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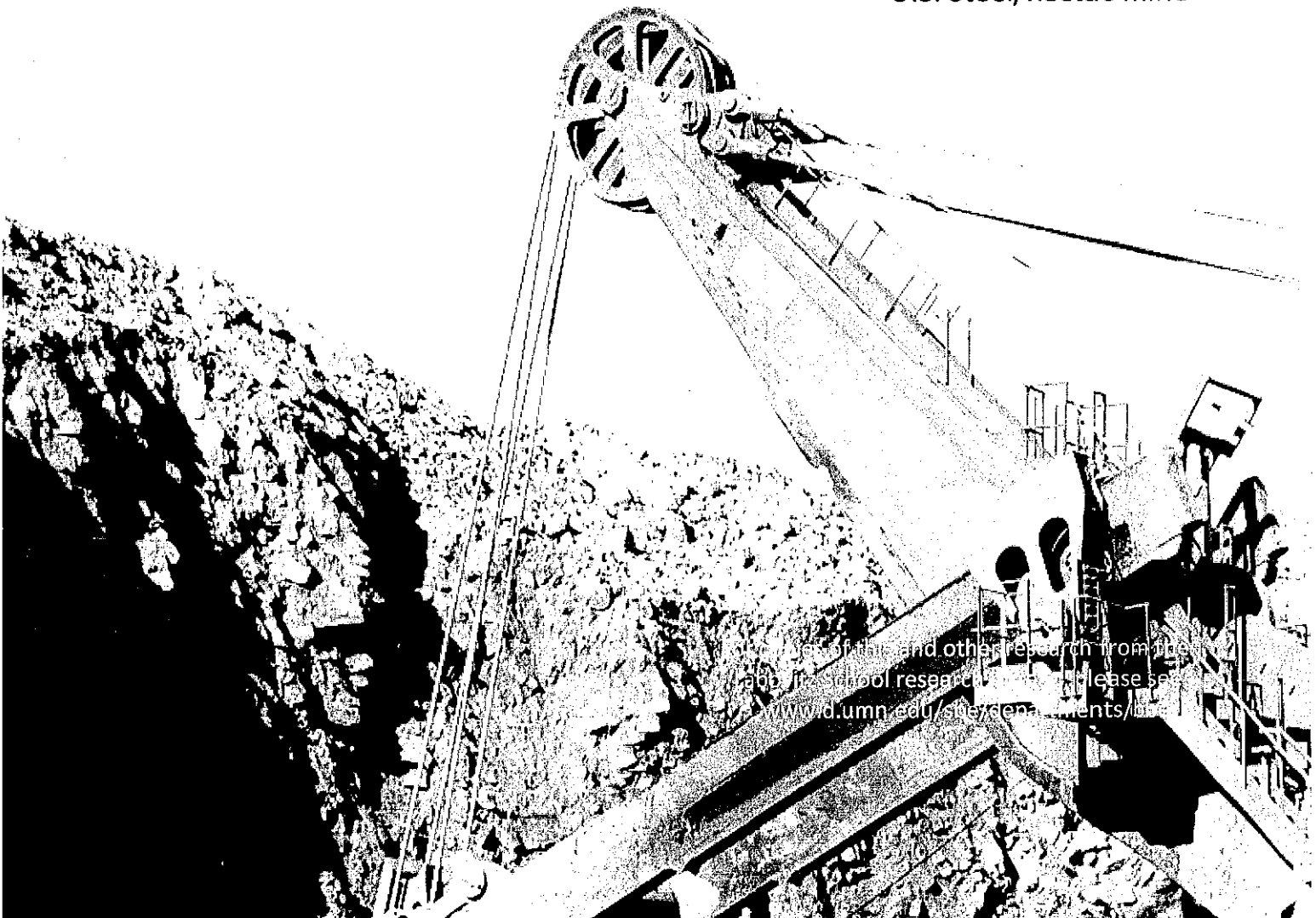
Bureau of Business and
Economic Research

Research Report

The Economic Impact of U.S. Steel's
Keetac Mine Expansion on the State of Minnesota
And on the Arrowhead Region

March 2009

For
U.S. Steel/Keetac Mine



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Executive Summary

ABOUT THE PROJECT

The objective of this project is to assess the employment and economic impacts of U.S. Steel Corporation's project to expand its taconite mine near Keewatin, Minnesota. This analysis includes both short term impact through construction and the long term impact of employment growth for the region. The results of this study will be incorporated into the required Environmental Impact Statement (EIS) for the Keetac mine expansion.

This study applies an economic multiplier analysis and input-output model that was created in Minnesota by the Minnesota IMPLAN Group, Inc., and is used by state governments and the USDA Forest Service, among others. For the proposed Keetac facility, IMPLAN input-output models were constructed to estimate measures of Employment, Output, and Value Added impacts. Results from the IMPLAN models for these measures are reported in terms of direct, indirect, and induced impacts. (*Indirect effects* here are changes in spending, income, or levels of employment by businesses that supply goods and services to the mining sector. *Induced effects* reflect the spending of income earned by employees who work for local businesses that directly or indirectly serve the mining sector.) Impacts are reported by showing estimated economic activity for year-by-year construction costs for the proposed project, as well as a (full operations) typical year projection.

IMPACTS ON MINNESOTA

Important note: the economic impacts reported in this study measure only the expansion of the Keetac mine. Note also all values are reported in 2007 dollars. Expenditures through 2010-2013 are deflated to 2007 dollars.

Impacts from Construction: With the completion of the construction phase for the proposed Keetac expansion, it is estimated that the project will have generated almost \$1.19 billion in output spending (local production) and almost \$581 million in value-added spending (wages, rents, interest and profits) in the State, by directly expending approximately \$659 million in output spending and \$294 million in value-added spending on construction. During the peak year of construction, Keetac will also have created 856 full-time, part-time, and temporary jobs by directly employing approximately 500 people.

Impacts from Operations: When operations for the Keetac expansion project reach full operations capacity (2013), the expanded Keetac mine is estimated to generate more than \$653 million in output spending and \$315 million in value-added spending in the State by directly expending approximately \$421 million in output and \$191 million in value-added spending during a typical operations year. During a year of full operations, the project will create an estimated 479 fulltime, part-time, and temporary jobs by directly employing an estimated 170 people in operations at the Keetac mine.

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IMPACTS ON THE ARROWHEAD REGION

Impacts from Construction: With the completion of the construction phase for the proposed Keetac expansion, it is estimated that the project will have generated almost \$876 million in output spending and more than \$404 million in value-added spending in the Arrowhead Counties, by directly expending approximately \$588 million in output spending and \$244 million in value-added spending on construction. During the peak year of construction, Keetac will also have created 760 jobs by directly employing approximately 500 people.

Impacts from Operations: When operations for the Keetac expansion project reach full operations capacity (2013), the expanded Keetac mine is estimated to generate more than \$570 million in output spending and almost \$273 million in value-added spending in the Arrowhead Region by directly expending approximately \$421 million in output and \$191 million in value added spending during a typical operations year. During a year of full operations, the project will create an estimated 398 jobs by directly employing an estimated 170 people in operations at the Keetac mine.

**Summary: Keetac Expansion Project Construction Impacts
on the State of Minnesota and on the Arrowhead Region
2010-2013 (in 2007 Dollars)**

Years	Value Added Totals		Employment Totals		Output Totals	
	Minnesota	Arrowhead	Minnesota	Arrowhead	Minnesota	Arrowhead
2010	\$93,316,089	\$67,841,741	342	304	\$190,971,097	\$147,038,094
2011	\$134,090,543	\$95,166,731	513	456	\$274,415,905	\$206,261,435
2012	\$132,487,849	\$91,779,532	513	456	\$271,135,992	\$198,920,126
2013	\$220,932,603	\$149,365,567	856	760	\$452,137,915	\$323,730,313
Total	\$580,827,084	\$404,153,571			\$1,188,660,909	\$875,949,968

**Summary: Keetac Expansion Project Operation Impacts
on the State of Minnesota and on the Arrowhead Region
Full Operation Year, 2013 (in 2007 Dollars)**

Year	Value Added Totals		Employment Totals		Output Totals	
	Minnesota	Arrowhead	Minnesota	Arrowhead	Minnesota	Arrowhead
2013	\$191,000,000	\$272,683,542	170	398	\$421,000,000	\$570,489,496

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The Economic Impact of U.S. Steel's Keetac Mine Expansion on the State of Minnesota, and on the Arrowhead Region

I. Project Description

The UMD Labovitz School of Business and Economics' research bureau, the Bureau of Business and Economic Research (BBER), was asked to study and estimate the economic impact of the Keetac mine expansion on the State of Minnesota and Minnesota's Arrowhead Region. 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*, and *Mesaba Metals Copper and Nickel Mining in Northeast Minnesota, 2003*.¹

BBER analyzed the employment and economic impacts of U.S. Steel Corporation's Keetac expansion of its taconite mine near Keewatin, Minnesota, both short term through construction and long term with employment growth for the region.

The economic modeling data and software to be used was IMPLAN Professional® 2.0 software. The study used IMPLAN's economic multiplier analysis and input-output modeling, created in Minnesota by the Minnesota IMPLAN Group, Inc. Data was the most recent IMPLAN county data, which is for year 2007. Results of modeling are presented here as a written report.

The research objectives of this study included the following:

- To model three measures and three effects of expanded mining activity, including employment, output, and value added measures, and to model direct, indirect, and induced economic effects in the economy of the State of Minnesota and the Arrowhead Region.
- To describe the tax impacts from expanded Keetac mining activity in Northeast Minnesota. (Appendix A)
- To draft the findings of this analysis into a report.

Modeling Issues

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,² include the following:

A small area can 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.

A study area that is actually part of a larger functional economic region will likely miss important backward linkages. For example, linkages with the labor force may be missing. Workers who live and spend outside the study area may actually hold local jobs.

¹ Reports on these and other BBER projects are available at <http://www.d.umn.edu/lbse/bber.php>

² 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

IMPLAN study areas are typically a collection of counties. A county is the smallest standard area for IMPLAN data sets.

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.

Deliverables

- 1) BBER will report the direct, indirect, and induced economic impacts of construction and operations activities of the Keetac mine expansion project in Northeast Minnesota, measured in employment, output, and value added.
- 2) BBER will report a description of tax impacts from expanded Keetac mining activities.
- 3) BBER will draft a final written report that will present the findings and analysis.
- 4) BBER will offer an oral PowerPoint presentation of the BBER findings, if so requested.

The BBER will work closely with Keetac and Barr Engineering 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 construction periods. Operating assumptions required for the models include employment estimates, estimates of local purchases, and operations dollar value of sales or output production.

Regional data for the impact models for Value Added, Employment, and Output are supplied by IMPLAN for this impact. Employment assumptions were provided to the model to enable construction of the impact model. From these data, Social Accounts, Production, Absorption, and Byproducts information was generated from the national level data and was incorporated into the model. All region study definitions and impact model assumptions were agreed on before work with the models began.

Study Area

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

Figure 1. MN Arrowhead Counties. Source: <http://www.census.gov/geo/www/maps>

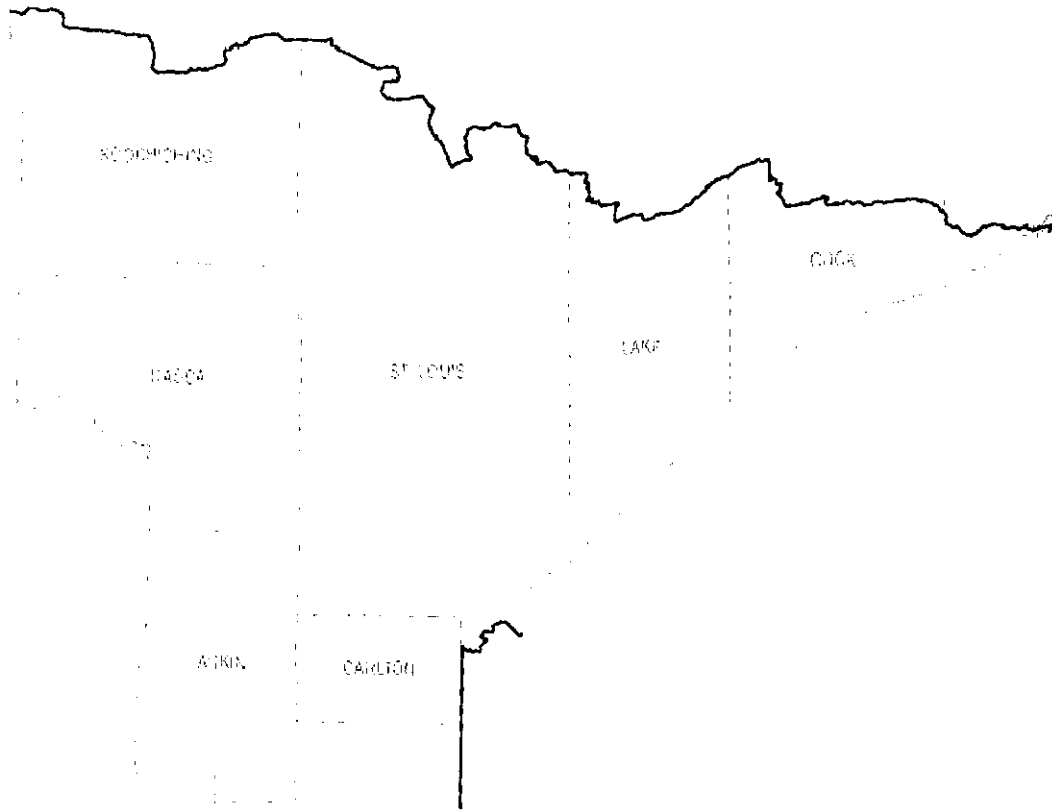
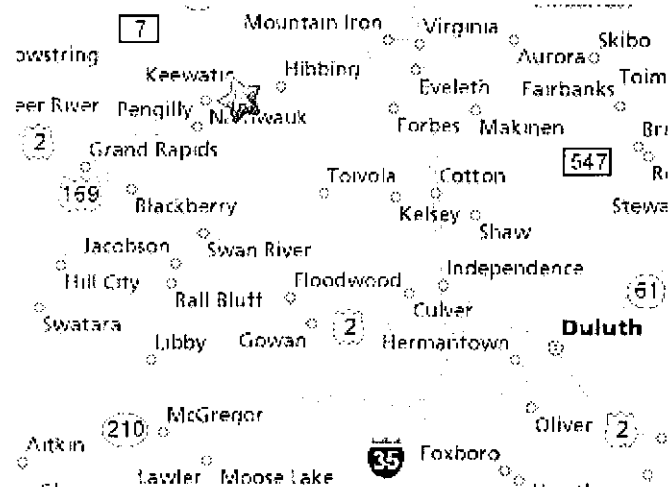


Figure 2. Location of U.S. Steel's Keetac Mine, near Keewatin, MN. Source: Mapquest



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II. Impact Procedures and Input Assumptions

IMPLAN Models

There are two components to the IMPLAN system—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, for example employment numbers.

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. IMPLAN also provides for 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 Keetac'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.

IMPLAN measures of direct, indirect, and induced employment impacts follow from assumptions in the model concerning the estimation of the number of jobs created and the Keetac plant's production in the economy.

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 the Keetac mine expansion models used the most recent IMPLAN data available which is for the year 2007. All impacts are reported in 2007 dollars.

Economic impacts are made up of direct, indirect, and induced impacts. The following are suggested assumptions for accepting the impact model: IMPLAN input-output is a production-based model, and employment numbers (from U.S. Department of Commerce secondary data) treat both full and part time individuals as being employed.

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Definitions used in this report

Measures

- **Gross Output:** The value of local production required to sustain activities.
- **Value Added:** A measure of the impacting industry's contribution to the local community; it includes wages, rents, interest and profits.
- **Employment:** Estimates are in terms of jobs, not in terms of full-time equivalent employees. Therefore, these jobs may be temporary, part time or short term jobs.

Effects

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

Inputs provided for modeling the impact

U.S. Steel's Keetac Mine and Barr Engineering provided the BBER estimated expenditures concerning specific processes for the proposed plant expansion.

Construction: Keetac provided estimates for dollars for products and services for the construction project. Labor costs for 2007–2011, including direct cost and number of jobs were estimated.

Operations: For the operations impact, Keetac provided estimates for such components as staffing and labor cost per year, including all annual direct labor to support plant operations.

Industry sector adjustments: Production functions addressed in the gross absorption tables for the industrial sectors of the input-output modeling were reviewed to reflect estimates for the Keetac plant expansion construction and operations demand changes.

NAICS coded industry sectors supplying the proposed Keetac plant expansion were adjusted to the requirements of the sector modeling in the IMPLAN model.

Employment: Estimates for labor costs were provided by Keetac. A cost estimate summary was reported to BBER, from estimated plant construction and operations, including labor cost for all requirements.

III. Findings: Keetac’s Economic Impact on the State of Minnesota

The following tables use the estimated values of direct expenditures for the Keetac expansion in the State of Minnesota as the original input for the model. Direct expenditures are listed in the column labeled, “Direct Effect.” In these tables, “Indirect Effect” measures the amount of increased spending between commercial, government, and service industries. “Induced Effect” measures the amount of increased spending by residential households. “Total Effect” is the sum of Direct, Indirect, and Induced Effects.

The “Value Added,” “Employment,” and “Output” totals in the following tables show the Keetac expansion’s economic impacts for Minnesota. These totals incorporate the economic impacts that the Keetac expansion is likely to have on the State, which are shown in the corresponding “Value Added,” “Employment,” and “Output” columns in the tables of this section of the report.

Note that none of the tables that show Keetac’s yearly employment impacts add the total number of jobs-created across all years. This removes the possibility of double counting. For instance, although using the IMPLAN model required that each calendar year of construction be modeled as a separate event, each job created by construction activity may carry through all calendar years as the same job, and could thus be counted more than once if years are summed. (For example, the engineers, project managers, and installers that Keetac will employ for year 2010 might still be employed by Keetac in year 2011.)

Important note: the economic impacts reported in this study measure only the proposed expansion of the Keetac mine. The values reported in the tables below reflect the portion of Keetac’s activity generated by additional employment and output. Note also all values are reported in 2007 dollars. Expenditures through 2010-2013 are deflated to 2007 dollars.

Construction

<i>Years</i>	<i>Value Added Totals</i>	<i>Employment Totals</i>	<i>Output Totals</i>
2010	\$93,316,089	342	\$190,971,097
2011	\$134,090,543	513	\$274,415,905
2012	\$132,487,849	513	\$271,135,992
2013	\$220,932,603	856	\$452,137,915
Total	\$580,827,084		\$1,188,660,909

Table 1 summarizes the total impact effects of Keetac’s direct construction expenditures, as illustrated by the detail in Tables 2 through 4. In the summary table, the column on the left (labeled “Value Added Totals”) reports the economic impact of almost \$294 million that Keetac is expected to use to pay for wages, rents, interest, and profits (total direct effect from Table 2). This expenditure is estimated to result in an additional \$287 million in commercial, government, services and consumer spending (total indirect and induced from Table 2) for a total of almost \$581 million.

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In the summary table, the column on the right (labeled “Output Totals”) shows that Keetac’s overall construction expenditure of approximately \$660 million (direct effect from Table 3) is calculated to create almost \$529 million (indirect and induced effects from Table 3) in further spending—resulting in economic activity totaling almost \$1.19 billion.

In the same way, in the summary table, the column in the center (labeled “Employment Totals”) shows the total number of jobs that Keetac will create in the State. The column shows that in the peak year of construction, Keetac is expected to directly employ 500 workers for construction projects (from Table 4), which will result in the creation of approximately 356 other jobs in the State (from Table 4), totaling 856 jobs.

Detailed Tables

The Construction impact findings for the three measures in Tables 2 through 4 are reported by year, and by effect. Table 2 shows the impact of Keetac’s construction expenditures on Minnesota, over all months of construction required to build Keetac’s plant expansion. “Value Added” measures the economic impact of capital that Keetac specifically expects to spend on wages, rents, interest, and profits related to construction.

As Table 2 illustrates, the model estimates Keetac will spend a total of almost \$294 million on wages, rents, interest, and profits, which in turn will generate an additional \$287 million in further spending, for a total impact of almost \$581 million. Dividing total value added impact (\$581 million) by direct expenditures (\$294 million) results in a value-added multiplier of 1.98. This means that for each dollar that U.S. Steel spends on wages, rents, interest, and profits related to construction, the economy will spend another \$0.98.

Table 2. Keetac Value Added Impacts from Construction, Minnesota, 2010-2013

Years	Value Added in 2007 \$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	\$47,184,996	\$22,459,849	\$23,671,244	\$93,316,089
2011	\$67,802,472	\$32,273,678	\$34,014,393	\$134,090,543
2012	\$66,992,076	\$31,887,932	\$33,607,841	\$132,487,849
2013	\$111,713,896	\$53,175,321	\$56,043,386	\$220,932,603
Total	\$293,693,440	\$139,796,780	\$147,336,864	\$580,827,084

Table 3 shows the economic impact of U.S. Steel’s total output expenditures over four years of construction. Based on direct expenditures of approximately \$660 million, Keetac is expected to create \$529 million in further spending activity in the State. The ratio of Total Effect to Direct Effect (\$1.19 billion to \$660 million) results in an output multiplier of 1.80 for the State.

Table 3. Keetac Output Impacts from Construction, Minnesota, 2010-2013

SOURCE: IMPLAN

Years	Output in 2007\$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	\$105,959,144	\$43,050,633	\$41,961,320	\$190,971,097
2011	\$152,257,984	\$61,861,604	\$60,296,318	\$274,415,906
2012	\$150,438,144	\$61,122,213	\$59,575,635	\$271,135,992
2013	\$250,865,952	\$101,925,494	\$99,346,468	\$452,137,914
Total	\$659,521,224	\$267,959,944	\$261,179,741	\$1,188,660,909

Table 4 shows Keetac's impact on employment in Minnesota, over the four years of plant construction. This table shows that every job that Keetac creates during the peak construction period will result in the creation of 0.71 additional jobs. Table 4 shows that Keetac will create 500 jobs during the peak construction year, which in turn will cause the creation of 356 jobs throughout other sectors.

Table 4. Keetac Employment Impacts from Construction, Minnesota, 2010-2013

SOURCE: IMPLAN

Years	Employment			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	200	64	79	343
2011	300	95	118	513
2012	300	95	118	513
2013	500	159	197	856

Note: Employment impacts from construction cannot be summed for a total over the four-year construction period.

The IMPLAN model can report employment activity by industry sector. For the peak construction employment year of 2013, the model shows the following top twenty employment sectors.

Table 5. Keetac Employment Impacts from Construction, Minnesota, Peak Construction Year 2013, by Industry Sector

SOURCE: IMPLAN

IMPLAN Sector	Projected Employment			
	Direct	Indirect	Induced	Total
Construct other new nonresidential structures	500	0	0	500
Architectural- engineering- and related services	0	39	1	40
Food services and drinking places	0	5	22	27
Wholesale trade businesses	0	10	7	17
Real estate establishments	0	5	8	13
Employment services	0	9	4	13
Retail Stores - General merchandise	0	2	7	9
Offices of physicians- dentists- and other health	0	0	9	9
Private hospitals	0	0	9	9
Retail Stores - Food and beverage	0	2	7	9
Transport by truck	0	6	2	8
Automotive repair and maintenance- except car	0	5	2	7
Nursing and residential care facilities	0	0	7	7
Retail Nonstores - Direct and electronic sales	0	2	5	7
Services to buildings and dwellings	0	4	2	6

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Retail Stores - Motor vehicle and parts	0	2	5	7
Legal services	0	4	2	6
Civic- social- professional- and similar orgs	0	2	3	5
Private household operations	0	0	5	5
Retail Stores - Miscellaneous	0	1	4	5
Other (remaining sectors of the economy combined)	0	61	86	147
Total	500	159	197	856

Operations

Table 6. Summary: Keetac Operations Impacts, Minnesota, 2013, Full Operations Year (2007 Dollars)

<i>Year</i>	<i>Value Added Totals</i>	<i>Employment Totals</i>	<i>Output Totals</i>
2013	\$315,402,161	479	\$653,488,755

Tables 6 through 9 show the economic effects that the Keetac mine expansion is expected to have on the State of Minnesota during a typical year of full operations. It is important to note that unlike the effects of Keetac’s construction expenditures, which are singular, Minnesota will reap the benefits of Keetac’s full-operations expenditures annually for the life of the expansion.

Table 6 summarizes Tables 7 through 9, showing the total economic effects of Keetac’s direct expenditures for operations on Minnesota. The left-most column of Table 6 (labeled “Value Added Totals”) shows the economic impact of the money that Keetac expects to use specifically to pay for wages, rents, interest, and profits related to operations. During a full operations year, it is predicted that Keetac will directly expend more than more than \$191 million (from Table 7) in value-added expenditures to meet these costs, which should result in total spending of more than \$315 million.

The right-most column in Table 6 (labeled “Output Totals”) displays the economic effects that Keetac’s total expenditures for operations are expected to have on the State. In a full operations year, Keetac is expected to directly spend more than \$421 million for operations, thereby generating a total of more than \$653 million in economic activity across the State.

The center column of the summary table above (labeled “Employment Totals”) reports the number of jobs that Keetac is likely to create directly and indirectly during a full operations year. Over a full operations year, Keetac is likely to employ 170 workers in operations, which should result in the creation of 479 jobs in total across the State.

Detailed Tables

Table 7 shows the Value Added impacts that Keetac’s specific spending on wages, rents, interest, and profits is expected to have on Minnesota. The table shows that in a full operations year, Keetac is expected to directly spend more than \$191 million to meet these expenditures, which should create a total of almost \$124 million in other spending throughout the rest of the State. The value added

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multiplier is 1.65, or the ratio of "Total Effect" to "Direct Effect" (\$315 million to \$191 million).

Table 7. Keetac Value Added Impacts from Operations, Minnesota, 2013, Full Operations Year

SOURCE: IMPLAN		Value Added in 2007\$			
Years	Direct Effect	Indirect Effect	Induced Effect	Total Effect	
Full Operations (2013)	\$191,164,704	\$74,721,184	\$49,516,273	\$315,402,161	

Table 8 shows the Output impacts on Minnesota of Keetac's expenditures for operations. As illustrated in Table 8, Keetac is expected to spend over \$421 million for operations in a full operations year, which should result in a total of more than \$653 million in spending in the State. The economic multiplier is 1.55 (\$653 million to \$421 million).

Table 8. Keetac Output Impacts from Operations, Minnesota, 2013, Full Operations Year

SOURCE: IMPLAN		Output in 2007 \$			
Years	Direct Effect	Indirect Effect	Induced Effect	Total Effect	
Full Operations (2013)	\$421,280,896	\$144,431,816	\$87,776,043	\$653,488,755	

Table 9 shows the impacts that Keetac's creation of operations jobs is expected to have on the State. In a full operations year, Keetac is expected to employ 170 people in operations, which should result in the creation of 479 jobs total across the State. The employment multiplier is 2.82.

Table 9. Keetac Employment Impacts from Operations, Minnesota, 2013, Full Operations Year

SOURCE: IMPLAN		Employment			
Years	Direct Effect	Indirect Effect	Induced Effect	Total Effect	
Full Operations (2013)	170	138	171	479	

Table 10 shows employment impact detail from operations for the State, listing the top indirect and induced jobs created by direct Keetac employment. The table shows the following top twenty employment sectors contributing to additional jobs.

Table 10. Keetac Employment Impacts from Operations, Minnesota, 2013, Full Operations Year, by Industry Sector

SOURCE: IMPLAN IMPLAN Sector	Projected Employment			
	Direct	Indirect	Induced	Total
Mining iron ore	170	0	0	170
Transport by truck	0	28	2	30
Food services and drinking places	0	3	19	22
Wholesale trade businesses	0	12	6	18
Electric power generation- transmission- and distr	0	12	1	13
Management of companies and enterprises	0	9	1	10
Real estate establishments	0	2	7	9
Offices of physicians- dentists- and other health	0	0	8	8
Private hospitals	0	0	8	8
Employment services	0	5	3	8
Retail Stores - General merchandise	0	1	6	7
Retail Stores - Food and beverage	0	1	6	7
Nursing and residential care facilities	0	0	6	6

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US Postal Service	0	4	1	5
Retail Nonstores - Direct and electronic sales	0	1	4	5
Retail Stores - Motor vehicle and parts	0	1	4	5
Maint & repair construct of nonresident structures	0	4	1	5
Private household operations	0	0	4	4
Services to buildings and dwellings	0	2	2	4
Civic- social- professional- and similar orgs	0	1	3	4
Other (remaining sectors of the economy combined)	0	52	79	131
Total	170	138	171	479

IV. Findings: Keetac’s Economic Impact on Minnesota’s Arrowhead Region

As with the impacts on the State of Minnesota, the impacts for the Arrowhead Region use Keetac’s direct expenditures as the original input for the models. Direct expenditures are listed in the column labeled, “Direct Effect.” “Indirect Effect” measures the amount of increased spending between commercial, government, and service industries. “Induced Effect” measures the amount of increased spending by residential households. “Total Effect” is the sum of Direct, Indirect, and Induced Effects.

The “Value Added,” “Employment,” and “Output” totals in the following tables show Keetac’s economic impacts for the Arrowhead Region. These totals incorporate the economic impacts that Keetac is likely to have on the Arrowhead Counties, which are shown in the corresponding “Value Added,” “Employment,” and “Output” columns in the following tables.

None of the tables that show Keetac’s yearly construction employment impacts add the total number of jobs created across all months. Although IMPLAN required that each calendar year of construction be modeled as a separate event, each job created by construction activity may carry through all calendar years as the same job, and could thus be counted more than once if years are summed. (For instance, the engineers, project managers, and installers that Keetac will employ for year 2010 might still be employed by Keetac in year 2011.)

Construction

<i>Years</i>	<i>Value Added Totals</i>	<i>Employment Totals</i>	<i>Output Totals</i>
2010	\$67,841,741	304	\$147,038,094
2011	\$95,166,731	456	\$206,261,435
2012	\$91,779,532	456	\$198,920,126
2013	\$149,365,567	760	\$323,730,313
Total	\$404,153,571		\$875,949,968

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Table 11 summarizes the total impact effects of Keetac’s direct construction expenditures, as illustrated by the detail in Tables 12 through 14. In Table 11, the column on the left (labeled “Value Added Totals”) reports the economic impact of more than \$244 million that Keetac is expected to use to pay for wages, rents, interest, and profits (total direct effect from Table 12). This expenditure is estimated to result in an additional \$160 million in commercial, government, services and consumer spending (total indirect and induced from Table 12) for a total of more than \$404 million.

In the summary Table 11, the column on the right (labeled “Output Totals”) shows that Keetac’s overall construction expenditure of approximately \$588 million (direct effect from Table 13) is calculated to create \$288 million (indirect and induced effects from Table 13) in further spending—resulting in economic activity totaling almost \$876 million.

In the same way, in the summary Table 11, the column in the center (labeled “Employment Totals”) shows the total number of jobs that Keetac will create in the counties of the Arrowhead Region. The column shows (as detailed in Table 14) that in the peak year of construction, Keetac is expected to directly employ 500 workers for construction projects (from Table 14), which will result in the creation of almost 260 other jobs in the Region (from Table 14), totaling 760 jobs.

Detailed Tables

The construction impact findings for the three measures in Tables 12 through 14 are reported by year, and by effect. Table 12 shows the Value Added impact of Keetac’s construction expenditures on the Arrowhead Region, over all months of construction required to build Keetac’s plant expansion. This “Value Added” measure shows the economic impact of capital that Keetac specifically expects to spend on wages, rents, interest, and profits related to construction.

As Table 12 illustrates, the model estimates Keetac will spend a total of over \$244 million on wages, rents, interest, and profits, which in turn will generate an additional \$160 million in further spending, for a total impact of over \$404 million. Dividing total value added impact (\$404 million) by direct expenditures (\$244 million) results in a value added multiplier of 1.65. This means that for each dollar that Keetac spends on wages, rents, interest, and profits related to construction, the economy will spend another \$0.65.

Table 12. Keetac Value Added Impacts from Construction, Arrowhead Region, 2010-2013

Years	Value Added in 2007 \$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	\$40,998,840	\$13,031,462	\$13,811,439	\$67,841,741
2011	\$57,512,168	\$18,280,215	\$19,374,348	\$95,166,731
2012	\$55,465,180	\$17,629,581	\$18,684,771	\$91,779,532
2013	\$90,266,184	\$28,691,063	\$30,408,320	\$149,365,567
Total	\$244,242,372	\$77,632,321	\$82,278,878	\$404,153,571

Table 13 shows the economic impact of Keetac’s total output expenditures over four years of construction. Based on direct expenditures of approximately \$588 million, Keetac is expected to create \$288 million in further spending activity in the Arrowhead Region. The ratio of Total Effect to Direct

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Effect (\$876 million to \$588 million) results in an output multiplier of 1.49 for the Region.

Table 13. Keetac Output Impacts from Construction, Arrowhead Region, 2010-2013

Years	Output in 2007 \$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	\$98,667,808	\$23,994,994	\$24,375,292	\$147,038,094
2011	\$138,408,784	\$33,659,589	\$34,193,062	\$206,261,435
2012	\$133,482,504	\$32,461,568	\$32,976,054	\$198,920,126
2013	\$217,234,592	\$52,829,213	\$53,666,507	\$323,730,312
Total	\$587,793,688	\$142,945,364	\$145,210,915	\$875,949,967

Table 14 shows Keetac's impact on employment in the Arrowhead Region, over the four years of plant construction. This table shows in the peak year of construction 500 direct jobs that Keetac creates during the construction period will result in the creation of 260 additional jobs. The employment multiplier for the Arrowhead Region is 1.52.

Table 14. Keetac Employment Impacts from Construction, Arrowhead Region, 2010-2013

Years	Employment			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
2010	200	46	58	304
2011	300	70	86	456
2012	300	70	86	456
2013	500	116	144	760

Note: Employment impacts from construction cannot be summed for a total over the four year construction period.

The IMPLAN model can report employment activity by industry sector. For the peak construction employment year of 2013, the model shows the following employment activity detail. Table 15 lists the top twenty indirect and induced jobs created by direct Keetac construction employment.

Table 15. Keetac Employment Impacts from Construction, Arrowhead Region, Peak Construction Year 2013, by Industry Sector

IMPLAN Sector	Projected Employment			
	Direct	Indirect	Induced	Total
Construct other new nonresidential structures	500	0	0	500
Architectural- engineering- and related services	0	36	0	36
Food services and drinking places	0	4	19	23
Wholesale trade businesses	0	6	3	9
Retail Stores - General merchandise	0	3	6	9
Private hospitals	0	0	8	8
Retail Stores - Food and beverage	0	2	6	8
Offices of physicians- dentists- and other health	0	0	8	8
Automotive repair and maintenance- except car	0	6	2	8
Retail Nonstores - Direct and electronic sales	0	2	5	7
Nursing and residential care facilities	0	0	6	6
Retail Stores - Motor vehicle and parts	0	2	4	6
Civic- social- professional- and similar orgs	0	2	3	5

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Retail Stores - Miscellaneous	0	1	3	4
Retail Stores - Building material and garden suppl	0	1	3	4
Employment services	0	3	1	4
Private household operations	0	0	4	4
Services to buildings and dwellings	0	3	1	4
Legal services	0	3	1	4
Other (remaining sectors of the economy combined)	0	42	61	103
Total	500	116	144	760

Operations

Table 16. Summary: Keetac Operations Impacts, the Arrowhead Region, 2013, Full Operations Year (2007 Dollars)

<i>Years</i>	<i>Value Added Totals</i>	<i>Employment Totals</i>	<i>Output Totals</i>
2013	\$272,683,542	398	\$570,489,496

Tables 16 through 19 show the economic effects that the Keetac expansion is expected to have on the Arrowhead Region during a year of full operations. It is important to note that unlike the effects of Keetac's construction expenditures, which are singular, the Arrowhead Region will reap the benefits of Keetac's full operations expenditures annually for the life of the expansion.

Table 16 summarizes Tables 17 through 19, showing the total economic effects of Keetac's direct expenditures for operations on the Arrowhead Region. In Table 16, the left-most column (labeled "Value Added Totals") shows the economic impact of the money that Keetac expects to use specifically to pay for wages, rents, interest, and profits related to operations. During a full operations year, it is predicted that Keetac will directly expend more than over \$191 million (from Table 17) in value added expenditure to meet these costs, which should result in total spending of almost \$273 million.

The right-most column of the summary table (labeled "Output Totals") displays the economic effects that Keetac's total expenditures for operations are expected to have on the Arrowhead Region. In a full operations year (as seen in the detailed Table 18), Keetac is expected to directly spend almost \$421 million for operations, thereby generating a total of more than \$570 million in economic activity across the Region.

The center column of Table 19 (labeled "Employment Totals") shows the total number of jobs that Keetac is likely to create directly and indirectly during a full operations year. Over a full operations year, Keetac is likely to directly employ 170 workers in operations, which should result in the creation of 398 jobs in total across the Region.

Detailed Tables

Table 17 shows the Value Added impacts that Keetac's specific spending on wages, rents, interest, and profits is expected to have on the Arrowhead Region. The table shows that in a full operations year,

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Keetac is expected to directly spend more than \$191 million to meet these expenditures, which should create a total of almost \$273 million in other spending throughout the rest of the Region. The value added multiplier is 1.43, or the ratio of "Total Effect" to "Direct Effect" (\$272 million to \$191 million).

Table 17. Keetac Value Added Impacts from Operations, Arrowhead Region, 2013, Full Operations Year

SOURCE: IMPLAN

Years	Value Added in 2007\$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Full Operations (2013)	\$191,164,720	\$50,338,245	\$31,180,573	\$272,683,538

Table 18 shows the Output impacts on the Arrowhead Region of Keetac's expenditures for operations. As illustrated in Table 18, Keetac is expected to spend almost \$421 million for operations in a full operations year, which should result in a total of more than \$570 million in spending in the Region. The output multiplier is 1.35 (\$570 million to \$421 million).

Table 18. Keetac Output Impacts from Operations, Arrowhead Region, 2013, Full Operations Year

SOURCE: IMPLAN

Years	Output in 2007\$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Full Operations (2013)	\$421,280,896	\$94,179,168	\$55,029,430	\$570,489,494

Table 19 shows the employment impacts that Keetac's creation of operations jobs is expected to have on the Region. In a full operations year, Keetac is expected to employ 170 people in operations, which should result in the creation of 398 jobs total across the Region. The employment multiplier is 2.34.

Table 19. Keetac Employment Impacts from Operations, Arrowhead Region, 2013, Full Operations Year

SOURCE: IMPLAN

Years	Employment in 2007\$			
	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Full Operations (2013)	170	94	134	398

Table 20 shows employment impact detail from operations for the Arrowhead Region. Table 20 lists the top twenty indirect and induced jobs created by direct Keetac operations employment.

Table 20. Keetac Employment Impacts from Operations, Arrowhead Region, 2013, Full Operations Year, by Industry Sector

SOURCE: IMPLAN

IMPLAN Sector	Projected Employment			
	Direct	Indirect	Induced	Total
Mining iron ore	170	0	0	170
Food services and drinking places	0	2	18	20
Electric power generation- transmission- and distr	0	13	1	14
Transport by truck	0	12	1	13
Wholesale trade businesses	0	7	3	10
Private hospitals	0	0	8	8
Offices of physicians- dentists- and other health	0	0	7	7
Retail Stores - General merchandise	0	1	6	7
Management of companies and enterprises	0	6	0	6
Retail Stores - Food and beverage	0	1	5	6
Nursing and residential care facilities	0	0	6	6

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Retail Nonstores - Direct and electronic sales	0	1	5	6
Retail Stores - Motor vehicle and parts	0	1	4	5
US Postal Service	0	4	1	5
All other crop farming	0	4	0	4
Private household operations	0	0	4	4
Civic- social- professional- and similar orgs	0	1	3	4
Maint & repair construct of nonresident structures	0	3	1	4
Retail Stores - Miscellaneous	0	0	3	3
Transport by rail	0	3	0	3
Other (remaining sectors of the economy combined)	0	35	58	93
Total	170	94	134	398

V. Conclusions

This study applies an economic multiplier analysis and input-output modelling system that was created in Minnesota by the IMPLAN Group, Inc., and is used by other state governments and the USDA Forest Service, among others. Readers of this report are reminded here that the economic impacts reported in this study measure only the expansion of the Keetac mine. Note also that all values are reported in 2007 dollars, and expenditures through 2010-2013 are deflated to 2007 dollars.

IMPACTS ON MINNESOTA

Impacts from Construction: With the completion of the construction phase for the proposed Keetac expansion, it is estimated that the project will have generated in the State

- almost \$1.19 billion in output spending, and
- almost \$581 million in value added spending.

During the peak year of construction, Keetac will also have created

- 856 (full-time, part-time, and temporary) jobs.

Impacts from Operations: When operations for the Keetac expansion project reach full operations capacity (projected to be year 2013), the expanded Keetac mine is estimated to generate in the State

- More than \$653 million in output spending, and
- More than \$315 million in value added spending.

During a year of full operations, the expansion project will create an estimated

- 479 (fulltime, part-time, and temporary) jobs.

IMPACTS ON THE ARROWHEAD REGION

Impacts from Construction: With the completion of the construction phase for the proposed Keetac expansion, it is estimated that the project will have generated in the Arrowhead Region

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- Almost \$876 million in output spending, and
- More than \$404 million in value added spending.

During the peak year of construction, Keetac will also have created 760 (full-time, part-time, and temporary) jobs.

Impacts from Operations: When operations for the Keetac expansion project reach full operations capacity (projected to be year 2013), the expanded Keetac mine is estimated to generate in the Arrowhead Region

- Over \$570 million in output spending, and
- Almost \$273 million in value added spending.

During a year of full operations, the expansion project will create an estimated

- 398 (fulltime, part-time, and temporary) jobs.

Special considerations

Special considerations for interpreting these impact numbers: Regional indirect and induced effects are driven by assumptions in the model. With some models, 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, for example, 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) can be further analyzed with an in-depth impact study, involving much more specific data collection and more detailed analysis.

Construction costs may be larger due to commodity prices, banker's fees, and interest payments. Any differences would affect the estimates given here.

Readers are also encouraged to remember the UMD Labovitz School's BBER was asked to supply an economic impact analysis only. Any subsequent policy recommendations should be based on the "big picture" of total impact.

References

Minnesota Department of Natural Resources. Keetac Mine Expansion Project.
<http://www.dnr.state.mn.us/input/environmentalreview/keetac/index.html>

Urban Regional Economics: Concepts, Tools, Applications, by Wilbur R. Maki and Richard W. Lichy.
February 2000. Iowa State Press.

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Stillwater, MN 55082, www.implan.com.

Input-output Analysis: Foundations and Extensions by Ronald E. Miller and Peter D Blair, Englewood
Cliffs, N.J. Prentice-Hall, 1985 (out of print).

Elements of Input Output Analysis, Willam Miernyk, New York, Random House, 1966.

APPENDIX A: Tax Impacts of the Keetac Expansion Project

Operations Tax impacts for the State of Minnesota

The Keetac tax impacts are IMPLAN model estimates. The impacts assume a typical year business operation (year 2013). Note the following two assumptions about the IMPLAN model and tax impacts: 1) impacts use the same distribution as a base year of social accounts, and 2) the distribution of expenditures holds, no matter what the mix of affected industries (once indirect business taxes are estimated from the various impacted industries those indirect business taxes are disbursed as a single entity). The federal tax includes more than \$10 million from the Keetac expansion during a typical year of operations. Tax impacts from the direct and induced impact include personal income taxes, indirect business taxes and other taxes paid by the impacting sectors. Keetac's contribution of state and local taxes is estimated to be more than \$8 million for a typical year's operations. The tax impacts from the direct and induced impact of personal income taxes, indirect business taxes and other taxes would, again, be paid by the indirect and induced impacting industrial sector.

Keetac Expansion Operations Tax Impacts, Minnesota, Full Operations Year 2013 (in 2007 Dollars)

Federal Government (Non-Defense)	\$10,030,389
State/Local Govt (Non-Education)	\$8,644,269

Operations Tax impacts for the Arrowhead Region

Keetac Expansion Operations Tax Impacts, Arrowhead Region, Full Operations Year 2013 (in 2007 Dollars)

Federal Government (Non-Defense)	\$8,541,615
State/Local Govt (Non-Education)	\$7,688,119

APPENDIX B: Comparisons with the Mining Sectors of the State

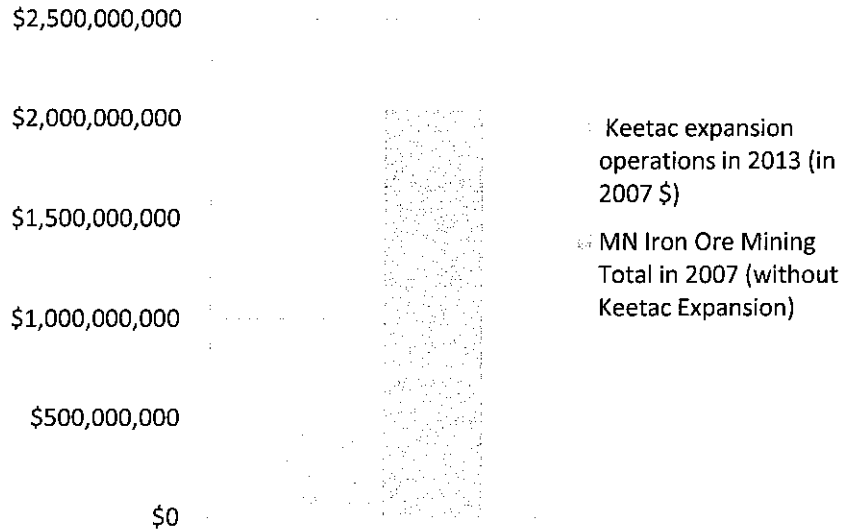
To provide a context for the impact numbers in this report, the following table lists basic total values for the economy of the State of Minnesota. These values are taken from the IMPLAN model (before the proposed Keetac expansion), for specified sectors (mining iron ore, and the indirect and induced sectors related to the impacts of the Keetac expansion).

Minnesota's Mining and Mining-Related Industry Sectors by Output, 2007				
<i>IMPLAN sector</i>	<i>Industry</i>	<i>Output*</i>	<i>Employment</i>	<i>Value Added*</i>
319	Wholesale trade businesses	\$27,731	140,456	\$18,189
360	Real estate establishments	\$16,725	116,184	\$13,725
381	Management of companies and enterprises	\$16,398	65,656	\$9,963
394	Offices of physicians- dentists- and other health	\$12,149	97,234	\$8,404
397	Private hospitals	\$10,111	89,628	\$5,658
413	Food services and drinking places	\$10,062	197,727	\$4,624
31	Electric power generation- transmission- and distribution	\$6,512	10,211	\$4,690
335	Transport by truck	\$5,051	39,134	\$2,348
320	Retail Stores - Motor vehicle and parts	\$3,399	37,350	\$2,220
329	Retail Stores - General merchandise	\$3,180	64,302	\$2,142
324	Retail Stores - Food and beverage	\$3,155	54,960	\$2,145
398	Nursing and residential care facilities	\$3,034	91,526	\$1,949
39	Maint & repair construct of nonresident structures	\$2,882	29,674	\$1,417
331	Retail Nonstores - Direct and electronic sales	\$2,717	52,325	\$2,102
425	Civic- social- professional- and similar organizat	\$2,270	45,630	\$1,063
382	Employment services	\$2,193	72,873	\$1,704
22	Mining iron ore	\$2,043	3,621	\$927
427	US Postal Service	\$2,002	18,245	\$1,571
388	Services to buildings and dwellings	\$1,926	35,674	\$943
426	Private household operations	\$182	37,435	\$182
	
	Totals for all industries	\$494,381	3,518,744	\$259,084

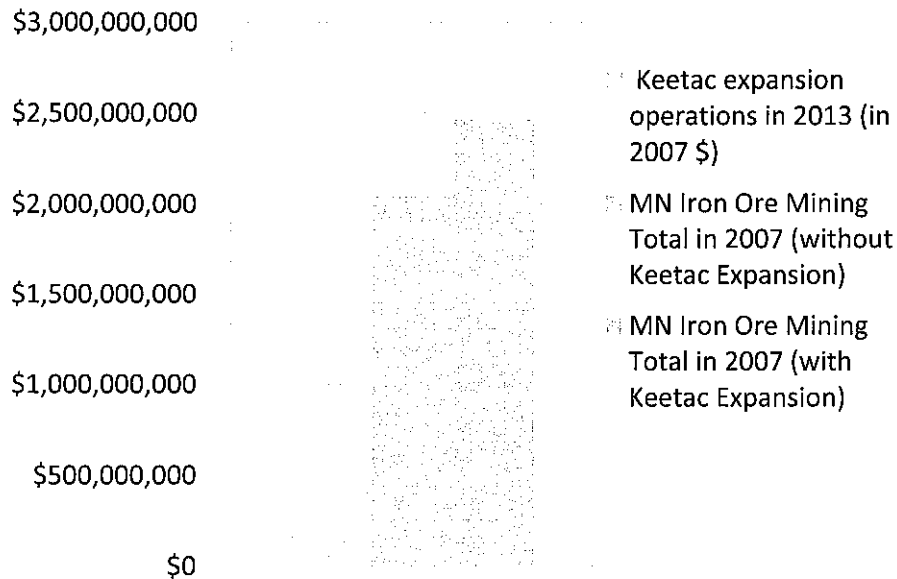
*Millions of dollars

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Keetac and Minnesota Iron Ore Mining , Output in 2007 Dollars



Keetac and Minnesota Iron Ore Mining , Output in 2007 Dollars



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APPENDIX C: History of the Keetac Expansion Project

Review of press releases and newspaper articles following this project:

In February, 2008, U.S. Steel announced a \$300 million expansion of its taconite production plant in Keewatin, Minnesota. The project is expected to create 75 full-time jobs and increase iron pellet production by 60%. The plant currently produces 6 million tons annually and employs 370 workers. The expansion will help to meet the increasing demand for iron pellets in expanding economies like China and India. It will take approximately three years to complete the project and this process will create 500 construction jobs. However, the expansion will bring about an increase in mercury emissions in the region. The Department of Natural Resources (DNR) will look at a number of environmental issues including “potential effects on forest, wildlife and water resources.” The U.S. Army Corps of Engineers are looking at “wetland issues” while Minnesota Pollution Control Agency is concerned with air emissions, which includes mercury emissions. The DNR is expected to present an impact statement by spring 2009.

Sources:

- StarTribune
<http://www.startribune.com/templates>
- TwinCities.com
<http://www.twincities.com>
- Duluth News Tribune
<http://www.duluthnewstribune.com/articles/index.cfm?id=59474§ion=News>
- Minnesota Public Radio
<http://minnesota.publicradio.org>
- BusinessNorth.com
<http://www.businessnorth.com>

APPENDIX D: IMPLAN NAICS BRIDGE TABLE

The following table translates IMPLAN industry codes to North American Industry Classification System (NAICS) codes. This bridge table is provided to assist those wishing more detail on industries listed as contributing indirect and induced employment from Keetac's direct employment.

IMPLAN Sector	IMPLAN Description	2007 NAICS Code(s)
source: implan.com		
10	All other crop farming	11194, 111992, 111998
22	Iron ore mining	21221
31	Electric power generation, transmission, and distribution	2211
36	Construction of other new nonresidential structures	23
39	Maintenance and repair construction of nonresidential maintenance and repair	23
319	Wholesale trade	42
320	Retail - Motor vehicle and parts	441
323	Retail - Building material and garden supply	444
324	Retail - Food and beverage	445
329	Retail - General merchandise	452
330	Retail - Miscellaneous	453
331	Retail - Nonstore	454
332	Air transportation	481
333	Rail transportation	482
335	Truck transportation	484
360	Real estate	531
367	Legal services	5411
369	Architectural, engineering, and related services	5413
381	Management of companies and enterprises	55
382	Employment services	5613
388	Services to buildings and dwellings	5617
394	Offices of physicians, dentists, and other health practitioners	6211-3
397	Hospitals	622
398	Nursing and residential care facilities	623
400	Individual and family services	6241
413	Food services and drinking places	722
414	Automotive repair and maintenance, except car washes	81111-2, 811191, 811198
425	Civic, social, professional, and similar organizations	8134, 8139
426	Private households	814
427	Postal service	491



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