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THE STUDY OF IMPACTS FROM PEOPLE AND MONEY  
RELATED TO COPPER-NICKEL DEVELOPMENT

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Copper-Nickel mining (if it occurs) will be the sixth resource-based economy to take place in northeastern Minnesota since the white man first entered the area in the late seventeenth century. The fur trade followed fast on the heels of the early explorers and was well developed by the French by 1750, before the British pushed them out in 1763. A gold rush occurred in 1865 but did not pan out. However, it was during this period that large amounts of iron ore were first noticed. Timber was cut in 1860's supplying the building materials for a growing nation. Once iron ore mining started in 1884, it soon surpassed timber as an economic force. There were twenty mines on the Mesabi Range in 1900 and 111 by 1910. This began the fantastic development of Minnesota's iron resources which have helped fight two World Wars and significantly aided in the growth of modern, western technological civilization.

Iron mining was the beginning of a pattern of boom and bust with what many now consider to be serious instances of social and economic exploitation. The Vermilion Range boomed first with Tower reaching a population of 5,000 by 1886 and Ely surpassing it shortly thereafter. The Mesabi Range development was close behind with a growth rate of 550 percent between the years 1900 and 1910, and a population of nearly 80,000 by 1920. This was the era when immigrants were lured from Europe, Russia, and China with false promises of untold wealth to be gleaned from the proverbial streets of gold. Instead, many of them found streets of mud and untold drudgery. The typical boom and bust phenomena plagued the area. Boom periods were marked by high prices, high rents, and inadequate housing. Transient towns called "locations" were

moved about or simply disappeared as open pit mining drew near. The bust came with lower prices for steel or national economic disaster. The "Rangers" were beset with high unemployment, low pay, foreclosures, and severe out-migration. The present boom in taconite mining is following a long bust period preceded by the depletion of the natural ore or hematite.

The past attitudes of the state and the mining companies showed little or no systematic concern for any of the above mentioned indirect socio-economic trade-offs of iron mining. Huge profits flowed out of Minnesota to eastern firms and stock holders while immigrant miners lived in small shacks on the edge of open pits.

Now, of course, attitudes and circumstances have changed. Strong unions and occupation/health and safety laws protect the worker. The sciences of economics and sociology recognize that there are more subtle impacts of economic growth that affect people's lives than simply new jobs and more money. Present concerns are directed toward the increased cost of government services (such as new roads, sewers, social services, snow plowing, school costs, etc.) and changes in the social structure.

Possible copper-nickel mining presents an unique opportunity to provide needed information to policy makers that will enable them to consider the development potential of the ore, yet provide realistic assessment of trade-offs among many concerns. Past studies of this type of development have had several problems. They have usually been done on a piecemeal basis, one at one time, unrelated to previous studies. More often than not, these after-the-fact studies were focused entirely on the natural environment, ignoring the relationship between socio-economic events and that environment. Socio-economic

studies (such as there were) usually looked at the gross benefits and ignored the trade-offs of large scale development.

The Copper-Nickel Regional socio-economic study has had several advantages bestowed upon it, some by a far-sighted legislature, some by fortune. Fortune has seen fit to provide a \$1 billion taconite expansion phase that started in the early seventies and continues at the present time. Using historical data and examining the taconite expansion events, much can be said about the mechanisms and consequences of modern growth in the copper-nickel study area. The legislature has seen fit to provide time and resources to allow the project to obtain an in-depth look at several aspects of expected impact.

These above two circumstances give the state the opportunity to conduct a broad comprehensive look at the socio-economic effects of possible copper-nickel development. It is the intention of the project to examine what will happen to the area given several development alternatives of copper-nickel mining. (See Technology Assessment article).

It is expected that there may be significant impacts resulting from the possible increase and distribution of population and money. An increase in population would be expected to produce a flow of money in retail sales and increased tax revenues while simultaneously requiring increased services from local governments. Increased populations could also cause changes in land use such as dispersed settlement patterns, expanding urban areas, and increased pressure on recreation areas. Population growth would also require more fuel to heat homes, more cars and gasoline to transport people and more or better sewage facilities to treat their wastes. These activities of an increased population would cause further changes in air quality, water quality

and general noise levels.

Increased money in the area would result from the spending of wages by employees and by mining company trade with local industries such as heavy equipment dealers, tire dealers and so on. This increased revenue in the business community would be expected to provide more jobs, possible physical expansion of facilities, further use of energy, increased cost of services, and more tax revenue. Further cyclical impacts are obvious; increased population, change in environmental quality, and an alteration of the quality of life.

The distribution of people and money is as significant an issue as their potential increase. In some circumstances population increase and its associated costs may be concentrated in one town while a neighboring town receives most the money of direct taxes from the mine. This is not uncommon and it is occurring right now on the Iron range. The age distribution of the population may change requiring expansion of some services and contraction of others such as nursing homes, welfare or unemployment. An incoming population may settle in a dispersed manner outside of established communities due to lack of housing or the prohibitive costs of urban living. This circumstance has a unique set of problems requiring expanded mail service, snow plowing, school bus routes, and treatment of domestic wastes.

It is a relatively easy matter to define expected impacts (such as new jobs or costs of services) but it is another matter entirely to forecast the size and distribution of expected socio-economic impacts.

This task requires that the forecasting process contend with the mystery of human behavior and the incalculable whims of mankind. All of the issues

discussed earlier fit in the category of human behavior, described in the aggregate by the laws of economics and sociology.

The Copper-Nickel socio-economic group will forecast the expected patterns of human behavior resulting from copper-nickel development by conducting dynamic characterization, stress response, and impact studies to provide ranges of expected impact to legislators, local governments, state agencies, and citizen's groups. The dynamic characterization and stress response studies are designed to provide relevant, up-to-date information on socio-economic relationships which will be used to help forecast events in the impact studies.

1. DYNAMIC CHARACTERIZATION STUDIES

These are expected to provide information on how the people, governments, and businesses are all interacting at the present time. If relevant historic information exists, it will be compared against present information to result in the stress response studies. If usable historic data does not exist, the dynamic characterization studies will be used as a point of departure for the impact studies.

1A. Household Survey

Up-to-date demographic, labor force, settlement pattern and housing preferences, and commuting pattern information will be generated by this survey (which is underway at the time of this printing). This survey will define characteristics of the people in the east end of the Iron Range (from Virginia to Ely), the entire Iron Range, all of the seven county Arrowhead (Region III), and Duluth.

Since the unique aspects of the people living in each of these areas will be different, the assessment of impacts will be made on each different area.

1B. Community Studies

The community studies will provide a portrait of the communities expected to be impacted by copper-nickel development. These studies will concentrate on the past use and present and future capabilities of community activities such as revenues, bonding capacity, education, government costs, business activity, population, employment, labor force, etc. Historic and continuously updated data will be examined for at least the eight east range communities (Virginia, Eveleth, Gilbert, Biwabik, Aurora, Hoyt Lakes, Babbitt and Ely) and Duluth. It is expected that some of the North Shore and other Iron Range communities will be studied with the thought that they will be receiving significant impacts.

1C. Land Use

The present land uses will be examined and mapped concentrating on urban, scattered residential, forestry, recreation, transportation, and mining uses. They are expected to emphasize the East Range area in some detail and the Arrowhead Region more generally.

1D. Taxation Study

Many of the important economic issues will revolve around the possible tax generated revenues from copper-nickel development and the anticipated cost of services and loss of revenue resulting from changing population pressures. The taxation study will determine the present copper-nickel and taconite tax rates (direct and employee income) and distribution for all levels of govern-



ment in the state.

1E. Taconite Commuter Study

Commuter patterns affect settlement patterns, transportation systems, and energy use. The present pattern of travel to work exhibited by taconite employees and construction workers may approximate that of future copper-nickel employees. Therefore, the origin and destination of these employees is being determined with the kind cooperation of the taconite mining companies.

1F. Mine Models

The technology assessment team is constructing the models of likely copper-nickel development. They will provide information to the socio-economic team on probable location of mines and smelters, the number and type of employees needed, the amount of wages paid, the costs of construction, maintenance, and machinery. This information will be used in projecting the impact of the employees and money on the copper-nickel study areas.

1G. Economic Studies

Should copper-nickel mining occur it will have various effects on the other base economies of the region. A base economy is an economic activity which brings money into a region from outside that region. By all indicators it is obvious that taconite mining is the major economic activity for the region. Forestry and tourism are other major private enterprise base economies. However, their exact contribution to the regional economy is largely unknown. A study is underway to characterize the economic contribution of forestry, tourism and taconite to the regional economies.

2. STRESS RESPONSE STUDIES

The taconite development and expansion has dominated community affairs and economic activities within the expected copper-nickel impact area since 1970. This occurrence provides a natural laboratory for the study of these patterns in the face of large scale mining development. The stress response studies will examine these patterns by comparing information from 1970 and earlier with up-to-date information to assess degrees of change that have occurred with the taconite expansion.

2A. Settlement Patterns

The distribution of an increased or altered population resulting from copper-nickel is of prime importance. The patterns of where and why people have settled in relation to taconite development and expansion will provide data useful in forecasting settlement patterns expected from copper-nickel development.

2B. Demographic Trends

The number and kind of people who will move into the area as a result of copper-nickel development will in turn determine the size and nature

of many impacts. Therefore, this is one of the more crucial forecasts. It will be aided by comparing the size and characteristics of the present population with that described by the 1970 Census.

2C. Economic Trends

Taconite mining is currently undergoing a \$1.5 billion expansion program which began in the early 1970's. Historic information in the form of sales tax records, income tax records, new and expanding business records, government budgets and other data will be compared with present information. It is expected that this will provide insights into patterns of how the spending and buying patterns of business, government and people will affect each other in the copper-nickel study area.

2D. Energy Trends

Adequate energy supplies for increased mining activities in the Arrowhead Region is an already critical issue. This study will work with the Minnesota Energy Agency to document past, present and future energy requirements, without copper-nickel development. The forecasting of energy requirements with copper-nickel development is included in the impact analysis section.

3 . IMPACT ANALYSIS

Impact analysis will forecast the effects of potential copper-nickel development on the socio-economic environment of the state, region and sub-region using the dynamic characterization studies, stress response studies, mine models and accepted socio-economic theory as input.

3A. Tax Model

A tax model will analyse the generation and distribution of expected copper-nickel and taconite tax revenues. It will produce information

on direct taxes from a mine and indirect taxes from mine employees and show the distribution of these taxes to all levels of government. The model will be designed so that one can change key assumptions about the size of the mine, tax rates and distribution formulas and thereby determine what effect any such change would have on the generation and distribution of tax revenues to municipalities, counties, and state governments.

3B. Economic and Demographic Model for the Arrowhead Region, Duluth and the East End of the Iron Range

This model will forecast the various economic and demographic changes expected from copper-nickel development. It is the keystone of the socio-economic impact analysis and special care will be taken in the construction of the model, the use of data and the determination of assumptions to be used in the model. Each of the dynamic characterization and stress response studies will be used to provide data and validation of socio-economic relationships for this model. For example, the household survey will provide present information on the size and make-up of the population. This will be compared with the 1970 Census and other data (demographic trend study). Both the data and the growth patterns will be used in the economic-demographic model to forecast future changes.

3C. Community Impact Analysis

This analysis will also use many of the trend and characterization studies plus the economic-demographic model to forecast changes in the local communities based on impacts from copper-nickel development. This analysis will show changes in expected community revenues and compare this with expected changes in costs of community services for such population caused developments as new roads, new sewage treatment facilities, schools, police, etc.

3D. Land Use Impact Analysis

The land use characterization study will provide the background for this impact analysis. Development associated with increased population and economic activity will be geographically located based on mine models and previously determined settlement patterns and commuter patterns. An overlay method of mapping will be used illustrating various uses and potential conflicts.

3E. Energy Impact Analysis

Four principle components will be involved in the analysis: copper-nickel development, taconite expansion, declining natural gas supplies, changing energy technology and secondary impact -- generated demand. These components and other appropriate factors, will be used to forecast how copper-nickel development will affect current and projected energy supply and demand, with problem identification receiving high priority.

3F. Copper-Nickel Market Analysis

This will forecast supply, demand and price for copper-nickel and aluminum for up to twenty-five years. It will estimate production costs of actual operations and expected costs of future operations. It will make a determination of the influence of recycling on the market and the importance of Minnesota's copper-nickel reserves as they relate to the world supply. This information will help forecast the economic viability of copper-nickel mining in Minnesota and subsequent economic impacts.

3G. Interdisciplinary Impact Studies

All areas of the total project will cooperate to examine the influences of people on the natural environment and the impacts of altered air quality and water quality on the population. For example the socio-economic study

will provide to the natural sciences information on changes in population and related sewage effluent, from this the physical science team will estimate water quality impacts on the area. The biological sciences team will estimate game habitat and numbers which could be used to provide analysis of recreation opportunities for immigrating copper-nickel workers.

#### Summary

If copper-nickel mining precedes it will be another mineral based economic activity in an area already dominated by taconite which is currently undergoing an expansion phase. For these reasons many of the socio-economic study activities will use the taconite expansion activities as a model for forecasting socio-economic impacts resulting from copper-nickel development.

In essence, the socio-economic group will forecast expected impacts of copper-nickel development on established dynamic institutions and significant issues. These are: governmental units such as towns, counties, and state; energy demand and supply; landuse; population; taxes; business activity and the copper-nickel market.