,781
Total				10,194

5) Implications of Minnesota mining in a global context.

Minnesota iron mining responds to world demand. As the Minnesota DNR reports in its discussion of school trust lands, in FY06, gross revenue from these [mining] activities totaled $24.7 million, and net revenue was $16.3 million, 91% of which came from timber sales and mineral leases. In FY07, gross

fund it adequately.

revenue was $29.8 million, and net revenue was $18.5 million. The big increase in FY07 revenue was the result of increased mining activity in Minnesota, which was driven in large part by increased worldwide demand for iron from China: from FY06 to FY07, school trust minerals revenue increased almost $5.5 million. [7]

The DNR also noted that Minnesota's taconite producers suffered a wave of bankruptcies in 2000-03, but a turnaround that began in late 2003, and by 2007 had them operating at full capacity. A dramatic increase in steel production and iron ore consumption by China led to record world-wide demand, and school trust revenue from mineral leasing rose almost $11 million from FY04 to FY07, with $5 million of that increase occurring in FY06-07. The downturn in mining (and the rest of the economy) is expected to last the duration of the current recession but should return to 2007 levels and more, because foreign demand will continue to increase.

Who is mining selling to? According the IMPLAN models used in this study, lFerrous and non-ferrous mining has a small demand from local industries, and no purchasing by households. Demand for Iron Ore Mining, in large part comes from sales to domestic trade (as processed taconite shipped to steel mills), and in a smaller percent to Foreign Trade.

Industry and Institutional Demand for Iron Ore Mining in the Economy of Minnesota, 2007.

Industry	*Demand for Iron Ore Mining**
Mining iron ore	12.33
Iron and steel mills and ferroalloy manufactu	10.04
Architectural engineering and related servi	0.13
Industrial gas manufacturing	0.12
Scientific research and development services	0.12
Management of companies and enterprises	0.01
All other basic inorganic chemical manufactur	0.01
Total Industry Demand	22.76
Households	0.00
Federal Government	0.00
State/Local Govt	0.00
Capital	0.00
Inventory Additions/Deletions	1.03
Foreign Trade	511.17
Domestic Trade	1,532.20
Total Institutional Demand	2,044.41

*Millions of Dollars
Source: IMPLAN

[7] DNR's School Trust Report, at http://files.dnr.state.mn.us/lands_minerals

For non-ferrous mining, demand comes as a larger percent of sales to Foreign Trade, and a smaller percent to Domestic Trade than is reported for ferrous mining.

Industry and Institutional Demand for Non-ferrous Mining in the Economy of Minnesota, 2007.

Industry	*Demand for Non-ferrous Mining**
Primary smelting and refining of nonferrous m	7.23
Data processing hosting ISP web search por	2.03
Community food housing and other relief ser	1.61
Other amusement and recreation industries	1.50
Personal care services	1.47
Fitness and recreational sports centers	1.43
Real estate establishments	1.36
Other private educational services	1.34
Industrial gas manufacturing	1.31
Other personal services	1.20
Medical and diagnostic labs and outpatient an	1.18
Offices of physicians dentists and other he	1.15
Internet publishing and broadcasting	1.09
Spring and wire product manufacturing	1.09
More . . .including industry demand less than 1.	
Total Industry Demand	22.76
Households	0.00
Federal Government	0.00
State/Local Govt	0.00
Capital	0.00
Inventory Additions/Deletions	0.05
Foreign Trade	121.22
Domestic Trade	87.17
Total Institutional Demand	210.43

*Millions of Dollars

A recent estimate from the National Mining Association notes that "The value of metals is highly correlated with world economic growth. As economic growth accelerates, so does demand for manufactured goods. World economic growth increased by 5.0 percent in 2007, with China and other emerging markets leading the way. As a result, prices for metals, energy and other commodities increased during 2007. This led to, along with increasing volumes, a large increase in the value of production for 2007."[8]

[8]The Economic Contributions of U.S. Mining in 2007, National Mining Association, February 2009.