1981 Report to the Legislature on Copper-Nickel Development

House Committee on Environment and Natural Resources

Senate Committee on Agriculture and Natural Resources

Prepared Pursuant to Minnesota Laws 1980, Chap. 614, Section 181.

Submitted By:

State Planning Agency
Pollution Control Agency
Department of Natural Resources
Department of Health

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I. INTRODUCTION AND SUMMARY

This report was prepared pursuant to 1980 Session Laws, Chapter 614, Section 181, which directed the State Planning Agency, Pollution Control Agency, Department of Natural Resources, and Department of Health to review the Regional Copper-Nickel Study and to report on that review to the 1981 Legislature.

Background

The $4.3 million Regional Copper-Nickel Study, culminating three and a half years of study of the environmental, social, and economic effects of a new copper-nickel industry in northeastern Minnesota, was presented to the Environmental Quality Board on September 20, 1979. The Regional Copper-Nickel Study contains considerable technical information, but does not make policy recommendations based on this information. Some of the research conducted in conjunction with the Study is still going on.

In response to the Regional Copper-Nickel Study, the Environmental Quality Board established a technical advisory committee to review the thoroughness and accuracy of the study, and the adequacy of state policies and programs to manage the opportunities and problems associated with copper-nickel development. The committee in its June 19, 1980 report to the EQB focused on four major issues (air quality, water resources, energy, and social and fiscal), and made general recommendations for each issue area (Appendix A).

On November 10, 1980, the State Planning Agency presented a report to the Governor on copper-nickel tax policy issues. This report (Appendix B), prepared with the assistance of the Departments of Revenue and

Natural Resources, was also transmitted to the tax committees of the Minnesota Legislature.

In preparing this report, the State Planning Agency, Pollution Control Agency, Department of Natural Resources and Department of Health have prepared a joint report in response to Chapter 614 instead of a separate report from each agency. Although the four agencies agree on the recommendations contained herein, it should be recognized that some of the agencies do not have the technical expertise to provide informed comments on some of the recommendations.

Recommendations

The recommendations fall into three major categories: legislative actions, administrative actions, and policy studies. The rationales for these recommendations are presented with the individual reports from each agency (Section II).

In the case of legislative recommendations, existing legislation provides considerable direction and authority to the state agencies. The Legislature should consider legislation in the following three areas:

-- The Legislature should establish a committee to examine the issue of siting a smelter in Minnesota and to formulate and recommend corresponding state policy, including the identification of areas within the state where a smelter should not be located. This committee should include representatives from the State Planning Agency, Pollution Control Agency, Department of Natural Resources, Energy Agency, the mining industry, and the public.

-- The Legislature should prohibit copper-nickel develpment which would affect waters that are directly tributary to the BWCA, that is, which do not drain into Birch Lake before their drainage into the BWCA. (This exclusion area represents approximately 6-7 percent of the MINESITE Study Area.)

-- The Legislature should consider establishing a time-table during the 1981 session for developing copper-nickel tax legislation. Tax legislation is not necessary this session, but is desirable by 1983.

The following administrative actions are recommended:

-- If copper-nickel mining takes place in Minnesota, a smelter should be built within the State, for the State's economic interests, and should be required to apply the best available technology to control environmental impacts. The State should examine means by which it could accommodate the construction of a smelter in Minnesota.

-- The DNR water quality studies now underway should be completed before mineland reclamation results applicable to copper-nickel mining are promulgated and before the State approves any commercial-scale copper-nickel operation.

-- A study plan for the investigation of the mine pit water quality issue should be prepared by the Department of Natural Resources and presented to the legislature in 1982. This plan should include an outline of the problem, estimates of costs and time required to complete the study, and recommendations of responsible agencies.

-- Research into the nature and extent of potential water quality impacts, and the efficacy of control and treatment measures, should be supported and continued, in order to provide an adequate data base for the development of appropriate reclamation standards.

-- No permit for a commercial-scale copper-nickel mining operation should be granted until appropriate reclamation standards for such mining have been promulgated.

-- The Non-Degradation provisions of 6 MCAR 4.8014 and 4.8015 should be made applicable to waters affected by copper-nickel development, and no commercial copper-nickel development should be allowed in Minnesota until provisions for such application have been developed by the Pollution Control Agency.

-- Within three years, the Pollution Control Agency should define how the Non-Degradation provisions of 6 MCAR 4.8014 and 4.8015 will be applied to waters affected by copper-nickel development.

-- The energy supply/demand situation in northeastern Minnesota should be updated well in advance of any copper-nickel development, recognizing, however, the dynamic nature of the energy future in Minnesota.

-- The Prevention of Significant Deterioration rule should be adopted by the Pollution Control Agency to implement requirements of the federal Clean Air Act Amendments.

-- The Offset Rule should be adopted by the Pollution Control Agency to implement requirements of the federal Clean Air Act Amendments.

-- In addressing the need for a statewide asbestos standard, copper-nickel mining activities should be specifically considered.

-- The Pollution Control Agency should evaluate visibility impacts in Class I areas in considering the siting of a smelter.

-- The Pollution Control Agency should continue to review existing solid waste rules as new data become available relative to copper-nickel development.

-- The nature and extent of potential impacts to water quality should continue to be evaluated to provide a base for implementing existing regulations. In addition, a pit water study as noted in the Department of Natural Resources recommendations should be started.

-- Alternative water control and treatment options should continue to be explored to provide information on feasible mitigation measures.

-- Within three years and prior to the commencement of any copper-nickel mining, a method should be developed by which non-degradation provisions for water quality can be implemented.

-- Because necessary additional health information can best be obtained for site-specific studies, the Department of Health

recommends that those studies be undertaken as part of a site-specific environmental impact statement.

The following policy studies are recommended:

-- The Department of Natural Resources should, within the next three years, prepare a regional comprehensive water management plan for the area that could be affected by copper-nickel development. This effort should also include the Pollution Control Agency, the State Water Planning Board, the mining industry, and the public.

-- The Minnesota Environmental Quality Board should initiate an examination of policy options for the management of energy resources and coordination of future energy policies in northeastern Minnesota in light of potential copper-nickel development. Such an examination should involve other governmental agencies, such as the Minnesota Energy Agency and the Arrrowhead Regional Development Commission, utilities, industry and the public. Among the policy options that should be considered is that of an electrical generating facility as part of a copper-nickel operation.

A Final Note

With the completion of the Regional Copper-Nickel Study, the State moved from a predominantly data gathering phase to a phase of translating this mass of data into state policy. Full scale copper-nickel development will not occur within the next few years and probably not until the 1990s, if at all. Given this situation, the State has ample time to carry out the recommendations contained in this report in order to be prepared for the actual arrival of copper-nickel development.

II. AGENCY REPORTS

DEPARTMENT OF NATURAL RESOURCES

SMELTER POLICY

A. Major Factors

1. A smelter does not necessarily have to be located at the mine/mill site, due primarily to the relatively small amounts of material to be transported and the fact that only a small percentage of material processed by a smelter is discharged as waste. This waste is generally useful as construction material if there is a local market.

2. Many factors influence the decision of where to site a smelter:
   a. distance to product market
   b. access to a transportation network
   c. availability of process water
   d. availability of energy
   e. pollution control requirements
   f. land use factors
   g. tax policies

3. Even if large-scale copper-nickel development is carried out in Minnesota, including a number of separate mining operations, economic and market factors would in all likelihood limit the number of possible smelters to one or two.

r. The development of Minnesota's copper-nickel ores, due

to their unique chemical characteristics, would necessitate the use of a "customized" smelting process.

5. Existing air quality standards in the BWCA may be exceeded as a result of the development that is projected in northeastern Minnesota in the next ten years. These projections do not include a smelter in northeastern Minnesota.

6. A smelter located in Minnesota could generate significant tax revenues distributable within the state, and could lead to additional manufacturing development in Minnesota.

7. Application of the best available smelter control technology would allow existing air quality standards in Minnesota to be met.

B. Discussion

The State of Minnesota has a legitimate and significant interest in whether or not a smelter is located within the state, and, if it is, where it is located. From the state's point of view, the primary advantage to having a smelter within the state is economic; a smelter would represent an additional source of tax revenue, would provide jobs, and would serve to diversify the economic base of the surrounding region. On the other hand, certain adverse enironmental impacts are associated with smelters, the most important of which are air quality

impacts. These economic and environmental factors will have to be addressed in resolving the smelter issue.

Currently, the authorities that would apply to a smelter proposal are the permiting programs carried out by the State, primarily through the PCA and DNR. At present, a decision on the acceptability of a smelter at a proposed site would be made strictly on the basis of whether or not, on an individual permit basis, permit conditions could be met.

One of the problems with this regulatory approach is that a smelter in northeastern Minnesota, for example, while meeting air quality standards, could prohibit future industrial development in that region. This is because under existing air quality laws, air quality in the region can be degraded up to a certain point. When that point is reached, three options are available: No further air quality degradation, meaning no further development is allowed; air quality standards are modified to allow such additional development; or existing air pollution emitters in the region reduce their emissions to make available an air pollution increment for new development. In essence, a smelter, which is not site dependent on the mineral resource, could prevent the future development of a facility which is site dependent, such as a copper-nickel or taconite mine and mill. In addition, the incremental permitting activities that would be applied to a smelter proposal today do not provide for a comprehensive analysis of mineral development proposals; such an

analysis is necessary today, in light of current and potential land use conflicts in northeastern Minnesota.

A smelter, whether or not it were associated with a mine and mill proposal, would undoubtedly be evaluated through the environmental impact statement procedure. Although this process does include an assessment of specific alternatives to the proposed project, it does not represent the type of comprehensive, inter-agency planning effort necessary for the state to effectively deal with the smelter issue.

The state has adopted siting authorities for various industrial facilities. For example, the siting of large power plants in Minnesota is carried out under the State Planning Agency's Power Plant Siting Program. The Department of Natural Resources, through its Mineland Reclamation Program, has identified areas within the state where certain mining facilities and activities are not allowed or are discouraged. The basis for these two programs is land use management and environmental protection. Because of the potential environmental impacts associated with a smelter, the state should participate in the determination of where such a facility could or should be located.

While it should not be the responsibility of the government to determine acceptable smelter locations for industry, it is in the best interests of the State to generally identify areas where smelter facilities could be acceptable. As such,

the identification of areas in which the location of a smelter would not be allowed or would be discouraged could serve to enhance future mineral-related development within the state.

C. Recommendations

1. If copper-nickel development takes place in Minnesota, it would be in the best economic interests of the state to site a smeltering facility within Minnesota. The best available technology should be applied to the operation of a smelter to control environmental impacts. The state should examine means by which it could accommodate the construction of a smelter in Minnesota.

2. A committee should be established to examine the issue of siting a smelter in Minnesota and to formulate and recommend corresponding state policy, including the identification of areas within the state where a smelter should not be located. This committee should include representation from appropriate state agencies, along with input from the mining industry and the public. This committee should report its findings to the 1982 legislature.

WATER QUALITY STUDIES POLICY

A. Major Factors

1. Water runoff from rock stockpiles containing Duluth gabbro and seepage from copper-nickel tailings basins could create serious quality problems. Heavy metals concentrations in water samples of stockpile runoff have ranged from 10 to 100,000 times natural background concentration. Acidification of runoff water could also be a serious water quality problem.

2. The mass of lean ore and waste rock material that would be stockpiled during the life of a copper-nickel operation is extremely large. For example, AMAX has projected for its open pit project rock stockpiles 500-600 feet high which would cover 3400 acres.

3. Water which collects in an open pit copper-nickel mine could pose substantial water quality and reclamation problems. The pit water can be expected to contain elevated concentrations of heavy metals and could become acidified.

4. Methods for collecting and treating waters contaminated by heavy metals and acidification exist, and could be employed during operation of the mine. After mine operation, suitable reclamation methods would be necessary to permanently control the quality of runoff and pit

water. To date, no proven reclamation techniques to control these problems have been demonstrated.

5. The DNR has conducted studies to evaluate different techniques for the control of stockpile runoff and treatment of contaminated water. These studies have shown promising results, but additional work is necessary in order for these results to be proven. No studies have been carried out by the state on the control of the pit water problem.

B. Discussion

Historically, one of the major problems associated with the mining of metal sulfide deposits, such as the Duluth gabbro, has been the release of toxic metals and the acidification of water, both of which result from the leaching process. While these effects can be treated and controlled during the operational life of the mining operation, their long term treatment through effective reclamation practices has yet to be proven.

In northeastern Minnesota, precipitation exceeds evaporation, meaning that there will be an ongoing source of runoff water in the mining area. Combined with the sulfide chemistry of the gabbro, and the large scale of the various mine facilities, the potential for severe water quality problems is high, not only from stockpile runoff and tailings basin seepage, but also from pit water.

The water quality studies conducted to date provide information on the leaching process, and identify the types of problems we can anticipate, but not a great deal is known about the extent of the possible water quality problems due to copper-nickel mining in northeastern Minnesota. Several factors make a mining operation in the Duluth gabbro unusual, if not unique. The chemical composition of the gabbro, the relatively large scale of projected mining operations, and the abundance of precipitation in northeastern Minnesota contribute to the unique nature of such a mining operation.

For the past several years, DNR, with assistance from the State Pollution Control Agency, the Bureau of Mines, and the Environmental Protection Agency, as well as AMAX and Erie Mining Company, has been conducting studies to evaluate different techniques of treating and controlling runoff from gabbro stockpiles and tailings basins. The general goal of these studies is to identify low cost, passive methods, using readily available materials, to effectively control and/or treat runoff water. To date, these studies have shown promising results, but it will probably be two to three years before the results are final.

No effort has yet been made to study the extent and control of the pit water problem to the same degree as runoff water. This is certainly an area requiring serious attention.

The results of the water quality studies will provide the basis for modifying DNR's mineland reclamation rules. The rules that are now in effect for iron ore and taconite mining will, for the most part, be applicable to copper-nickel mining. Most of the necessary modifications to the rules relate to the anticipated water quality impacts associated with copper-nickel development.

Recommendations

1. The DNR water quality studies now underway should be completed before mineland reclamation rules apllicable to copper-nickel mining are promulgated and before the state approves any commercial-scale copper-nickel operation.

2. A study plan for the investigation of the pit water issue should be prepared by the Department of Natural Resources and presented to the legislature in 1982. This plan should include an outline of the problem, estimates of cost and time required to complete the study, and recommendations of responsible agencies.

MINELAND RECLAMATION POLICY

A. Major Factors

1. The Minnesota Mineland Reclamation Act (Minn. Stat. § 93.44-.51) provides the authority for the DNR to require the reclamation of lands disturbed by the mining of metallic minerals, including copper-nickel.

2. Currently, the DNR has promulgated rules governing the reclamation of lands disturbed by iron ore and taconite mining. These rules would be entirely and generally applicable to copper-nickel mining; however, specific areas of the rules would require modification in order to properly address copper-nickel mining.

3. The mining and milling of copper-nickel ores, while generally similar to taconite mining and milling, would result in certain additional environmental and land use impacts not associated with taconite development. These additional impacts are due to the chemistry of the copper-nickel minerals in northeastern Minnesota and the geographic setting of possible copper-nickel mineralization.

B. Discussion

The Minnesota Mineland Reclamation Act was originally

passed in 1969. It was subsequently amended in 1973. These 1973 amendments resulted from recommendations made by the Interagency Task Force on Base Metal Mining, a group which had as its primary focus possible copper-nickel development in Minnesota. The reclamation law, as amended in 1973, provides an adequate statutory basis for the reclamation of lands disturbed by copper-nickel mining.

The existing reclamation rules contain seven sections: General provisions; reclamation standards; permit application requirements; procedural standards; publication guidelines; administrative standards; and an inspection provision. The sections containing the reclamation standards and the permit application requirements provide the primary substantive basis of the reclamation program. These two sections, while certainly applicable to copper-nickel mining, will require modification in order to effectively address some of the additional problems posed by copper-nickel development. Clearly, however, the administrative and procedural framework for a copper-nickel reclamation program exists; the informational and performance standards, while being substantially applicable to copper-nickel, will require some change.

The copper-nickel minerals in northeastern Minnesota are sulfide minerals. The presence of sulfur in the ore that might be mined and milled means that copper-nickel tailings, lean ore, and waste rock would also contain sulfides. The

existence of sulfur in these materials can lead to such problems as acidification of water and can enhance the leaching and release of heavy metals into the environment. Additionally, a severe water quality problem could exist with respect to water which collects in an open pit copper-nickel mine. These are problems which, for the most part, are not associated with iron ore and taconite mining. The control of potential water acidification and heavy metals release will likely require different, perhaps more demanding, reclamation procedures than are necessary with iron mining. (This will be discussed further in the Water Quality Studies section).

Generally, the potential for major land use conflicts in the region of known copper-nickel mineralization is somewhat higher than it is with iron mining. The potential conflicts exist not only between the minerals industry and other land uses, such as recreation, but also within the minerals industry itself. Accordingly, the need for the careful planning and siting of any future copper-nickel development facilities has increased importance. In order to accommodate these types of impacts, which go beyond the impacts of iron mining, the following sections of the reclamation standards will have to be modified: Siting; sloping and landform design; vegetation; subsidence and other surface displacement; and deactivation and release.

The extent to which the reclamation rules require modifi-

cation is dependent on the results of various research projects currently underway or to be undertaken in the future. Once the nature and controllability of potential water quality impacts are understood, appropriate modifications to the reclamation rules can be prepared.

C. Recommendations

1. No permit for a commercial-scale copper-nickel mining operation should be granted until appropriate reclamation standards for such mining have been promulgated.

2. Research into the nature and extent of potential water quality impacts, and the efficacy of control and treatment measures, should be supported and continued, in order to provide an adequate data base for the development of appropriate reclamation standards.

WATER USE POLICY

A. Major Factors

1. Copper-Nickel development in Minnesota would require large quantities of water, primarily in the concentration, tailings transport and deposition, and, if it occurs, the smelting and refining phases. Electrical generating facilities also require large quantities of water for cooling purposes.

2. Precipitation exceeds evapotranspiration in northeastern Minnesota, and surface water is abundant in this part of the state. Groundwater, on the other hand, is not abundant in the area of copper-nickel mineralization.

3. Since a copper-nickel operation, like taconite, would be essentially a "closed system" with respect to water use, most of the water used in such an operation would be reused, rather than consumed. Makeup water is required to replace that lost through seepage and evaporation.

4. The area of known copper-nickel mineralization in northeastern Minnesota is a region in which significant taconite development is being carried out. In light of existing and possible future additional taconite development in the region, copper-nickel development could lead to extreme competition for water and, possibly, inadequate water supplies to meet demand. This would be particularly true during drought periods.

B. Discussion

Like other types of mining development, a copper-nickel operation would require very large quantities of water. Water is used in the milling and processing stage, as a medium for tailings transport and disposal and in the smelting, refining, and electric generating phases. Most of the water used in a mining operation is reused, although there is some lost through seepage, through and under dams and tailings basins, and through evaporation.

The Regional Copper-Nickel Study estimates that an average of .76 to 1 billion gallons per year of fresh makeup water would be necessary for a copper-nickel operation that included a smelter-refinery. It is possible, although not certain, that surface runoff from within the mining area of a copper-nickel operation could provide this volume of water. On the other hand, it is possible that such volumes of water from within the mining area would not provide the necessary quantity of makeup water, in which case the mining operation would be a net appropriator of water, having to appropriate water from outside the mining area. Whether a specific mining operation would be a net appropriator or net discharger of water would depend on a number of factors, predominantly, location in the watershed and the surface area encompassed by the operation. It is uncertain whether a commercial AMAX venture, for example, would be a net appropriator or discharger of water.

Copper-nickel development in northeastern Minnesota would amplify competition for water in the region, due to the proximity of the taconite mining district. Moreover, land use conflicts related to water use could be multiplied. The Department is now coordinating a land use study involving several mining companies, local units of government, and the U. S. Forest Service, in the east end of the Mesabi Iron Range. A possible conflict exists regarding a taconite company, which wants to construct a water reservoir in an area that could be critical to future copper-nickel development. If copper-nickel development were to proceed in northeastern Minnesota, the potential for this type of conflict would increase.

In spite of the abundance of surface water in the region, and without knowing the extent of possible future copper-nickel development, the adequacy of future water supplies to meet all of the potential demands cannot be determined.

The Department of Natural Resources exercises the primary regulatory authority relative to the appropriation and use of surface and ground water in the state. The Pollution Control Agency has regulatory authority over water discharges. While these authorities, obviously, would apply to copper-nickel development in Minnesota, other special laws may also apply to development affecting water use in northeastern Minnesota. For example, federal and state laws have been passed that relate to the maintenance

of water levels in a specifically defined area in northeastern Minnesota which could be affected by copper-nickel development. Such laws could affect the availability and use of water in that part of the state, and would have to be considered in the establishment of water use policy in the context of potential copper-nickel development.

3. Recommendation

The Department of Natural Resources should, within the next three years, prepare a regional comprehensive water management plan for the area that could be affected by copper-nickel development. This effort should also include the Pollution Control Agency, the State Water Planning Board, the mining industry, and the public.

DEVELOPMENT SITING POLICY

A. Major Factors

1. The area of known copper-nickel mineralization in northeastern Minnesota is divided by the Laurentian Divide, north of which waters flow into the Boundary Waters Canoe Area and south of which waters ultimately flow into Lake Superior, via the St. Louis River.

2. Mineral resource estimates by the Minnesota Department of Natural Resources indicate that approximately 88% of the copper-nickel resource lies north of the Divide. Those copper-nickel resources south of the Divide, although not as well explored as those north of the Divide, appear to exist in scattered increments too small to support a mining operation in the foreseeable future.

3. Receiving waters, into which would flow discharges and runoff from a copper-nickel mining operation, exist in substantially larger quantities north of the Divide than south of the Divide, due to the volume of water contained in and flowing into Birch Lake. Certain of the waters north of the Divide flow directly into the BWCA, while others flow into Birch Lake, which drains into the BWCA.

4. With a few specific exceptions, water north of the Divide has been generally unaffected by industrial activities. Waters south of the Divide, particularly below the confluence of the Partridge and St. Louis Rivers, have been significantly affected by industrial development.

5. The watershed which would be affected by copper-nickel development north of the Divide serves an essentially recreational and aesthethic purpose, being tributary to a national wilderness area. The watershed which would be affected by copper-nickel development south of the Divide has been affected by taconite mining, provides water supplies for various communities, and also supports a variety of recreational uses.

6. Within economic limitations, certain facilities of a mining operation need not necessarily be located at or adjacent to the mine itself. For example, tailings basins can be located further from the mine than can stockpiles, which have to be quite close to the mine. The mill should be located either near the mine or the tailings basin. The water supply can be located fairly distant from the mine or mill.

B. Discussion

For the past several years, the issue of where copper-

nickel development, if proposed, ought to be allowed has centered around the issue of development north and south of the Laurentian Divide. Copper-nickel development north of the Divide would affect waters that flow into the BWCA. These waters, with a few exceptions, have been generally unaffected by industrial development. (Both Erie and Reserve Mining Companies' mines, as well as the city of Ely's sewage treatment facility, affect waters north of the Divide.) Copper-nickel development south of the Divide would affect waters that flow into Lake Superior via the St. Louis River. This watershed has been significantly affected by mining and other development.

The Minerals Division of the Department of Natural Resources has calculated that approximately 88% of the copper-nickel resource exists north of the Divide. Although the area south of the Laurentian Divide has not been exhaustively explored, available information suggests that copper-nickel development in this region is not as likely in the near future, due to the discontinuous and relatively small areas of mineralization. The practical implication of this is that should copper-nickel development take place in the foreseeable future, it would likely occur predominately north of the Divide.

As discussed in the Water Quality Policy paper, the extent of possible water quality problems associated with copper-nickel development in northeastern Minnesota is not precisely understood. In addition, the effectiveness of various control and

treatment methods is still being evaluated.

The Department of Natural Resources is recommending that appropriate reclamation rules be promulgated and necessary water quality studies be completed before commercial copper-nickel development is carried out. It appears that mineral evaluation schedules by potential copper-nickel developers will allow adequate time to complete these studies. It is not empirically possible to conclude, on the basis of existing information, whether or not copper-nickel development could be carried out within water quality standards. Therefore, any pronouncement regarding the acceptability of commercial copper-nickel development anywhere in the copper-nickel resource zone is inappropriate at this time.

The Minnesota Pollution Control Agency, under whose jurisdiction water quality standards are implemented, has the authority to apply more restrictive water quality standards to discharges into waters of exceptionally high quality. Under the authority of 6 MCAR 4.8014 and 6 MCAR 4.8015, the PCA is empowered to apply "Non-Degradation" standards to such high quality waters. To date, criteria for the application of this authority have not been established. The Non-Degradation authority could be applied in any circumstance determined by the PCA to warrant the application of such standards, including copper-nickel development in northeastern Minnesota.

Obviously, mining can only take place where mineralization

occurs. However, many other mining-related facilities can be located some distance from the mine itself, within certain economic constraints. Stockpiles generally cannot be located more than three to five miles from the mine. Although it is desirable to site milling facilities as close to the mine as possible, it is not uncommon for a mill to be located near the tailings basin. Greater location flexibility also exists for tailings basins and reservoirs, which can be located further away from the mine than the stockpiles. Therefore, although the majority of the known copper-nickel mineralization exists north of the Laurentian Divide, it does not necessarily follow that all mining-related facilities would have to be located north of the Laurentian Divide. In fact, there are at least two mineral resource areas north of the Divide where some of the facilities could be located south of the Divide.

C. Recommendations

1. The DNR water quality studies now underway, as well as a study of the mine pit water quality issue, should be completed before commercial copper-nickel mining is allowed in Minnesota.

2. No copper-nickel development should be allowed which would affect waters that are directly tributary to the BWCA, that is, which do not drain into Birch Lake before their drainage into the BWCA. (This exclusion area represents approximately 6-7% of the MINESITE

Study Area.)

3. Within three years, the Pollution Control Agency should define how the Non-Degradation provisions of 6 MCAR 4.8014 and 6 MCAR 4.8015 will be applied to waters affected by copper-nickel development.

4. The Non-Degradation provisions of 6 MCAR 4.8014 and 6 MCAR 4.8015 should be made applicable to waters affected by copper-nickel development, and no commercial copper-nickel development should be allowed in Minnesota until provisions for such application have been developed by the Pollution Control Agency.

ENERGY POLICY

A. Major Factors

1. Copper-nickel development, like taconite development, is highly energy intensive. A large integrated development (including a smelter and refinery) capable of producing 100,000 tons of copper plus nickel metal annually would require an electircal generating capacity of 150 megawatts.

2. Based on projections by the Regional Coper-Nickel Study, a smelter-refinery facility accounts for more than half of the electrical demands of a copper-nickel facility as described in (1) above.

3. The issue of energy supply/demand in general, and for northeastern Minnesota in particular, has changed in recent years and is still subject to change. Accordingly, energy policies are being formulated by government agencies, utilities, and industry to respond to and accommodate the dynamic energy supply/demand situation.

4. Regional energy demand was projected by the Regional Copper-Nickel Study to increase 30 percent by 1985 and double by the year 2000 over 1976 levels. Since these projections were made, a number of changes have occurred that would significantly alter (mostly reduce) these

projections.

5. Competition for water could provide constraints for locating electrical generating facilities in the region.

6. Existing air quality laws and standards limit the extent to which air emission facilities, including electrical generating facilities, could be operated in northeastern Minnesota. (See the Smelter Policy paper.)

B. Discussion

The mining and milling of copper-nickel in northeastern Minnesota would substantially increase energy demands in that part of the state. Like taconite mining and processing, copper-nickel development would be a highly energy intensive industry. The significance of this is increased by the fact that Canadian supplies of oil and natural gas, on which northeastern Minnesota has been relatively dependent, have been drastically reduced. This has in turn resulted in a search for alternative sources of these fuels or alternative fuel types, as well as intense energy conservation programs.

Because of the dynamic nature of the energy supply/demand situation and questions regarding future fuel source and type, the projections contained in the Regional Copper-Nickel Study, which are now approximately five years old, may no longer be

accurate. Furthermore, in the past five years, government agencies and industry have formulated new energy policies and programs which are not necessarily consistent with one another. This may be particularly true in the case of northeastern Minnesota, which has been more dependent on Canadian fuel than the rest of the state, and which, due to the concentration of mining and processing in the region, is an area of very high energy consumption. (According to the Minnesota Energy Agency, the Minnesota iron mining industry, in 1973, consumed 10.5% of the total state consumption of natural gas, 18.3% of electricity, and 15.7% of diesel fuel.)

Energy demands resulting from copper-nickel development also have significant environmental implications, primarily air quality and water use. In response to the cutback in oil and natural gas availability, the mining industry in Minnesota is making increased use of coal, which generally does not burn as cleanly. Further, a power plant requires large quantities of water for cooling purposes.

The consequences of locating an electrical generating facility in or near the copper-nickel resource zone are:

1) the siting of an emission facility which, like a smelter, could "use up" an available increment of allowable air pollution, thereby perhaps foreclosing future development, and
2) increasing the competition for water in the region, which is itself a subject requiring further effort on

the part of the State. (See the Water Use Policy paper).

On the other hand, locating an electrical generating facility within the copper-nickel resource zone, perhaps as part of a copper-nickel development proposal, could provide co-location and cogeneration opportunities. (Co-location refers to a situation where waste heat from electric generating plants is used for heating, cooling, or industrial purposes. Cogeneration refers to a situation where waste heat from an industrial process is used to generate electricity.) Co-location and cogeneration, in the context of copper-nickel development, could conceivably result in lower overall energy consumption and less environmental degradation than other more traditional energy generation and consumption facilities.

The location of a smelter-refinery facility would greatly affect the need for and distribution of electrical energy, accounting for more than half of the total electrical power demand of a fully integrated copper-nickel operation. In addition, the smelter-refinery phase accounts for approximately 71% of the fossil fuel requirements of such a copper-nickel operation, according to the Regional Copper-Nickel Study. The smelter-refinery phase accounts for 60% of the total energy requirements of a fully integrated copper-nickel operation. Clearly, the location of smelter and refinery facility poses significant implications in terms of energy requirements of a copper-nickel industry in Minnesota.

The lead time necessary to develop adequate energy supplies for copper-nickel development is comparable to the lead time necessary to plan and develop a copper-nickel mining and milling facility. If a new electrical generating facility were necessary for copper-nickel development to proceed, now would not be too early to begin an examination of energy supply options in northeastern Minnesota.

C. Recommendations

1. The Minnesota Environmental Quality Board should initiate an examination of policy options for the management of energy resources and coordination of future energy policies in northeastern Minnesota in light of potential copper-nickel development. Such an examination should involve other governmental agencies, such as the Minnesota Energy Agency and the Arrowhead Regional Development Commission, utilities, industry, and the public. Among the policy options that should be considered is that of an electrical generating facility as part of a copper-nickel operation.

2. The energy supply/demand situation in northeastern Minnesota should be updated well in advance of any copper-nickel development, recognizing, however, the dynamic nature of the energy future in Minnesota.

MINNESOTA POLLUTION CONTROL AGENCY

Major Factors

The Minnesota Pollution Control Agency has major responsibilities in controlling the potential environmental effects of copper-nickel mining, milling and smelting. Areas of major concern include degradation of surface and/or ground water from discharges originating from a mine, mill or smelter. Air emissions including sulfur dioxide, trace element emissions and fugitive dust are associated with mining, milling and smelting operations and bear careful evaluation and monitoring. Additionally, air pollutants from a smelter could contribute to acid precipitation and the degradation of water quality in sensitive lakes. The safe disposal of any potential solid or hazardous waste would be a responsibility of the MPCA.

MPCA Statutory Authority

The Minnesota Pollution Control Agency has broad general statutory authority to administer and enforce all laws relating to water, air, land and noise pollution and solid and hazardous waste, Minn. Stat. §115.03 and 116.07. The MPCA has permitting authority for waste water disposal systems and other equipment and facilities related to water pollution control, all facilities related to the collection, transportation, storage or disposal of solid and hazardous waste, Minn. Stat. §115.03, subd. 1, and 116.07, subd. 4a. The MPCA also has general rule-making authority with respect to water, air and noise pollution and solid and hazardous waste, Minn. Stat. §115.03, subd. 1, 115.44, 116.07, subds. 2 and 4. In addition, the MPCA has statutory right of access to public and private land to obtain information or conduct surveys or investigations for any

purpose related to its statutory powers and duties, Minn. Stat. §115.04, subd. 3, and 116.091, subd. 3.

The MPCA has sufficient existing statutory authority to deal with the regulatory concerns of the Agency with respect to copper-nickel mining, milling and smelting.

AIR QUALITY

Prevention of Significant Deterioration - Emission Offset

Permit applications for new major emission facilities must satisfy the federal Prevention of Significant Deterioration (PSD) rule or the Offset rule, depending on the proposed location. The PSD rule applies in areas attaining the National Ambient Air Quality Standards, whereas the Offset rule will apply in areas not attaining these standards. The MPCA has been delegated authority to administer the federal PSD rule by the U.S. Environmental Protection Agency.

The MPCA administered the federal Emission Offset Interpretative Ruling under a delegation of authority until that authority expired in July, 1979. Until a state Offset rule is adopted, no installation permit can legally be issued to a new major emission facility in a nonattainment area due to a federal prohibition.

At this time, a copper-nickel smelter could not be permitted in a nonattainment area for sulfur dioxide or particulate matter. Even after the state Offset rule is adopted, location of a smelter in a nonattainment area would be difficult due to the large emission reductions that would be required to offset new emissions from a smelter.

The PSD rule could also affect location of a smelter. Maximum allowable increases (increments) in ambient pollution levels are specified for three classes of land: Class I areas include the Boundary Waters Canoe Area and the Voyageurs National Park and allows almost no increase in ambient pollution levels so location of a smelter nearby would be difficult and expensive although not prohibited per se. The rest of the state is Class II which does allow planned industrial growth. However, an area which has industrial growth since the baseline data of August 7, 1977, may have insufficient increment to allow addition of a very large emission facility such as a smelter. In this event, offsets must be obtained to avoid violation of the increments or the smelter must locate elsewhere.

Standards of Performance for Primary Copper Smelters

Under the authorities delegated to the State of Minnesota by the EPA, the state could apply 40 CFR Part 60.160 (subpart P), Standards of Performance for Primary Copper Smelters to any proposed smelting facility. This standard of performance also specifies continuous monitoring (in-stack) for sulfur dioxide and opacity. If the smelter is located sufficiently close to Class I areas, tighter emission limits may have to be adopted to accommodate the location.

Ambient Standards

Total Suspended Particulate and Sulfur Dioxide Ambient Air Standards have been designed for health and welfare protection. They should be adequate for protection of public health and welfare

concerns from these types of facilities. The state, however, does not have ambient standards for sulfates and heavy metals which have been identified as potential concerns in the smelting process. Heavy metals may be a source of concern as related to the mining waste disposal also. Additionally, mining activities may result in the generation of fibers through crushing and grinding processes.

The MPCA is monitoring and will continue to monitor for "asbestos" fibers. The need for an asbestos standard will be addressed within the 1981-1985 time frame.

Other Standards

It may be necessary to adopt a visibility standard. Visibility standards are currently meant to protect Class I areas, although they have been adopted over larger areas in portions of the United States. The visibility standards may be of either emission or ambient standard form.

Recommendations

1. The MPCA should adopt the Prevention of Significant Deterioration rule to implement the Clean Air Act Amendments in attainment areas.

2. The MPCA should adopt an Offset rule to implement the Clean Air Act Amendments in nonattainment areas.

3. In addressing the need for state-wide asbestos standard, copper-nickel mining activities should be specifically considered.

4. The MPCA should evaluate visibility impacts in Class I areas in considering the siting of a smelter.

SOLID AND HAZARDOUS WASTE

Various wastes would be generated by mining, milling and smelting operations. The State of Minnesota does have rules and regulations governing solid and hazardous wastes, which require that wastes be managed properly and in an environmentally sound manner.

Hazardous Waste

Hazardous wastes are regulated by Minnesota Rules 6 MCAR 4.9001 through 4.9010. These rules govern the generation, classification, transportation, storage, treatment and disposal of hazardous wastes.

Many wastes generated by general operations could be classified as hazardous wastes. These include the following: used solvents, greases, lubricants and oil, paint thinners and sludges, chemical lab wastes, absorbents and sweeping compounds. These wastes are commonly generated by cleaning, maintenance, production, and testing operations. Although the quantities may be small, they would be regulated under state hazardous waste rules. Other wastes such as fly ash and boiler water would probably be classified as nonhazardous but could require testing. Disposal of fly ash would be regulated by state rules.

The rules also provide the Agency with the authority to require that hazardous waste disclosures be submitted for review and approval. Disclosures include information regarding wastes generated and waste management. These management plans are subject to Agency approval. The Agency also has the authority to request additional information

regarding wastes and waste management.

Hazardous waste facilities must obtain an Agency hazardous waste facility permit prior to construction and operation. Specific permit requirements are given in the rules concerning facility information which shall be submitted, construction and operation methods, and location restrictions. Complete permit applications are reviewed by Agency staff and permits issued by the Agency.

Transportation of hazardous waste is also regulated by these rules. Transporters of hazardous waste must register with the Agency to be eligible to transport hazardous wastes, and must utilize the manifest system in tracking hazardous waste shipments. Transporters must also comply with applicable Department of Transportation (DOT) rules.

Solid Waste

Solid wastes such as general office refuse and construction debris which are not classified as hazardous wastes are regulated by Minnesota Solid Waste Rules 6 MCAR 4.6001 through 4.6012. These rules provide the Agency with the authority to regulate the transportation, processing, storage and disposal of solid wastes. Solid waste disposal facilities must meet certain locational requirements or obtain a variance from those requirements. Solid waste facilities must obtain an Agency permit prior to construction and operation. The Agency has the authority to require that a permit application, plans and engineering report and drawings be submitted to the Agency for review and permit issuance for any solid waste facility.

Byproducts and Disposal at Permitted Sanitary Landfills (SLF)

Materials which are not considered wastes but rather are by-products which are utilized without being discarded would not be regulated by any of these rules. The determination of whether a material is a waste or byproduct is a difficult one but must be made by the Agency to determine whether or not a material is to be regulated.

Disposal of industrial wastes at sanitary landfills is also regulated. Agency approval is required prior to disposal of industrial wastes at sanitary landfills. If operational changes at the sanitary landfill are necessary to handle the industrial wastes, the Agency would require appropriate changes to be made by the permittee. Changes could be required through permit amendments or stipulations, with permit amendments being processed in the same manner as permit applications. In any case, information regarding waste characteristics and quantities, and disposal methods would be required to be submitted to the Agency for review and approval. Authority for regulating sanitary landfills is given in Minnesota Solid Waste Rule 6 MCAR 4.6006.

It appears that existing rules provide the Agency with sufficient authority to regulate copper-nickel mining, milling and smelting operations. If there is a difference between state and federal requirements, the more restrictive one of the two will be applied.

Recommendations

1. The necessity for solid waste administrative rule changes to regulate mining, milling and smelting operations is not anticipated.

2. The MPCA should continue to review existing solid waste rules as new data becomes available relative to copper-nickel development.

WATER QUALITY

During mining operations, the potential for severe water quality problems exists with metals, acidification of water and degradation of existing high quality water being the primary concerns. These problems can result from water runoff from rock stockpiles, seepage from copper-nickel tailings basins and other potential discharges. Water collecting in an open pit at a copper-nickel mine could pose substantial water quality problems as well. Discharges from water runoff, seepage and other discharges which might contain fibers could cause health problems if later consumed by the public.

Discharges

The MPCA has authority under 6 MCAR 4.8036 to regulate discharges through the National Pollutant Discharge Elimination System permit. No additional water quality rules are needed to regulate potential sources of water pollution resulting from copper-nickel mining, milling and smelting. The existing permitting process can be used to establish any additional controls or standards for a specific discharge.

Tailings

Tailings would be regulated by the Agency through State Disposal System (SDS) and/or National Pollutant Discharge Elimination System (NPDES) permits for tailings basins. It is not anticipated that these wastes would require additional regulation. However, if the tailing waste were classified as hazardous waste, earthen basins

regulated by an NPDES permit would not be exempted from the requirement to obtain a hazardous waste facility permit.

Non-degradation of Waters

The Minnesota Pollution Control Agency has authority through 6 MCAR 4.8014 and 6 MCAR 4.8015 to apply more restrictive controls on discharges which could potentially degrade surface waters determined to be of unusually high quality. Although the non-degradation authority has not been generally applied thus far, copper-nickel development could impact waters of a quality which would warrant the application of this authority. A method must be developed by which non-degradation principles can be implemented.

Recommendations

1. The DNR should continue to evaluate the nature and extent of potential impacts to water quality to provide a base for implementing existing regulations. In addition, a study of pit water quality, as noted in the DNR recommendations, should be started.

2. The DNR should continue to evaluate alternative control and treatment options to provide information on feasible mitigation measures.

3. The MPCA, within three years and prior to the commencement of any copper-nickel mining, should develop a method by which non-degradation rules can be implemented.

HEALTH SUMMARY

Summary

The Minnesota Department of Health has reviewed the Regional Copper Nickel Study with regard to potential human health impacts. It is our opinion that existing state and federal regulatory mechanisms, if properly implemented, are sufficient to protect human health from the impacts which are known to be associated with copper and nickel mining and smelting. Based on these findings, we conclude at this time, that no additional legislation or administrative rules are necessary to protect human health from the risks associated with the development of those resources in the State.

Minnesota Department of Health
Report to the 1981 Legislature
Regarding Development of Copper and Nickel

Potential Health Effects:

The Health Chapter of the Regional Copper Nickel Study contained information based on reviews of the scientific and medical literature concerning human health impacts to persons working in or living near several mines and smelters located on the North American continent. The Minnesota Department of Health (MDH) staff played a significant role in compiling the background information which served as the basis for the Report. The Health Chapter was concisely summarized in two pages in the Executive Summary of the Report.

The Health Chapter describes the adverse human health effects from both acute and chronic exposure to substances presently known to be associated with the development of copper and nickel. Persons at risk include mine and smelter workers and their families and persons living near a mine or smelter, particularly those living downwind from a smelter and those who use water sources which might be affected by mine or smelter operations. The agents which can cause these adverse health effects include explosives, noise and accidents, and contaminants which enter the body either directly from contact with contaminated air or water or indirectly by ingestion of contaminated food or water. These contaminants include dust and particulates, and chemicals attributable to the mined ores and to their transportation and processing.

The health effects which have been observed and reported upon in the Study provide a good foundation for assessing the risks to which Minnesotans would be exposed. Because new relevant health effects information is likely to become available before full scale mineral development is undertaken, it would be wise to update the Health Chapter before state permits for such development are issued. The review of relevant literature should be updated since the Study referenced information which probably was current only through 1976. Numerous investigations are being undertaken as more is becoming known about the long-term effects of chronic exposures to very low doses of materials which heretofore were not thought to be harmful. In addition, the Study could not have shown whether the environmental control technologies which were being introduced in the early 1970's have had any measurable impact on human health. Since potential health effects would be greatly influenced by the location of a mine and smelter at specific sites, only qualitative estimates of health risk were made in the Study. Once the process of site selection is underway, quantitative assessments of health risk in specified populations will be possible and should be undertaken as part of the environmental review process.

Reduction of Potential Health Effects

The Health Chapter of the Study demonstrated the variety and severity of health effects which could be associated with copper and nickel development. As the State's health agency, the MDH is charged by law, to undertake activites which will lead to a reduction in harmful human health effects. The depart-

ment has a responsibility to anticipate adverse health impacts which might arise from mineral development in the State and to take those steps which it feels are necessary to prevent or minimize those adverse effects. In order to properly address the copper nickel issue, the MDH will want to evaluate baseline information on the potentially harmful effects of certain environmental contaminants once the proposed sites have been identified, in order to be able to recommend a site which would produce minimal health impacts. The MDH would also want to evaluate results of baseline studies on the health of persons living near the proposed facility locations. These studies would provide background or baseline information against which to compare measurements made once operations are underway. Such studies would be particularly helpful in evaluating the potential risks from exposure to contaminants which are known to be harmful but for which no standards or maximum exposure levels have yet been adopted. The department would evaluate these data and attempt to determine which contaminants have the potential for reaching unsafe levels. At such time as the department determined that the potential for serious health effects was increasing, it would take appropriate action either by proposing new legislation or rules to help reduce such effects.

Regulatory Mechanisms

Under present law, the following regulatory agencies would be involved in minimizing adverse health impacts:

1. The MDH has rulemaking authority to adopt and enforce standards to protect the public's health from environmental

hazards [Minn. Stat. §144.05(c)(1980)]; to regulate the disposal of sewage and unwholesome matter and the pollution of air and streams [Minn. Stat. §144.12 subd. 1 (1980)]; and to regulate drinking water supplies [Minn. Stat. §144.381 et. seq. (1980)]. The MDH enforces standards for certain contaminants in drinking water supplies and routinely studies and evaluates risks to health which can arise from chronic or acute exposure to various environmental contaminants. As a member agency of the Environmental Quality Board, the MDH is influential in shaping the Board's policies and decisions regarding human health.

2. The Minnesota Pollution Control Agency (MPCA) has authority to set and enforce environmental standards and to impose conditions on permits for release of contaminants into the air and water and for disposal of solid and hazardous wastes [Minn. Stat. §115.01 et. seq., Chap. 116 (1980)]. The MPCA, through its operating permit process can require as a condition to issuing a permit, that a permitee monitor for substances which could adversely affect human health and the environment. The department would work closely with the MPCA in the development of that agency's permits. The department would hope that the permits would be conditioned upon agreement by the permittee to undertake or support environmental and health monitoring programs which would supply the department with the necessary information.

3. The State enforces Federal Occupational Safety and Health Administration (OSHA) standards which set limits for worker exposure to certain substances in the work environment

[Minn. Stat. Chap. 189 (1980)]. The Minnesota Department of Laboratory and Industry (MDLI) enforces all OSHA standards. Inspections for compliance with health standards are carried out by the MDH which reports the results of its findings to the MDLI for enforcement. All workers would come under OSHA jurisdiction except those working in open-pit or underground mines and those working in certain ore processing facilities. The Mine Safety and Health Adminsitration (MSHA) is a purely Federal program which has jurisdiction over workers not covered by OSHA [40 C.F.R. §40 - 57 (1980)]. The OSHA and MSHA conduct periodic inspections of the work place and make measurements for various substances under their control. Recently adopted federal regulations will require employers to give access to medical history information to workers, their representatives, and designated health agencies.

Each of the foregoing regulatory agencies will be expected to play a role towards protecting human health when mineral development is undertaken in the state.

Recommendations to the Legislature:

Existing regulatory mechanisms seem to be sufficient to allow the MDH, in cooperation with the Minnesota Pollution Control Agency and other state and federal agencies, to act in a timely manner to minimize the adverse health effects commonly associated with copper and nickel development. Whatever additional information is necessary to evaluate and control adverse health effects can be obtained through regulatory procedures already in effect. As a result of this finding, the MDH does not recommend the adoption of new legislation or rules at this time.

Tax Policy

A. Background

On November 10, 1980, the State Planning Agency transmitted a report to the Governor on Copper-Nickel Tax Policy Issues (Appendix B). The report was prepared with the assistance of the Departments of Revenue and Natural Resources. The report was an extension of the information generated by the Regional Copper-Nickel Study and the report to the EQB from technical advisory committee on copper-nickel mining (Appendix A).

Copper-nickel taxes similar to taconite taxes were established by statute in 1965. Since that time, taconite taxes have been amended many times to better address state needs and interests, while copper-nickel taxes were amended only once (1967). Although copper-nickel and taconite have some common characteristics, there are a number of significant differences that make it desirable to have copper-nickel tax lows with characteristics different from taconite tax laws.

Copper-nickel development could generate considerable revenues for the State of Minnesota and its local governments, depending on the type and size of mine/mill operation and the tax rate. State tax policy will need to balance the economic benefits of jobs and income against the associated increased demands for government services.

B. Discussion

The report of the Governor identified six major aspects that should be seriously considered in the development of copper-nickel tax

policy:

It appears desirable to levy both a production tax (on tonnage) and an occupation tax (on the wet value of ore after mining and beneficiation) on copper-nickel mining. A production tax creates a tax obligation regardless of profitability or efficiency, while an occupation tax is related indirectly to profitability. A combination of the two assures income to the State whenever ore is mined and discourages inefficient operations, while at the same time basing a portion of the tax burden on the mining company's profitability.

Consideration should be given to exempting copper-nickel mining operations from the corporate income tax. Occupation taxes are levied in lieu of income tax on taconite operations. Income tax is based on corporate income assignable to Minnesota. The vagaries of predicting corporate income, together with the complexity of the formula used to assign corporate income, make it difficult to anticipate corporate income tax revenues from revenue. Also, the occupation tax is allowed as a credit against the income tax.

A local ad valorem property tax should be levied on a smelter, except when location of the smelter results in substantial costs to local governments which do not share in the additional property tax base associated with the smelter. In such cases, some other type of tax should be levied by the state in lieu of a local property tax, and the proceeds returned to local governments in the mining area. Minnesota tax laws consider a smelter to be a manufacturing facility subject to local ad valorem property taxes. Addition of a smelter to the local property tax base could create gross tax base dispari-

ties between localities and result in an imbalance between local government costs and revenues. A tax imposed by a larger jurisdiction -- either county or state -- permits revenues to be shared over a broader area, thus ameliorating the potential for inequitable distribution of local government costs and revenues.

The state should study the need and feasibility of a statewide economic protection fund financed from mineral tax revenues. Mineral taxes are levied in part to compensate for loss of an exhaustible natural resource. A portion of taconite taxes are placed in economic and environmental protection funds. While a major part of the natural resource "belongs" to people and their local governments in the mining region, it can be argued that the entire state shares an interest.

The formula for distributing copper-nickel production taxes should be re-evaluated to determine if it adequately meets the needs of mining area communities. The current distribution of copper-nickel productin tax revenues is: 50 percent to school districts; 22 percent to cities and towns; 22 percent to the county; and 6 percent to the state. This is the same as the 1965 formula for distribution of taconite production taxes. Distribution of taconite production tax revenues has been changed to better meet the needs of mining area communities. It may not be desirable to create a similarly complex, but different form for copper-nickel; however, the state should consider identifying a set of common principles to guide policy for distribution of revenue from the production tax for all minerals.

Copper-nickel policy should reflect the different needs of both industry and government during the start-up, operating, and ending stages of

copper-nickel development. The state should maintain flexibility in its mineral tax system to respond to changing conditions in the mining industry and in the state's revenue needs, while providing adequate guarantees of a fair and reasonably stable tax environment. An ideal tax policy should provide investors with enough certainty to make long-term decisions, but should also be capable of adjustment and fine-tuning to meet the needs of both industry and government at each stage of development. Changing conditions as the copper-nickel mining industry develops can be expected to require adjustments to tax laws that cannot now be foreseen. At the same time, it is important for the State to clarify the principles which can be expected to guide its copper-nickel tax laws.

Conclusions

1. Tax legislation is not necessary, and perhaps not desirable, in 1981.

2. The legislature should consider establishing a time-table during the 1981 session for developing copper-nickel tax legislation.

3. Legislation is desirable in 1982 or 1983.

III. APPENDICES

REPORT TO THE

ENVIRONMENTAL QUALITY BOARD

FROM THE

TECHNICAL ADVISORY COMMITTEE ON

COPPER-NICKEL MINING

transmitted by

Arthur E. Sidner, Chairman

June 19, 1980

I. ESTABLISHMENT OF COMMITTEE

In November 1979, Arthur Sidner, Chairman of the Environmental Quality Board (EQB), established a technical advisory committee on copper-nickel mining. He asked the committee to address the adequacy of the Regional Copper-Nickel Study, both in terms of thoroughness and accuracy, and the adequacy of state policies and programs to manage the opportunities and problems associated with copper-nickel development.

The committee membership consisted of:

Local officials:	Alvin Hall, St. Louis County Lloyd Houle, Lake County Matt Kapsch, Babbitt
Environmental groups:	Steve Chapman Alden Lind
Mining industry:	Jack Malcolm, AMAX Bill Ulland, American Shield
State agencies:	Peter Ashbrook, State Planning Agency *Bob Benner, Environmental Quality Board (EQB) David Brostrom, Department of Natural Resources (DNR) Kent Eklund, Economic Development Dwight Lahti, Revenue Lovell Richie, Pollution Control Agency (PCA)

*Chair

Committee meetings were held as follows:

Day	Place	Topics
12/12/79	Duluth	Organizational meeting
1/23/80	St. Paul	Mining methods, taxes and fiscal impacts, mineland reclamation
2/19/80	Duluth	Fiscal and social impacts, water resources
3/25/80	St. Paul	Water resources, air resources
4/24/80	Babbitt	Energy, draft of final report
5/29/80	St. Paul	Draft of final report

II. INTRODUCTION

This report has been prepared to advise EQB on the major issues related to copper-nickel development to assist in future policy development. It contains the opinions of various interested parties; however, the findings and recommendations do not necessarily reflect the consensus of the committee. The committee focused its attention on four major copper-nickel issues rather than comprehensively examining all copper-nickel issues. In each issue area background findings are presented followed by recommendations.

III. FINDINGS AND RECOMMENDATIONS

AIR QUALITY ISSUES

Background

Air quality standards may influence future industrial development. Parts of the Iron Range and Duluth are classified as non-attainment areas for particulates. The significance of this is that restrictions may be placed on new industrial development in these non-attainment areas. Prevention of Significant Deterioration (PSD) standards, which apply to new sources of pollutants, could also restrict development. Because of projected new sources of sulfur and particulate emissions, PSD standards may be exceeded in the next ten years even if copper-nickel development does not occur. The more stringent PSD standards that apply to the BWCA could affect how near a smelter could be built to the BWCA. The current PCA policy concerning PSD increments is "first come, first served"; so one development could conceivably use up the entire increment in an area. The committee could not propose a better alternative.

There is considerable latitude for where a smelter could be located. While a company may prefer to have a smelter close to the mine/mill, the economics are such that a smelter could be located elsewhere in the state, country or the world. The Copper-Nickel Study documented limitations that air quality regulations create in locating a smelter in northeastern Minnesota. The possibility of siting a smelter in Duluth was not examined. Location of a smelter on the Iron Range could limit other new industrial development if it exhausted the available PSD increment.

Acidic precipitation has been observed in northeastern Minnesota, where some of the lakes and soils have little capacity to buffer it. Current information suggests that most of the acidic inputs come from sources outside the state, although there is some disagreement on this point. A modern smelter would have strigent controls on sulfur dioxide. While a smelter would not contribute much to the regional acid rain problem, there could be some aggravation of acid rain effects in the immediate vicinity of a smelter due to breakdowns. Statewide monitoring studies to better define the extent and source of the acid rain problem have been initiated by the state and federal governments. Information for the EQB and state agencies to develop statewide policies should be available within the next two years. Although smelters have been significant sources of sulfur dioxide elsewhere, the major sources in northeastern Minnesota are power plants. Thus, acidic precipitation is more than just a Minnesota or copper-nickel problem. A national strategy is needed, but Minnesota has a responsibility to do its share.

State regulatory authority with respect to air quality rests primarily with the PCA. The Clean Air Act requires federal standards to be reviewed and possibly updated every five years. Standards development and review is a continuous process. Some of the PCA emission standards would be applicable to copper-nickel development; however, PCA has no emission standards for mineral fibers, sulfates or metals. There are national emission standards for some hazardous pollutants but no ambient standards. PCA rules and the permit process appear adequate to require continuous monitoring of stack emissions. The PCA has ample legislative authority to adopt other types of air quality standards that may be needed for copper-nickel development. The DNR has authority to control fugitive dust from sources such as haul roads, stockpiles, and tailing basins through mineland reclamation rules. PCA and DNR have worked closely to coordinate rules.

The major noise issues are with aesthetics and wildlife. Existing PCA noise rules only address human health. DNR reclamation rules when promulgated will regulate noise from blasting. Mining activities can be heard for several miles in northeastern Minnesota because of the generally low noise levels. Certain assumptions made by the Copper-Nickel Study about size of trucks and fans may be larger than what will actually be proposed.

A standard for asbestos-like fibers in air was established by the circuit court for Silver Bay during the Reserve Mining trial using the "control city" approach.

RECOMMENDATIONS

-- In view of the significant economic benefits to the local and state economies of a smelter and the possible restrictions that air quality regulations may put on future industrial development in northeastern Minnesota, the state, regional or local governments should consider developing policies concerning the location of smelter(s) and other industrial projects.

-- In its permit process, the PCA should consider continuous ambient air monitoring near a smelter specifying a plan of action to restrict operation in the event of smelter breakdown or high ambient sulfur dioxide levels.

-- The PCA should consider making standards for mineral fibers, sulfates, and metals and examine the feasibility of standards based upon total deposition of heavy metals and other types of particulate matter because of the finite capacity of the region to assimilate such deposition.

-- Because of changing development plans, the future emissions and air quality projections used by the Copper-Nickel Study should be updated as needed.

-- Additional monitoring is needed to characterize current levels of both mineral fibers and constituents relating to acidic precipitation.

-- The PCA should investigate whether the "control city" standard for mineral fibers can be applied outside of the Silver Bay area.

-- DNR should include provisions for controlling fugitive dust emissions in the preparation of copper-nickel reclamation rules (See recommendation in the Water Resource section.

WATER RESOURCE ISSUES

Background

Runoff from lean ore and waste rock stockpiles could be a source of polluted water for many years after a mining operation ceases, and is the most significant environmental issue related to copper-nickel development. Open pit mine waters (dewatering, seepage, and from precipitation) would also be of concern. These waters can be collected and treated during operation. A number of options have been suggested to control runoff, but the understanding of leachate production and the effectiveness of various control options is not very good. If passive measures such as vegetation of stockpiles are found not to be suitable for protecting water quality over the long term, then more costly active measures such as collection and treatment will have to be considered for long-term protection of water quality. The Department of Natural Resources is conducting ongoing studies in this area in cooperation with the PCA and several mining companies; however, it will be many years before definitive results are obtained. Control of runoff from stockpiles can be regulated through DNR permits, reclamation rules, and PCA rules.

The Laurentian Divide, which bisects the area of copper-nickel mineralization, has special significance. All waters discharged from a copper-nickel development north of the Divide would eventually flow through the Boundary Waters Canoe Area (BWCA) all waters south of the Divide eventually reach Lake Superior. Some people feel that mining should not be permitted north of the Divide because of the potential for polluting the BWCA waters.

Saline groundwater has been identified in the area of possible copper-nickel mining. Such water produced from mine dewatering operations could have adverse environmental effects. During operation saline groundwater could be used in processing ore, and would not need to be discharged. The source, quantity and spatial distribution of saline groundwater is unknown.

Competition for water could become an issue in parts of the potential copper mining areas. Committee members disagreed about whether there is sufficient water for the various users in dry years. Some members of the committee felt that a regional water management plan should be developed. Others suggested that if a water management plan is needed at all, it should be based on an "as-needed" or "first come, first served" approach to allocation, which is the way the DNR now handles water appropriation permits.

Water use models developed by the Copper-Nickel Study assume that a mining company would have a net discharge of water. Local variations in evaporation and varying water management practices suggest that a net appropriation may instead be necessary. Some concern was expressed by the committee that different potential impacts such as possible reductions in stream flows should be analyzed in the case of net appropriations and the Copper-Nickel Study only looked at the case of a net discharge.

Asbestos-like fibers occur in the copper-nickel area and raise potential human health issues similar to those with Reserve Mining in Silver Bay. Analysis of baseline and pilot plant samples has been very limited. Information that is available suggests that possible water discharges from a copper-nickel operation could increase natural fiber levels.

State regulatory authority of water quality rests primarily with PCA which has stated that it has sufficient regulatory authority to control copper-nickel mining. Current PCA rules address metals individually. PCA has the authority to require site-specific bioassays which would address the combined effects of all constituents present in the water. PCA rules are based on the concept of protecting water for its most sensitive use and incorporates non-degradation elements. DNR reclamation rules are the primary mechanism for controlling non-point sources of water pollutants in the mining industry. The DNR also has authority to regulate the appropriation of waters from surface and ground sources.

Recommendations

-- Because sufficient information to document permanent control of runoff from stockpiles will not be available for many years, the first mining project should be carefully located and closely studied to provide information for future proposals. The DNR should continue its research on this subject.

-- The need for a regional water quantity management plan to assure that the various users will have sufficient water is a policy decision that could be addressed by the legislature, Water Planning Board, EQB, and/or the DNR.

-- The DNR should prepare reclamation rules for copper-nickel mining, with the close cooperation of PCA.

-- Additional monitoring to characterize natural levels would be necessary to develop baseline data for asbestos-like fibers.

-- General studies to characterize the occurrence of saline groundwater are not warranted at this time due to the apparent wide variability in its occurrence; however, this issue should be thoroughly addressed in site-specific studies.

ENERGY ISSUES

Background

Copper-nickel development, like taconite, is highly energy intensive. A large integrated development (including a smelter and refinery) capable of producing 100,000 tons of copper plus nickel metal annually would require a generating capacity of 150 megawatts. This electric energy demand is approximately 10 percent of the northeast regional demand projected for 1985. If a mining company decides to purchase this electricty from a utility, it must commit itself to buy electricity seven to eight years before it would start mining because of the lead time required to build a new power plant. This creates a dilemma for mining companies because they do not commit themselves to the actual project until three or four years prior to opening the mine. If new power plants or power lines are needed to meet copper-nickel energy demands, separate environmental impacts statements would probably be required.

Energy supply in northeastern Minnesota is in a state of flux because of the phaseout of Canadian sources of oil and gas. Even so, the copper-Nickel Study projected regional energy demand to increase 30 percent by 1985 and double by the year 2000 over 1976 levels. Over this period natural gas use is expected to drop by one-third, coal use triple, fuel oil use to increase by one-third and electricity demand quadruple. Since the Copper-Nickel Study made these projections, a number of changes have occurred that would significantly alter (mostly reduce) these projections.

RECOMMENDATIONS

-- The legislature, EQB, or Engergy Agency should consider the possibility of establishing tax incentives or other measures to encourage more efficient energy use, cogeneration, district heating, or alternative sources of energy.

-- The EQB, Energy Agency or the ARDC should consider examining broad policy options for a coordinated approach to regional energy management to assure stable supplies for industry and the public.

-- Forecasts for future energy demands should be updated as needed. Already the Copper-Nickel Study forecasts are outdated.

SOCIAL AND FISCAL ISSUES

Background

Five major taxes are applicable to copper-nickel mining: occupation tax, production tax, corporate income tax, sales tax, and royalty tax. In addition, a smelter would probably be subject to property taxes. Occupation taxes are credited against income tax. Royalties could also be a major source of revenue for the state depending on the location of a mine; however, most royalties go to designated funds or to local units of government instead of to the State's general fund. Some members of the committee felt that consideration should be given to returning more of the royalty revenue to local units of government. It is difficult to predict the amount of this revenue on a regional scale since state controlled mineral rights are so variable. In the case of the proposed Minnamax project, the state owns 55 percent of the mineral rights (possibly the highest percentage of anywhere along Duluth Contact). The Department of Revenue estimates that additional regulatory costs placed upon a company will reduce state tax revenue approximately 13 cents for every dollar of added regulatory cost. For example, mineland reclamation costs will be allowed as deductions to the occupation tax.

Of the five major taxes, proceeds from only one (production tax) are distributed specifically to local units of government. Production taxes would be distributed according to a 1965 law fixing the method of distribution of Copper-nickel taxes as was used for taconite in 1967. A smelter in certain locations would probably also generate substantial revenue for local units of governemnt via property tax.

The Regional Copper-Nickel Study estimated the net fiscal impact on local units of government and school districts. To do this, the Study assumed that all services were operating at full capacity. Using this assumption and several hypothetical mine development scenarios, the Study determined that revenues were equitably distributed, but that the fiscal impact on local governments and school districts would be negative, i.e. increased revenues would not be sufficient to cover increased expenses. In actuality, the schools are operating well below capacity and are anticipating further drops in enrollment, and the cities generally have excess capacity in sewer and water systems and other services. To the extent that the development induced by copper-nickel utilizes this excess capacity, the estimated additional capital costs associated with the provision of public services would be reduced.

At the beginning of a new mining development there is a lag of several years between when new or expanded services must be provided and when increased revenues are received. This is more of a problem for the local governmental units than for schools because state school aids are based on current enrollment. Because heavy taxes in the early years of a mine development are much more detrimental to profitability than heavy taxes in later years, raising taxes to cover the early lag in revenues is not a good idea.

Two major areas of social impacts are related to transient workers and secondary economic activity induced by mining development. During the construction stage of development (typically 3-5 years), there is a large influx of transient workers. These workers need housing and services, yet leave the area within a few years. During the recent taconite expansion housing was very tight on the Iron Range. Impacts due to transient workers may have little effect on the smaller range communities if construction workers commute from Duluth or the larger Range cities, as recently occurred during major construction activities of Milepost 7 by Reserve in Silver Bay, and the earlier taconite expansion period.

A large new industry such as mining usually induces additional economic activity in the region to meet the demand of a large population and to serve the new industry. The Copper-Nickel Study assumed this induced development would be spread equitably among the Range cities. However, when taconite development occurred, this induced economic development has tended to center in the Hibbing and Virginia areas, and did not materialize for the smaller Range communities. Energy considerations have begun to cause a spreading out of economic activity throughout the Range.

Recommendations

The legislature should consider reviewing copper-nickel tax policy. In doing so, the following should be discussed:

-- whether smelters should be subject to a property tax or some other tax instead.

-- replacing the occupation and income taxes with a single tax.

-- local governmental needs for revenue during the lag between population influx and the inflow of tax revenue. The use of a fund similar to the IRRRB is one possibility.

-- backup provisions for generating revenue in case local governments experience negative fiscal and adverse environmental impacts from copper-nickel development.

-- which policies would maximize: a) return to the state; b) profit for a mining company; and c) return to the Iron Range, and how these three concerns should be balanced among each other.

-- whether incentives for locating a smelter and related fabricating industries in the state to maximize economic benefit are desireable.

-- review of the distribution of royalties from state-owned lands.

-- methods for distribution of tax revenues.

IV. CONCLUSIONS

Minnesota's copper-nickel resources are approximately one-fourth the size of U. S. copper reserves and 50 times the size of U.S. nickel reserves. These resources therefore have significant strategic importance to the nation. The committee did not discuss national policy issues; however, it recognized that national interests could become important in determining the course of copper-nickel development. It is therefore important for the state to begin addressing the many complex decisions about how to manage such development to assure that state's interests are met.

Although the committee has divided this report into four major issue areas, the many interrelationships among these issues require all four to be considered together. In addition, it is futile to look at the impacts of copper-nickel development by itself, since other development in the region also contribute to these impacts. The Regional Copper-Nickel Study has given the state a unique opportunity for comprehensively examining these complex issues before any commercial development has occurred, and provides a solid foundation for the state to develop management policies.

Minnesota State Planning Agency
101 Capitol Square Building
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St. Paul, Minnesota 55101
Phone 296-6662

November 10, 1980

TO: Governor Al Quie

FROM: Arthur E. Sidner
State Planning Director

SUBJECT: Report on Copper-Nickel Tax Policy

The attached report is in response to your request that the State Planning Agency provide you with suggestions concerning copper-nickel tax policy. The report was prepared by an interagency working group of representatives from the Department of Natural Resources, the Department of Revenue, and the State Planning Agency. The project was coordinated by the Fiscal Studies unit in our Office of Local and Urban Affairs.

This report is a follow-up to the Regional Copper-Nickel Study, which was prepared for the Environmental Quality Board. The Regional Study was a comprehensive technical examination of the social, environmental and economic impacts associated with potential development of copper-nickel resources in northeast Minnesota.

In June 1980, the Technical Advisory Committee on Copper-Nickel Mining reported to the Environmental Quality Board on the adequacy of the Regional Copper-Nickel Study's analysis of a variety of social, economic and environmental issues. I convened this Committee to obtain opinions and advice from local officials, environmental groups, the mining industry and state agency representatives. The Committee made recommendations on a variety of issues including taxes. This report addresses many of the same issues. However, a complete review of the issues raised by the Advisory Committee will involve more intensive analysis than was possible in preparation of this report.

The working group believes that, in order to encourage reasonable and orderly development of copper-nickel tax policy, the legislature should be advised of the need to begin work toward adoption of legislation in 1982 or 1983. If may be appropriate for you to indicate in your State of the State address your objectives for copper-nickel development and the principles which you believe should guide the state's copper-nickel tax policy.

The working group believes it may be desirable to share this report with the legislature soon after you review it. Although you have no obligation to do so, I believe the report is an objective overview of mineral taxation issues, and would provide a solid basis for the legislature to begin its study of copper-nickel tax issues. The legislature has instructed several state agencies, including the Planning Agency to provide recommendations on several aspects of copper-nickel development. With your agreement, I believe this report should be included in the materials provided to the legislature.

Report To The Governor

On

Copper-Nickel Tax Policy Issues

Submitted By:

State Planning Agency
November 10, 1980

CONTENTS

INTRODUCTION

The major copper-nickel resources in northeast Minnesota could bring large economic benefits to the state and region starting in the next decade. The potential benefits must be balanced against both economic and environmental costs, and the implications of depletion of an exhaustible resource. The Regional Copper-Nickel Study, which was prepared for the Environmental Quality Board, was a comprehensive technical examination of the social, environmental and economic impacts associated with potential development of copper-nickel resources in northeast Minnesota. The study did not make recommendations for or against development; rather, the report's findings provide a necessary informational base for important policy decisions concerning copper-nickel development.

One important element in mining development over which the state has discretion is tax policy. The State Planning Agency, at the request of the Governor, convened an interagency working group in September, 1980, to provide suggestions to the Governor concerning copper-nickel tax policy. The working group included representation from the Department of Revenue, the Department of Natural Resources and the State Planning Agency.

Many factors influencing copper-nickel development are outside the direct control of the state. According to the Regional Copper-Nickel Study, the single most important influence on potential profitability is the world market price of copper and nickel. Yet, especially when the world market price for copper and nickel results in narrow profit margins, tax policy can potentially influence the timing, location and amount of copper-nickel mining.

An important factor in consideration of copper-nickel tax policy is the potential costs, both short and long-run, of development and mining. The employment and economic impact, together with anticipated tax revenues, will largely determine if development is worth the costs for the region and the state.

Findings of the Regional Copper-Nickel Study concerning social and economic impacts (including taxes) included the following:

*Mineral taxes have considerably less influence on profitability than market price or ore quality.

*Copper-nickel development could generate considerable revenues for the State of Minnesota and its local governments, depending on the type and size of mine/mill operation and the tax rate.

When the location and characteristics of a mine/mill or smelter development are known, the type of analytical methods used by the Regional Copper-Nickel Study can be used to estimate specific costs and benefits to the State and localities.

Although this report deals directly with only copper-nickel mining, the working group believes that many of the issues discussed apply to mineral taxation generally. Although tax and local aid policies must be tailored to meet the unique characteristics of each type of mineral industry, the working group believes that a common set of principles should guide present and future mineral taxation policy, regardless of the type of mineral or where in the State development occurs.

Although tax legislation is not necessary, and perhaps not desirable in 1981, it is desirable for the State to establish a time-table for developing copper-nickel tax legislation. It is in the interests of both the mining companies and the affected communities to know what type of tax policy to expect.

However, mineral taxation is a highly complex and contentious issue that should not be left for the eleventh hour. Legislation is probably desirable in 1982 or 1983. This information, and other information concerning ore grade, recovery rates and processing technology, will be influential in decisions about full-scale development. The attached summary of issues suggests some areas which the interagency working group believes deserve special consideration. Preparation of actual tax legislation will require much more intensive effort. This report only highlights areas of concern and suggests possible approaches.

SUMMARY OF ISSUES

The inter-agency working group identified several aspects of copper-nickel tax policy which should be seriously considered in development of tax policy.

1) It appears desirable to levy both a production tax (on tonnage) and an occupation tax (on the net value of ore after mining and benefication) on copper-nickel mining.

   A production tax, which in Minnesota is levied in lieu of a property tax, is applied to the amount of ore mined, while an occupation tax is based on the net value (value minus operating costs, etc.) of ore. A production tax creates a tax obligation regardless of profitability or efficiency, while the occupation tax obligation is related indirectly to profitability.

2) Consideration should be given to exempting copper-nickel mining operations from the corporate income tax.

   Under current laws the corporate income tax applies to copper-nickel, but not to taconite mine/mill operations. The occupation tax is levied in lieu of the income tax on taconite operations. The two taxes allow substantially similar deductions from the tax base. Because only a small portion of a corporation's income would likely be assignable to Minnesota, and because the occupation tax is allowed as a credit against the corporate income tax, the corporate income tax would probably generate very little income for Minnesota.

3) A local ad valorem property tax should be levied on a smelter, except when location of the smelter results in substantial costs to local governments which do not share in the additional property tax base associated with the smelter. In such cases, some other type of tax should be levied by the state in lieu of a local property tax, and the proceeds returned to local governments in the mining area.

   Addition of a smelter to the local property tax base could create gross tax base disparities between localities and result in an imbalance between local government costs and revenues. If a production tax is levied, revenues should be distributed back to local governments in the area of the smelter according to an equitable formula.

4) The state should study the need and feasibility of a statewide economic protection fund financed from mineral tax revenues.

   The entire state shares an interest in the costs associated with extractive industries development and in the consequences of the exhaustion of mineral deposits. The state's ability to respond to problems of economic dislocation and to plan for an ever-changing economy could be enhanced by creation of such a fund. The fund could be used for loans or grants to cover front-end costs to the state or communities for development of new industries, for research, and for monitoring of mineral reserves and industry trends.

5) The formula for distributing copper-nickel production taxes should be evaluated to determine if it adequately meets the needs of mining area communities.

The 1965 taconite law established the production tax distribution formulas for both taconite and copper-nickel. The law for distributing taconite production tax revenues has since been changed. It is not known if the taconite distribution formula is appropriate for copper-nickel. The taconite formula is very complex -- it may not be desirable to create a similarly complex, but different formula for copper-nickel. However, the state should consider identifying a set of common principles that can guide production tax policy for all minerals.

6) Copper-Nickel policy should reflect the different needs of both industry and government during the start-up, operating, and ending stages of copper-nickel development and mining. The state should maintain flexibility in its mineral tax system to respond to changing conditions in the mining industry and in the state's revenue needs, while providing adequate guarantees of a fair and reasonably stable tax environment.

Obviously, neither the Governor nor Legislature can guarantee the details of tax laws for the duration of copper-nickel mining in Minnesota. Changes, as have occurred in taconite tax laws, will no doubt occur. Yet, if tax laws are designed now to take into account the needs and conditions associated with known stages of development and mining, the need for radical adjustments in the future should be greatly diminished.

DISCUSSION OF ISSUES

1) It appears desirable to levy both a production tax and an occupation tax on copper-nickel mining.

2) Consideration should be given to exempting copper-nickel mining operations from the corporate income tax.

A variety of taxes can be applied to mining operations:

- taxes on property
- taxes on the privilege of mining (severance taxes)
- taxes on income

Each tax applies to a different tax base--that is, a different measure of value, wealth or income. A fair and efficient tax system usually combines more than one tax covering different aspects of value, wealth and income. Just as is the case with individuals, reliance on only one type of tax for mining operations may cause some types of operations to escape a reasonable tax burden, and cause others to pay an unfair amount.

Income taxes and taxes on the net value of ore after mining and beneficiation, such as Minnesota's occupation tax, permit deductions for a variety of operating expenses. One advantage to the mining company of such a tax on net income ("profit") or net value is that when a mine is not profitable, it is not burdened with an additional cost in the form of taxes. However, such a tax also is forgiving to an inefficient or marginal operator. Thus, such a tax may produce little or no revenue from marginal operations.

A tax on the gross amount or gross value of production, on the other hand, results in a tax liability any time ore is mined, regardless of profitability or efficiency of the mine. Such a severance tax, like Minnesota's production tax, which is based on the amount of ore mined (or processed) becomes an added fixed cost of operation, and thus may discourage marginal or inefficient mines,

or delay mining until higher prices or improved technology make mining profitable. However, a reasonable severance tax on gross production, in addition to an income or net value tax such as Minnesota's occupation tax, guarantees that a marginal mine which escapes a significant income or net production tax burden will still pay for the priviledge of extracting a non-renewable resource from the ground. If market conditions, or the ore grade or recovery rates, make even an efficiently operated mine a marginal investment, such a severance tax may encourage development to be postponed until conditions change.

Thus, combined use of both an occupation tax and a tax based on gross production probably improves the State's revenue position, and discourages inefficient operations and rapacious rates of production, while at the same time basing a portion of the mining company's tax burden on a form of net taxable value, or if you will, profitability.

Under current Minnesota laws, copper-nickel mining operations are subject to both the corporate income tax and the occupation tax. Taconite operations are exempt from the corporate income tax in Minnesota. Although the corporate income tax is based on corporation income assignable to Minnesota and the occupation tax is based on value of ore produced, the tax bases are actually similar since they are adjusted by the same types of deductions. They do not, however, necessarily produce the same amounts of revenue at the same points in time during the life of the mine. The vagaries of predicting corporate income, together with the complexity of the three-factor formula used to assign corporate income to Minnesota, make it difficult to anticipate corporate income tax revenues from mining.

Also, the occupation tax is allowed as a credit against the corporate income tax. As the occupation tax increases, it simply delays any income tax liability until the income tax liability exceeds the occupation tax liability. At that point, the sum of the two tax liabilities is equal to the amount which the corporate income tax would be without the credit for the occupation tax. The Regional Copper-Nickel Study estimated that mining companies would not have significant corporate income tax liabilities in the first 10 to 15 years of a mine's life span.* Any revenue which the state would lose by eliminating the income tax on copper-nickel would, accordingly, be in the later years.

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*If proposals for more rapid depreciation are adopted for federal corporate income taxes, and are followed by Minnesota, an income tax liability could occur sooner for mining operations under the Minnesota corporate income tax.

3) A local ad valorem property tax should be levied on a smelter, except when location of the smelter results in substantial costs to local governments which do not share in the additional tax base associated with the smelter. In such cases, some other type of tax should be levied by the state in lieu of a property tax, and the proceeds returned to local governments in the mining area.

Minnesota tax laws consider a smelter to be a manufacturing facility subject to local ad valorem property taxes. In part because of the difficulties of valuation, mine/mill operations pay a gross production tax in lieu of property tax. The Regional Copper-Nickel Study estimated that depending on its location, a large smelter/refinery complex could generate large amounts of local revenue, mostly from property taxes. A smelter/refinery is less labor-intensive than a mine/mill complex, and therefore would probably result in fewer fiscal costs on a community. However, a smelter/refinery could generate more local government revenue than a mine/mill complex, depending on the location of the smelter.

A high value facility such as a smelter plays havoc with the property tax system, expecially when located in small taxing jurisdictions. In theory, a property tax relates in some way to costs of services to property. Not the least problem is that this relationship becomes very difficult to ascertain with a facility like a smelter. In addition, two political equity issues arise:

1) Balance of local costs and benefits. If located within a city, or near the border between two counties, neighboring jurisdictions may bear smelter-induced public service costs without sharing equitably in the smelter tax base.

2) Tax base disparities among jurisdictions. The tax base benefit of a smelter, whether realized in higher property tax yield or lower tax rates on existing property, could create a serious imbalance in communities' tax capacity. (This problem is taken care of for school districts through the foundation aid program.)

A smelter could be located either near the mine or some distance away, perhaps in or near Duluth. However, the smelter's impact on local finances would vary significantly, depending on location. If the smelter were located within a municipality, it would have a proportionately greater impact on the municipality's tax base than the county's--however, the county would share the benefit. The impact would be much greater in a small municipality (Babbitt) than in a larger municipality (Duluth). If located outside a municipality, the municipality would not share in the tax base growth, even though it might share in development-induced costs. However, if the site were near a city, annexation would be a likely event. Regardless of location, the school district would probably share in the increased tax base.

If the local governments maintained their mill rates at current levels, they would be able to increase their property tax levies by a percentage equal to the smelter-induced growth in their tax base, without increasing taxes on existing property. However, the state's levy limit laws would limit the potential windfall for cities over 2,500 population which are subject to levy limits. Instead, the more likely result is that the local mill rate could be lowered, resulting in lower taxes on existing property made possible by a shift of the tax burden on to the smelter. It is possible that, expecially in a small city, mill rates could be reduced to a very low level. A somewhat different situation exists for school districts. Under the State's school foundation aid program, school districts' basic per pupil unit operating revenue is established by the legislature. A school district receives state aid equal to the difference between what it can

raise with a uniform statewide mill rate and the target per pupil unit revenue. Increased assessed valuation resulting from a smelter would simply increase the yield of the school district's local levy and reduce its state aid. Thus, at least for the operating portion of its budget, the school district would not directly benefit from location of a smelter within the district.*

A city might also fare relatively less well in state aids because the Local Government Aid formula uses a distribution factor based on its levy limits base and yield from a 10 mill tax rate. Increased taxable value would result in a relatively smaller distribution factor, unless the City's levy limit base were adjusted upward as a result of smelter-induced population growth.

A tax imposed by a larger jurisdiction--either county or state--permits revenues to be shared over a broader area, thus ameliorating both the potential for inequitable distribution of local government costs and revenues, and for tax base disparities among local jurisdictions. For this purpose the type of tax is less important than the jurisdiction which levies it. Conceivably, the tax could be a county or state-levied tax on property, to be redistributed according to a formula based on need. However, some sort of State production tax probably has better precedent.

Such a state-levied tax in lieu of local property taxes would not be a disincentive for smelting in Minnesota, especially if the state tax does not result in a tax burden which is substantially greater than what a smelter would pay under a property tax which would otherwise be levied. In addition, it should be noted that the existing occupation tax law provides an incentive for smelting by granting a credit if smelting is done in Minnesota.

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*Increased enrollment resulting from smelter-induced population growth would result in a higher revenue target.

4) The State should study the need for, and feasibility of, a statewide economic protection fund financed from mineral tax revenues.

Difficulty in administering a property tax on mining has led many states to levy a tax on production, or a type of severance tax, in lieu of states and/or local property taxes. Thus, if such a tax has as its sole purpose the replacement of lost local property tax revenues, the tax should be set so as to generate adequate amounts of revenue for that purpose. However, taxes on production are also used to compensate for loss of an exhaustible natural resource. In the case of Minnesota's taconite production tax, a large portion of revenues are returned to local governments in lieu of property taxes, and another portion is placed in the taconite economic and environmental protection funds.

While a large part of the natural resource certainly "belongs" to people and their local governments in the mining region, it can be argued that the entire state shares an interest. If so, the state should share in some revenue based on production. Currently, the state receives one cent per ton from the taconite production tax to defray administrative expenses. In addition, the portion of taconite production tax revenues turned back to local governments in the form of aids indirectly benefits the state through reduced property tax relief obligations. Under current legislation the State would receive six percent of copper-nickel production tax revenue. The state would also receive some royalty revenue from mining on state-owned land, and some royalty tax revenue from royalties paid to private land owners.

Minnesota's taconite occupation tax, however, is a substitute for the corporate income tax on taconite operations. It is a tax on net value of ore after mining and beneficiation. If the occupation tax is levied in lieu of the corporate income

tax, it should generate at least as much revenue as would have the income tax. However, if the production tax does not adequately compensate the state for its interest in the mineral resource, it can be argued that the occupation tax should be adjusted upward to do so.

Regardless of which revenue source is used to reimburse the state for its interest in the natural resource, the state now has no fund, such as the taconite economic and environmental protection funds, for that purpose. Such a fund could be established on a statewide basis to deal with the economic and environmental impacts of mining industries generally. The entire state would share some indirect impact from the exhaustion of mineral production in northeast Minnesota. Similarily, northeast Minnesota shares an interest in potential uranium mining in other areas in Minnesota, as well as the health of other industires in southern Minnesota. The State's ability to deal with problems of exhaustion of resources and economic dislocation, as well as plans for a ever-changing economy, would be enhanced by creation of a statewide economic protection fund financed by contributions from major extractive industries. Such a fund would not be available in time to assist with the initial costs of copper-nickel development, but it could, among other things, be borrowed from to cover front-end costs to the state and communities for development of other new industries, including future copper-nickel developments. A portion of the fund might also be dedicated for state research into minerals technology and economic conditions affecting Minnesota's mineral industries, as well as monitoring of mineral resources and reserves in Minnesota.

5) The formula for distributing copper-nickel production taxes should be re-evaluated to determine if it adequately meets the needs of mining area communities.

The 1965 taconite law established the formula for allocating copper-nickel and taconite production tax revenues:

50% school district
22% city and town
22% county
6% state

The law for distributing taconite production tax revenues has since been changed. Among the significant changes were allotments for the Iron Range Resources and Rehabilitation Board (IRRRB), the Northeast Minnesota Economic Protection Fund, the Taconite Environmental Protection Fund, and the Taconite Property Tax Relief Fund (taconite homestead credit). Only allocations to the Property Tax Relief Fund, IRRRB, counties, and county road and bridge funds are indexed to steel mill product prices. All other allocations are for a fixed amount per ton. The Environmental and Economic Protection Funds receive one-third and two-thirds, respectively, of the balance remaining after all other allocations are made. This means that only the four indexed funds and the environmental and economic protection funds share in the growth in tax revenues resulting from indexation of the base tax rate.

The taconite production tax is levied in lieu of the local property tax in Minnesota. Accordingly, a large portion of the revenues are returned to local taxing jurisdictions in the mining area. A series of complex apportionment schemes provide direct aid to cities and towns, counties, and school districts. In addition, the taconite municipal aid fund, provides an additional per capita distribution to qualifying jurisdictions (M.S. 1978, 298.282).

These distributions should be large enough to compensate for revenues lost to local governments as a result of the exemption of mine/mill operations from the local property tax. However, a uniform production tax does not reflect the variations that would exist among different local property tax yields due to differences in levies and mill rates. Thus, a mining operation might have a production tax burden much higher or lower than would be the case under a property tax, depending on the jurisdiction in which it is located.

Mining area local governments also benefit indirectly from taconite homestead credits financed from the production tax. Through the taconite homestead credit, the state pays a portion of homestead property owners' property tax bills. The taconite homestead credit is in addition to the regular homestead credit extended to homestead properties in the rest of the state. In theory, the additional credit is necessary because the loss of mine/mill tax base to the local government results in other properties paying higher taxes. However, because the taconite homestead credit is subtracted from the gross tax bill before the state homestead credit, the state's financial obligation for the state homestead credit is reduced in all cases, except when the homeowner receives the maximum homestead credit.

The taconite homestead credit lowers homestead residential property taxes relative to taxes on other classes of property, including business. Direct aids to local governments, on the other hand--at least to the extent that they result in lower taxes as opposed to higher spending--benefit all classes of property. Yet, the taconite homestead credit may have the advantage of relating state aid to property taxpayer burden without directly affecting local budgets.

Given the types of issues discussed above, it may be desirable to re-evaluate the levels and types of distributions for the copper-nickel production tax.

6) Copper-nickel policy should reflect stages in copper-nickel development and mining. The State should be prepared to adjust tax laws to reflect changing conditions in the mining industry and in the State's revenue needs, while providing adequate guarantees of a fair and reasonably stable tax environment.

An ideal tax policy should provide investors with enough certainty to make long-term decisions, but should also be capable of adjustment and fine-tuning to meet the needs of both industry and government at each stage of development. Generally, the more complex a tax law, the more difficult it is to adjust in any fundamental way. Thus, there is merit in keeping a tax law as simple as possible both to facilitate understanding and adjustment.

Obviously the State cannot promise with any certainty the details of a copper-nickel tax law for the duration of mining in Minnesota. Changes in many conditions, including the State's revenue needs and the technology of the industry may necessitate adjustments. This has clearly been the case with taconite tax laws, originally enacted in 1941. The original law was intended to encourage exploration and development, but as the growth of the industry became more certain, adjustments in the tax law resulted. Similarily, it should be expected that changing conditions as the copper-nickel mining industry develops may require adjustments which cannot now be foreseen. At the same time, it is important for the State to clarify the priniciples which can be expected to guide its copper-nickel tax laws. While the current administration cannot commit future legislatures and governors, a clear declaration of intent is desirable.

Copper

Copper is used extensively for electrical applications such as in motors, generators, power distribution, communication equipment and wiring. Copper is also used in roofing, plumbing, heat exchangers, shell casings, instruments, jewelry, coinage and decorative items.

Copper production is a capital intensive industry, requiring about $7,000 per annual ton of new capacity for facilities from mining through refining. A variety of methods, depending on the type of ore, are used to produce copper concentrates which are in turn smelted and refined. Refined copper is generally cast into wirebars, ingots and other shapes and sent to fabricating mills for conversion to manufactured products. In addition to copper, copper-bearing ores often yield byproducts and coproducts such as gold, silver, molybdenum, selenium, telurium, and rhenium.*

The United States is the leading consumer and producer of copper. Between 1969 and 1978, 67 percent of U.S. domestic consumption was supplied by domestic mines, 21 percent from scrap and 12 percent from imports. U.S. demand for copper is expected to increase at an annual rate of about 3.6 percent between 1977 and 2000; worldwide demand is expected to increase slightly faster. Scrap metal is projected to supply about 31 percent of domestic supply by 2000.

Although the properties of copper make it almost irreplaceable in some applications, it faces competition from aluminum, plastics, steel and other materials. However, since substitution typically requires expensive modification of designs and processes, actual substitution usually lags behind incentives provided by price, availability and technological developments.

Because of the low copper content of most ores today, concentrating plants are nearly always close to the mine. In addition, since concentrates average only 25 percent copper, most smelters are also located fairly close to mine and concentrating plants.

Nickel

Nickel's greatest value is in alloys with other metals. Nickel adds strength and corrosion resistance to alloys over a wide range of temperatures. Nickel alloys are particularly important to the steel and aerospace industries.

Technology for concentrating sulfide ores, such as in Duluth gabbro, is well established. No effective means is yet available to concentrate laterite ores. Lower grade sulfide concentrates are smelted to form a nickel oxide which is eventually cast into anodes and refined.

U. S. reserves are small. The Hanna Mining Company operates the only U.S. nickel mine at Riddle, Oregon.

Domestic production accounts for 10 percent of U.S. demand. Imports provide 60 to 70 percent, while scrap accounts for 20 to 30 percent of demand. Most U.S. imports are from Canada, some of it by way of extraction plants in Norway and Great Britain.

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*Expected byproducts and coproducts in Minnesota include platinum, palladium, gold, silver, and cobalt. Sulfuric acid would be obtained during smelting.

MINERAL TAXATION

Background Discussion

Taxes are generally used for four purposes:

1) revenue raising--to provide the basic income without which governments cannot exist and without which they cannot provide services to business and individuals;

2) direction of the economy--although this can be a purpose of some state taxes, it is more often a purpose of federal taxes;

3) redistribution of wealth--between persons, or from private to public hands; and,

4) regulation--nonfiscal purposes such as influence of behavior.

There is no disagreement that mining operations, just as other businesses and individuals, rightfully should share in the financial support of state and local government. Three basic questions with all taxing decisions are:

1) What kind of tax?

2) What rates?

3) How to distribute revenue?

Because of the particular nature of the mining industry, these are often difficult questions. Several characteristics of mining industries should be considered in determining types and rates of taxes:

1) the principle asset of a mine is consumed in the course of production;

2) a large capital investment is required before any production occurs;

3) most capital cannot be physically transferred to another location when a mine is exhausted;

4) the total value of a mineral deposit is not accurately known until it is depleted; and,

5) after capital is committed, adjustment of output is more difficult than in many industries because of the large fixed costs which tend to encourage maximum production.

Taxes are usually not the most important influence on mining location decisions or on profitability. This is because locations of deposits are limited by nature,

Domestic demand is expected to grow about 3.6 percent annually between 1977 and 2000. Worldwide, the demand is expected to grow somewhat faster. However, since nickel is consumed principally in capital good and consumer durables, demand is sensitive to the business cycle. Domestic production will only satisfy a small portion of demand unless Minnesota's resources and laterite resources in California and Oregon are developed.

The Riddle, Oregon mine could be exhausted by about 1990. Worldwide, however, resources appear adequate to meet demand.

Sources:

H. J. Schroeder, Copper, U.S. Department of the Interior, Bureau of Mines, Mineral Commodity Profiles, September, 1979.

Norman A. Matthews, Nickel, U.S. Department of the Interior, Bureau of Mines, Mineral Commodity Profiles, May, 1979.

and because taxes typically are only a small part of an operation's total operating cost. Using existing copper-nickel tax rates, the Regional Copper-Nickel Study estimated that for the types of copper-nickel mining likely in Minnesota, total state (5.3%) and federal (7.4%) taxes would amount to 12.7% of total revenues from the mining operations. Differences in tax rates among states actually have less impact of location decisions that might be expected since state taxes are deductible on federal income taxes. The Regional Copper-Nickel Study estimated that, based on current copper-nickel tax rates, a 10% change in the world price of copper would have an inpact on profitability more than 200 times greater than would a 10% change in the production or occupation tax rate. Other factors which are much more important to profitability than taxes include changes in the grade of ore, the mineral recovery rate, changes in initial capital cost, and delays in construction. Nonetheless, the study warned the state policies could significantly affect economic viability of already marginal operations.

Taxes are generally levied against four types of bases:

1) wealth--fixed ownership or control of wealth, whether or not a transaction occurs;

2) income;

3) expenditures; and,

4) activity or privilege.

The types of taxes most often imposed against mining operations include:

1) income tax--a tax, such as Minnesota's occupation tax, on the net value of production has characteristics of an income tax;

2) taxes on property--fair and accurate appraisals of property value are often difficult;

3) transaction tax--usually an ad valorem tax, i.e., the retail sales tax; and,

4) excise tax--taxes imposed on the sale or production of selected commodities; severance taxes on the priviledge of mining, such as Minnesota's occupation tax, are also often considered as excise taxes.

Several characteristics of mining industries in part determine the economic impact of particular taxes on the industry:

Exhaustibility--While the capital assets of all firms decline in value, ore deposits are not replaceable and difficult to value.

Uncertainty in measure and value of deposits--There is an unusually wide margin of error in predicting the extent and value of deposits.

Accumulation of metal stocks--Accumulation of scrap or secondary supply of metal can depress demand for raw metal. A related problem is that competition from other metals or new alloys may suppress demand.

Structure of mining costs--Investments in mine development and equipment can only be recovered through continued extraction of ore; equipment and structures are usually site specific and cannot be transferred to other mines.

Mining operations are clearly liable for a share in the cost of government, as are other businesses and individuals. However, many economists argue that in many mining operations there is an element of "surplus value" -- that is, value inherent in the minerals over and above that created by human investment and effort. Many believe that this "surplus value" is, in effect, a gift of nature that belongs to all, and should be taxed accordingly. The difficulty in using this principle to determine tax rates is, of course, distinguishing with any precision between those values which are inherent in the minerals and those which are created by man. Given this difficulty, it is generally believed that a tax on net value, or net product, is more likely to reflect the true surplus value than is a tax on gross value of production, and thus not seriously influence rates of production or levels of recovery.

The advantages and disadvantages of the major types of taxes used for mining are discussed on the following pages.

Property Tax

Appraisal of property value is particularly difficult for minerals. Minerals, and therefore value, are largely hidden and unknown. There are differences in value among and within deposits. There is no organized market to provide comparative sale values. In the case of copper and nickel, there is no market to give a price for copper-nickel ore. Due to the integrated nature of the industry, the mineral is not marketed, and therefore priced, until after it is refined. This makes valuation of mine property difficult, especially if smelters are located outside the state.

Apart from valuation through negotiation, there are basically two commonly used techniques for valuation:

1) Annual income or proceeds as a substitute for total value--Applying a property tax rate to a measure of income or proceeds may not be consistent with taxing the full and true market value because the value of a mineral deposit changes over time. Because the deposit is exhaustible, a portion of the income does not really represent wealth in place at a certain time, but rather is a return on capital. This procedure would only by accident yield a tax burden similar to that which would result if the value of the mine could be appraised.

2) Hoskold Formula--This is a mathematical formula which derives an estimate of a mine's present value. The formula takes into account the expected annual income, the life of the mine, and what is considered an acceptable return on investment. Administration of such a formula requires sophisticated data from the mining companies provided in good faith and can yield fluctuating revenues as mining and economic conditions change. However, the latter problem can be largely avoided by averaging figures over a multi-year period.

A property tax, depending on its magnitude, can encourage early and rapid extraction of ore. The tax is collected each year on ore that may not be mined for many years in the future, even though the operator only receives income when the ore is finally mined. Thus, there can be an incentive for the industry to extract ore as rapidly as possible in order to meet current cash demands and to lower future property tax liability.

It can be argued that a property tax is more equitable to a marginal or high-cost producer than is a severance tax on gross production, such as Minnesota's production tax. This is because a high-cost operation, all else equal, will have a lower discounted net operating profit over the life of the mine, resulting in lower valuations for property tax purposes (Paschall, p. 229). The production tax treats a high-cost and low-cost operation the same, resulting in a relatively higher burden on the high-cost, marginal operation.

Income Tax

An income tax, or some similar tax on the value of net proceeds, is usually least objectionable to the mining industry because it relates tax burden to profitability. Because it is not a fixed cost, it does not encourage "high-grading" as does a severance tax on gross tonnage, such as Minnesota's production tax. It may actually encourage exploration and development if associated expenses are deductible from gross income. However, an income tax can conceivably encourage inefficient operations through deductions for operating costs.

An income tax is fundamentally different than a property tax or gross production-type severance tax (Paschall, p. 231). An income tax is levied against the operator of a mine, while the other taxes apply to the mine itself and production from the mine. The deductions, which are actually intended to compensate operators for the costs of mining, reveal the difference. It is the operator, not the property who incurs administrative expenses; deductions for interest on debt similarly reflect individual owners' financing decisions. Paschall argues that income taxes actually do not achieve equity between mines because entrepreneurial decisions concerning items such as debt financing can result in different tax bases for similar mines (Paschall, pp. 232-233).

A tax, such as Minnesota's occupation tax, on the net value of ore produced is like an income tax in that it allows substantially similar deductions for operating costs, as well as credits for research and exploration. The corporate income tax applies to the portion of the mining company's total income assignable to Minnesota, while the occupation tax applies to the net value of ore after mining and benefication. In both cases, however, tax liability is related to income or profitability.

Severance Taxes

A severance tax can be applied to the production of raw or processed (milled, smelted, refined) ore. A "pure" severance tax is based on the physical volume of production, as opposed to the value of production. However, taxes on the gross value or net value (occupation tax) are also sometimes considered severance taxes.

A severance tax is not imposed upon the mineral itself, as is a property tax, but rather upon the amount or value of mineral produced. However, a severance tax is sometimes used in lieu of a property tax because it is easier to administer. Since a severance tax is usually a state tax, however, it must be redistributed to local governments in some way if it is to replace revenues lost by local inability to levy a property tax. A severance tax, along with a formula for revenue-sharing can, in fact, be used to reduce tax base and tax-effort disparities resulting from unequal distribution of mines and processing facilities among local taxing jurisdictions.

Since most severance taxes have been considered by the courts as excise taxes in return for the privilege to mine, and not as property taxes, severance taxes are generally exempt from constitutional requirements of uniformity that apply to property taxes and may be levied in addition to a property tax without being considered double taxation. A severance tax can be based on the value of production (net or gross) instead of the physical volume of production, but value is usually measured at the time and place of production.

While the tax is usually levied as a fixed percentage of value or as a flat rate per unit or production,* it may be graduated according to value or quantity of production.**

A severance tax based on value, rather than volume, of production automatically changes with changes in prices,*** and better reflects differences in quality of ore produced. It, therefore, may be less likely to encourage "high-grading" since the tax decreases as the value of ore or the rate of production decreases. However, a tax such as Minnesota's production tax on the physical volume of production is easier to administer. The difficulty with a tax on value is with valuation. The lack of direct market for raw or semi-processed ore makes it necessary to work backwards from a finished product price to derive an estimate of the value of ore. Consequently, it is important to consider at what point in the mining-milling-refining process the tax should, or can, be applied.

*For state severance taxes on metals and minerals, a per-value base is three times more commonly used than a per-unit base (Starch, p. 42). A per-value base has the advantage of increased revenue yield as commodity prices increase, whereas a per-unit tax must be periodically revised to reflect price increases, unless it is indexed to price trends.

**The Minnesota production tax rate is increased 1.6% for each 1% that iron content exceeds 62%. However, this feature is intended more to capture revenue from premium ores than to obviate incentives for high-grading; most ores in Minnesota have iron content below 62%.

***The flat rate per ton of Minnesota's production tax is indexed to the steel mills price index.

A severance tax, such as Minnesota's occupation tax, based on some measure of net value rather than gross value, is more like an income tax than like a severance tax on tonnage. Unlike an income tax, which taxes income to a corporation, it taxes net value derived at a specified stage of mining/processing--in Minnesota's case, after mining and beneficiation.

Because of difficulties in valuation, such a tax is not necessarily a lot easier to administer than a property tax or corporate income tax. However, in Minnesota the occupation tax is more likely to result in a significant tax liability than is the income tax with its three-factor formula for assigning income.

Among the arguments for a severance tax, such as Minnesota's production tax, are the following (Starch, pp. 21-25):

1) To protect the natural heritage-Minerals are considered a gift to nature to be shared by all. Because resources are exhaustible, future generations may have an interest in their use. According to this view, delayed development or high-grading may not be a negative thing (the lower-grade ore will be mined when scarcity makes it profitable). This argument suggests that a portion of the proceeds should be placed in a trust fund for use by future generations.

2) Tax absentee ownership-A severance tax gives the State a chance to share in profits which might otherwise leave the State.

3) Exporting of tax burden-Depending on conditions, a significant portion of a severance tax burden may be shifted to consumers outside the State.

4) Alternative to property tax-Because of assessment difficulties, a property tax may result in a unfairly low tax on mining companies. Severance taxes, particularly those of volume on production, are easier to administer and generally are believed to produce more revenue.

5) Conservation-A severance tax restrains excessive production; it does not encourage rapid production in order to "mine out from under the tax" as does the property tax, although it may raise the cut-off grade ("high-grading"). It can be used as a tool to control growth.

6) Administrative ease-It is relatively easy to administer, especially if a flat rate per unit of production; it is difficult to evade.

7) Payment for cost of regulation-A severance tax is one way of internalizing the economic, environmental and social costs resulting from an extractive industry.

8) Equalization of local revenues-As an alternative to the local property tax, a severance tax makes possible redistribution of revenues to compensate for local tax base disparities. Of course, a state (as opposed to local) property tax would permit the same.

Severance taxes have been widely accepted both politically and legally. However, arguments made against a severance tax have included the following:

1) Discourages development and production--By raising production costs, it discourages production; this is particularly true for a flat rate per-unit tax on high-cost or marginal operations. However, tax policy should probably not protect inefficient or marginal industries.

2) Unsuitable alternative to property tax--It produces less stable revenue than does the property tax and diminishes local fiscal autonomy.

3) Wasteful of mineral reserves--A severance tax on tonnage mined promotes a higher cut-off grade.

4) Discrimination--Because it singles out the mining industry for special taxation, a severance tax is discriminating.

5) False premise of natural heritage theory--It is argued that there is no legal foundation for the natural heritage theory in our free enterprise system. By levying a severance tax, it is argued, States are asserting a royalty interest in property to which they have no valid claim. The minerals have no real value until they are mined and processed.

Arguments concerning the effect of taxes on conservation may appear contradictory. This is especially the case for the "pure" type of severance tax on tonnage. On the one hand, it is argued that a severance tax, by affecting operating costs, promotes waste through "high-grading". The waste is in the from of discarded metal-bearing ore that does not meet the higher cut-off grade resulting from the imposition of the severance tax. On the other hand, a severance tax may promote conservation in the sense that it discourages rapid development and premature exhaustion of resources, thus protecting the economic interests of future residents. Shifting production and consumption of exhaustible resources to future generations is one form of conservation.

Although the constitutionality of severance taxes has been widely upheld, it is important to understand the legal grounds on which they have been challenged:

1) Violation of interstate commerce clause by restricting movement of goods between states--In 1923, the U. S. Supreme Court ruled that the tax is at the point of severance, before minerals enter interstate commerce. Mining is considered a local business, subject to local regulations and taxation.

2) Violation of due process by imposing double taxation when levied in addition to a property tax--Severance taxes have been treated as an excise tax on the privilege of extracting ore and, therefore, are not considered as a second tax on property.

3) Violation of equal protection clause by unfairly discriminating against the mining industry--The 14th Amendment has not been interpreted to require that mining be taxed in the same ways as other businesses.

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