

Governor's Committee on Minnesota's Mining Future

UPDATE • OCTOBER 2008



2008 Update to the Governor's Committee on Minnesota's Mining Future: Summary of Goals, Strategies & Recommendations

GOALS

1) All types of mining:

- Improve Minnesota's government policies in ways that will not inhibit responsible and sustainable minerals business activity
- Strive to develop government policies that will enhance the overall competitiveness of Minnesota mining operations and encourage private investment in Minnesota's mineral resources

2) Ferrous industry:

- Taconite: Sustain 40 million tons per year of taconite concentrate production by capturing market share at United States and Canadian blast furnaces
- Value-Added Iron: Add 3 million tons per year of value-added iron production and become an iron-making technology center of excellence

3) Non-ferrous industry:

- Realize the potential of environmentally acceptable copper, nickel, PGM and other known non-ferrous resources in Minnesota
- Facilitate exploration and development of other non-ferrous mineral potential

4) Industrial minerals industry:

- Expand competitive aggregate and other industrial minerals production to meet Minnesota's development needs
- Become a regional multi-state supplier of industrial minerals

Strategies

1) Government Policies

1. Mining Taxes
2. Environmental Review and Permitting
3. State EIS Project Manager
4. Taconite Aggregate Tax
5. Royalty Strategies

2) Environmental Quality

1. Mercury TMDL
2. Acid Mine Drainage Controls
3. Sustainable Development Strategies

3) Applied Research

1. Geological Mapping
2. Minerals Exploration
3. Cost Effective Recovery Methods

4) Development and Communication

1. Rural Future Fund
2. Mine Modernization
3. Value-Added Iron Commercialization
4. Taconite Aggregate Marketing
5. Minerals Opportunities Meetings

5) Transportation and Energy

1. Taconite Aggregate Transportation Study
2. Transportation Infrastructure for New Rock Business
3. Alternative Energy

Strategy 1: Government Policies

Recommendation 1: Mining Taxes

Strategy #1 Government Policies - Institute supportive policies for mining businesses that help them control production costs, as well as policies that encourage investment and growth.

Recommendation and Lead Agency

1. Mining Taxes – The Commissioners of Iron Range Resources and Revenue and the Chairman of the Iron Range legislative delegation should select a committee to recommend mining tax reductions to the Governor by December 15, 2004. **Iron Ranges Resources (IRR)**

Summary Progress

Iron Range Resources formed an Ad-Hoc Mining Tax Committee, which met three times: 11/24/04, 12/17/04 & 12/29/04. The ten members included three Senators, two Representatives, Iron Range Resources Commissioner, Department of Revenue Commissioner, two iron mining company representatives and one non-ferrous mining representative. The results were four outcomes. 1. Department of Revenue Commissioner will include revised non-ferrous legislation in his proposal to the Governor. 2. No consensus of action regarding the taconite aggregate tax. 3. The Taconite Production Tax should have greater stability and be based on profitability, market price and production tonnage. 4. The legislators and mining companies would begin a dialogue on developing a long-term policy on taconite taxes during the next session. Both outcomes 1 and 4 were initiated. Recommendation 4 covers outcome 2 in more detail on page 6. NRRI Researchers prepared a formal report that compares the taxing structure and royalty structure for other mining states and Canadian provinces. This document provides information on what other jurisdictions do regarding taxation policies and can be used to see how current Minnesota policies compare with those employed by these other potential competitors. An excel based spreadsheet model was developed as part of this study and is being refined with a simple user interface so that it can be used to study changes in taxation and royalty policies for the future. This modeling tool will be available in the near future.

Next Steps and Target Dates

Follow up on the discussions between the mining companies and legislators regarding developing a long-term policy on taconite taxes. Larry Zanko, NRRI will complete the final report.

Strategy 1: Government Policies

Recommendation 2: Environmental Review and Permitting

Strategy #1 Government Policies - Institute supportive policies for mining businesses that help them control production costs, as well as policies that encourage investment and growth.

Recommendation and Lead Agency

2. **Environmental Review and Permitting** – A state team should be formed to recommend 2005 legislative changes that shorten review and permitting timelines while ensuring no reduction in environmental protection. **Department of Employment and Economic Development (DEED)**

Summary Progress

The Minnesota Pollution Control Agency (MPCA) and the Department of Natural Resources (DNR) have coordinated efforts on mining-related projects to ensure that environmental reviews and permitting are done as efficiently and effectively as possible. The MPCA formed a Mining Sector team and dedicated two high-level positions – a Mining Sector Director and a Mining Sector Manager – to lead the effort. In addition, the MPCA coordinates monthly conference calls with Department of Natural Resources, Department of Employment and Economic Development, Iron Range Resources, and Department of Revenue, to report on review and permitting progress for all mining related projects, ensuring that all parties are aware of new developments and any possible problems that could delay a project. These steps, while not specifically recommended by the 2004 committee report, have tended to shorten review and permitting timelines while ensuring environmental protection.

Next Steps and Target Dates

Continue monthly mining calls on the third Monday of each month at 11:30 am to maintaining communication among State agencies regarding the new mining projects.

Strategy 1: Government Policies

Recommendation 3: State EIS Project Manager

Strategy #1 Government Policies - Institute supportive policies for mining businesses that help them control production costs, as well as policies that encourage investment and growth.

Recommendation and Lead Agency

3. **State EIS Project Manager** – A state agency project manager position should be established to coordinate permitting activities for mining projects that propose to deploy new mining technologies in Minnesota and require both a state and federal Environmental Impact Statement. **Department of Natural Resources (DNR)**

Summary Progress

The Minnesota Department of Natural Resources Ecological Services Division has been assigned as the managing division for mining projects that require Environmental Impact Statements. The DNR Ecological Services Division has hired a Mining Planning director position to oversee the agency's environmental review project management efforts for all metallic mineral mining projects. In addition, the DNR hires a project manager for each mining EIS. The Department of Natural Resources Division of Lands and Minerals and Division of Waters, the Minnesota Pollution Control Agency Mining Sector and the Minnesota Department of Health assist the Ecological resources project manager during the EIS process.

The DNR Division of Ecological Resources mining Planning Director is not the "State EIS Project Manager" referenced in the recommendation in that this person does not coordinate permitting activities for mining projects. This person is in communication with regulatory authorities during the environmental review process, but does not manage or coordinate permitting activities. Those activities are conducted by the respective regulatory authorities, principally DNR Waters, DNR Lands and Minerals, PCA and the US Army Corps of Engineers.

Next Steps and Target Dates

The state agencies, DNR, MPCA, DEED, IRR, DOR, NRRI, and their respective divisions should meet to discuss and evaluate both their successes and opportunities for improvement in promoting the State to new mineral interests, conducting a timely environmental review and efficiently issuing permits. An effort to hold this meeting prior to the next legislative session should be made so that recommendations can be brought forward, if necessary.

Strategy 1: Government Policies

Recommendation 4: Taconite Aggregate Tax

Strategy #1 Government Policies - Institute supportive policies for mining businesses that help them control production costs, as well as policies that encourage investment and growth.

Recommendation and Lead Agency

4. **Taconite Aggregate Tax Policy** – The state should encourage use of taconite by-products by endorsing a policy of no production or special “sand and gravel” or aggregate tax for taconite aggregate. **Iron Range Resources (IRR)**

Summary Progress

Minnesota Statute 298.75 authorizes designated counties to impose a production tax up to ten cents per cubic yard or up to seven cents per ton of aggregate material originating within one of the listed counties: Becker, Benton, Big Stone, Carlton, Carver, Chisago, Clay, Dakota, Hennepin, Kittson, Le Sueur, Mahnomon, Marshall, Murray, Norman, Pennington, Polk, Pope, Ramsey, Red Lake, Rock, Scott, Sherburne, Sibley, St. Louis, Stearns, Washington, and Wilkin. This tax shall be imposed on aggregate material produced in the county when the aggregate material is transported from the extraction site or sold. The tax proceeds are dedicated to county road and bridge funds and ten percent to restoration of abandoned pits, quarries, or deposits located upon public and tax forfeited lands within the county. Counties not listed above can implement this tax by holding a public hearing, county board approving, and notifying the commissioner of revenue of the imposition of the tax.

In the 2008 Legislative session, this tax was expanded to include taconite tailings, crushed rock and architectural or dimension stone and dimension granite removed from taconite mines, effective for aggregate material removed beginning June 1, 2008. The proceeds of the production tax on materials removed from taconite mines will be deposited in the Iron Range Resources’ Taconite Area Environmental Protection Fund. Governor Pawlenty signed this legislation on March 7, 2008.

Next Steps and Target Dates

The impact of this additional tax should be monitored for any potential impacts it may have.

Strategy 1: Government Policies

Recommendation 5: Royalty Strategies

Strategy #1 Government Policies - Institute supportive policies for mining businesses that help them control production costs, as well as policies that encourage investment and growth.

Recommendation and Lead Agency

5. **Royalty Strategies** – The DNR, in partnership with the Minnesota Exploration Association, should conduct an evaluation of the nonferrous royalty structure applicable to state leased minerals. **Department of Natural Resources (DNR)**

Summary Progress

The Department of Natural Resources Division of Lands and Minerals has discussed non-ferrous royalty calculations and deductions with the president of the Minnesota Exploration Association.

Next Steps and Target Dates

Discussions should continue in an effort to reach a collaborative conclusion.

Strategy 2: Environmental Quality

Recommendation 1: Mercury TMDLs

Strategy #2 Environmental Quality - Formulate environmental policies and land management strategies that facilitate exploration, encourage investment and sustain production while maintaining good land and environmental stewardship

Recommendation and Lead Agency

1. **Mercury TMDLs** – The state should facilitate and help fund rapid development of appropriate Total Maximum Daily Loads (TMDLs) for mercury in the Lake Superior and Rainy River watersheds. **Minnesota Pollution Control Agency (MPCA)**

Summary Progress

In March 2007, the MPCA developed, and U.S. Environmental Protection Agency approved, a regional TMDL for mercury that covers most, but not all of the water bodies in the state. To be covered in the Mercury TMDL, the MPCA had to demonstrate that water bodies would meet water-quality standards after the mercury-reduction goals are achieved. Of the impairments on the 2008 list, 599 lakes and 32 rivers meet the requirement and are included in the final TMDL.

For some of the waters not included in the TMDL, the MPCA had insufficient data to demonstrate that the impairment would be addressed. The MPCA has increased data collection from these water bodies to better evaluate their eligibility for being covered by a future TMDL. In the meantime, all water bodies in the state will benefit from the implementation of the approved regional TMDL

Next Steps and Target Dates

Continue data collection

Strategy 2: Environmental Quality

Recommendation 2: Acid Mine Drainage Controls

Strategy #2 Environmental Quality - Formulate environmental policies and land management strategies that facilitate exploration, encourage investment and sustain production while maintaining good land and environmental stewardship

Recommendation and Lead Agency

2. **Acid Mine Drainage Controls** – The state and federal government, working with industry, should investigate new control technologies and implement demonstration projects for containing and treating acid mine drainage that can be associated with non-ferrous mining. **Department of Natural Resources: (DNR)**

Summary Progress

The Minnesota Department of Natural Resources (DNR), in conjunction with the United States Bureau of Land Management, has conducted past tests and is currently testing Minnesota Duluth Complex minerals for acid production and metal dissolution. Methods to eliminate or mitigate acid formation and metal dissolution are being tested. Small-scale dissolution and mitigation tests are being conducted in the laboratory (75 grams to 1000 grams) and large-scale mitigation and dissolution field tests, up to 60 tons of mineral material, are being conducted at the Hibbing DNR research facility. Subaqueous disposal methods of sulfide minerals are being tested at the Hibbing DNR facility.

Next Steps and Target Dates

Ongoing. Continue testing and publishing data, findings and final reports.

Strategy 2: Environmental Quality

Recommendation 3: Sustainable Development

Strategy #2 Environmental Quality - Formulate environmental policies and land management strategies that facilitate exploration, encourage investment and sustain production while maintaining good land and environmental stewardship

Recommendation and Lead Agency

3. **Sustainable Development Strategies** – Sustainable development strategies should be developed and deployed to enhance land-use planning, manage conflict concerning land uses, incorporate future land forms, lakes and wetlands into current permitting and planning, and make lands available for leasing and exploration. **Iron Range Resources (IRR)**

Summary Progress

Iron Range Resources is an active supporter and participant of Laurentian Vision Partnership, which is a range-wide coalition of mining, business, government, education, professional and community interests that promotes sustainable mining, and the reshaping of mining sites into productive future landscapes. The Partnership provides comprehensive land-use planning on a regional basis across the entire Iron Range. The primary goal is to plan for the sustainable use of the region's mine lands, and to capitalize on the opportunity to use the active mining process to construct an enhanced post-mining landscape for future residential, commercial and recreational land uses.

Sustainable development action items include land-use design workshops (called charrettes), which are conducted by the mining company, property owners and neighboring communities, and staffed by teams of landscape architects and planners. Since 2001, Laurentian Vision Partnership has sponsored charrettes in the Virginia, Hibbing/Chisholm, and Biwabik areas. The local communities and mining companies are currently implementing the land-use plans that resulted from these charrettes.

A new company, Magnetation, Inc., is reprocessing material from existing tailings basins to extract the residual iron units. In the process, the opportunity to create wetlands for future mitigation exists. Magnetation is working with the current landowners to encourage their participation in this opportunity.

Next Steps and Target Dates

Continue to support and promote participation in the Laurentian Vision Partnership (LVP).

Strategy 3: Applied Research

Recommendation 1: Geologic Mapping

Strategy #3 Applied Research - Maximize research and development incentives and financing for minerals exploration and commercialization of new technologies that allow mineral deposits to be developed in an economic and environmentally responsible way.

Recommendation and Lead Agency

1. **Geologic Mapping** – State funding for regional and detailed mapping should be increased for the Minnesota Geological Survey (MGS) and the Natural Resources Research Institute (NRRI) of the University of Minnesota – Duluth. **Minnesota Geological Survey (MGS) will lead the regional mapping and the Natural Resources Research Institute (NRRI) will lead the detailed mapping**

Summary Progress

Various mapping activities have continued using funding from various sources. The magnitude of funding as proposed in the original recommendation has not been implemented, but both the Minnesota Geological Survey and the Natural Resources Research Institute have continued to map prospective minerals and aggregate areas on a limited basis using funding from the Minerals Coordinating Committee and the Permanent University Trust Funds for Minerals. In addition, various exploration companies have contracted for detailed mapping work with the University. The work by the various organizations involved in geologic mapping is already having a significant pay back to the state in terms of exploration activity. The current exploration, drilling efforts and mine leases on state and University properties is bringing in millions of dollars of economic development at the current time. More support for this activity would support continued growth in exploration and development in the future.

Next Steps and Target Dates

Continue to update and expand regional and detailed mapping as funding becomes available

Strategy 3: Applied Research

Recommendation 2: Minerals Exploration

Strategy #3 Applied Research - Maximize research and development incentives and financing for minerals exploration and commercialization of new technologies that allow mineral deposits to be developed in an economic and environmentally responsible way.

Recommendation and Lead Agency

2. **Minerals Exploration** – Iron Range Resources should continue its Drilling Incentive Grant (DIG) program. Similar public-private partnerships to support exploration and research into exploration concepts and technologies should be developed. **Minerals Coordinating Committee (MCC)**

Summary Progress

The Minerals Coordinating Committee (MCC) has been actively investigating new methods of exploration. MCC decided to promote and fund a project in conjunction with the Minnesota Geological Survey (MGS) and the Natural Resources using the DNR Mineral Diversification funding to investigate the presence of base metals, gold and diamonds by analysis of glacial till samples. MCC also supported a project that allowed MGS to upgrade the Minnesota aeromagnetic survey databases. MCC members have attended several exploration conferences to promote exploration in Minnesota by private companies. There is currently more exploration in Minnesota for non-ferrous minerals than there has been for many years. Six mining companies are currently performing exploratory boring in Minnesota's non-ferrous mineral resources.

Next Steps and Target Dates

The Drilling Incentive Grant (DIG) program served a useful purpose and has been terminated due to lack of demand. The Minerals Coordinating Committee (MCC) should continue actively investigating new methods of exploration.

Strategy 3: Applied Research

Recommendation 3: Cost Effective Recovery Methods

Strategy #3 Applied Research - Maximize research and development incentives and financing for minerals exploration and commercialization of new technologies that allow mineral deposits to be developed in an economic and environmentally responsible way.

Recommendation and Lead Agency

3. Cost Effective Recovery Methods – The Legislature should encourage mineral development by providing funding to the DNR and NRRI for basic research on the cost efficient processing and recovery of Minnesota’s metals and industrial minerals. **Minerals Coordinating Committee (MCC)**

Summary Progress

State funding for Iron Ore Cooperative Research (IOCR) was increased by approximately \$400,000 during the current biennium. The intent of the IOCR program is to support and sustain the Minnesota taconite industry in the face of increasing overseas competition through additional research that would result in decreased production costs, improved product quality, improved productivity and development of new products. Two projects that are currently being funded include improvements in magnetite recovery that will lead to a decrease in processing costs. These research projects are being conducted in the Minntac concentrator.

Next Steps and Target Dates

The Legislature should continue or expand funding for mineral development projects through the Minerals Coordinating Committee (MCC) and the Iron Ore Cooperative Research (IOCR), so that Minnesota can capitalize on the global opportunities currently available in mining.

Strategy 4: Development and Commercialization

Recommendation 1: Rural Future Fund

Strategy #4 Development and Commercialization - Support the development and commercialization of mineral projects by partnering with other public and private entities to create a climate where private investment is encouraged and new technology and process innovation is supported.

Recommendation and Lead Agency

1. **Rural Future Fund** – A new Minnesota’s Future Fund should be created to encourage deployment of new technologies in rural Minnesota that add value to Minnesota’s minerals, forest products and agricultural products. **Iron Range Resources (IRR), in conjunction with DEED (Department of Employment and Economic Development)**

Summary Progress

White paper developed. No progress on implementation to date.

Whereas a fund specifically called the Rural Future Fund was not created, this role has been covered by other funding sources, i.e., 21st Century Minerals Fund, General Obligation State Bonding and Iron Range Resources.

Next Steps and Target Dates

Continue efforts to implement this recommendation.

Strategy 4: Development and Commercialization

Recommendation 2: Mine Modernization

Strategy #4 Development and Commercialization - Support the development and commercialization of mineral projects by partnering with other public and private entities to create a climate where private investment is encouraged and new technology and process innovation is supported.

Recommendation and Lead Agency

2. **Mine Modernization** – The state and federal governments should provide monetary support for demonstration projects of new technical developments that show good promise for enhancing the competitiveness of Minnesota mines. **Minerals Coordinating Committee (MCC)**

Summary Progress

State funding for Iron Ore Cooperative Research (IOCR) was increased by approximately \$400,000 during the current biennium. The intent of the IOCR program is to support and sustain the Minnesota taconite industry in the face of increasing overseas competition through additional research that would result in decreased production costs, improved product quality, improved productivity and development of new products. A research project that resulted in improved blast fragmentation and a decrease in crusher energy was conducted at United Taconite during FY 2007.

Various iron ore co-operative and federal grants have been attained to investigate various concepts for improving the economic competitiveness of our iron ore mining industry. The investigations undertaken include: improved mineral recovery and energy reduction concepts, new techniques at reducing mercury emissions levels, the use of alternative kiln heating and cooling techniques, modification of material flows through the plant to enhance silica removal from ore materials and the potential for creating direct reduced iron ore quality concentrate with very low gangue levels from taconite iron ore. In addition, very substantial federal and private funding was secured to test value-added iron concepts. Federal and State funding was used by Mesabi Nugget to test the feasibility of the ITmk3 process at the prototype furnace level at Silver Bay at the North Shore Mine and by the University's Coleraine Mineral Laboratory on their proprietary iron nodule development effort. Both efforts have resulted in additional interest and support by the steel industry.

Next Steps and Target Dates

The Minerals Coordinating Committee should continue pursuing state and federal governments' monetary support for demonstration projects of new technical developments that show good promise for enhancing the competitiveness of Minnesota mines, to supplement state funds.

Strategy 4: Development and Commercialization

Recommendation 3: Value-Added Iron Commercialization

Strategy #4 Development and Commercialization - Support the development and commercialization of mineral projects by partnering with other public and private entities to create a climate where private investment is encouraged and new technology and process innovation is supported

Recommendation and Lead Agency

3. Value-added Iron Commercialization – The state and federal government should continue to support value-added iron project such as “iron nugget” project. **Department of Employment and Economic Development (DEED) in conjunction with the Minerals Coordinating Committee (MCC)**

Summary Progress

The Mesabi Nugget plant is being constructed north of Hoyt Lakes. The plant will produce pig iron nuggets that will be used to produce steel in electric arc furnaces. Minnesota Steel is planning to begin construction of a plant near Nashwauk that will produce steel slabs from taconite. A research project to investigate the use of fluidized bed technology to produce direct reduced iron from micro-granulated magnetite particles was conducted during FY 2006 and FY 2009. If successful, reduction of magnetite in a fluidized bed could be used to make steel using the new Australian technology called HIs melt.

NRRI constructed and operated a DRI pilot plant at the Coleraine facility. They anticipate demonstrating the process in a pilot demonstration plant in a partnership with a steel producer.

Next Steps and Target Dates

Continue to promote the development and commercialization of cooperative funded, new technology mineral projects

Strategy 4: Development and Commercialization

Recommendation 4: Taconite Aggregate Marketing

Strategy #4 Development and Commercialization - Support the development and commercialization of mineral projects by partnering with other public and private entities to create a climate where private investment is encouraged and new technology and process innovation is supported

Recommendation and Lead Agency

4. Taconite Aggregate Marketing – The state should support the NRRI proposal to assist in developing various markets for taconite by-products, in particular those that meet MNDOT specifications. **Natural Resources Research Institute (NRRI), in conjunction with the Minerals Coordinating Committee (MCC)**

Summary Progress

The Department of Natural Resources (DNR) through the Mineral Diversification and program in conjunction with the Minerals Coordinating Committee (MCC) funded installation of test cells at the Minnesota Department of Transportation's (MnDOT) MNRoad facility near Otsego, Minnesota to test taconite aggregate for use in road construction. Several test cells were constructed using taconite aggregate and are currently being evaluated. Tests were also conducted by MnDot to determine if taconite aggregate could be used as aggregate for concrete. The University's Natural Resources Research Institute obtained a significant US Department of Commerce Grant through the Economic Development Agency to investigate the potential use of by-product rock from taconite mining operations as highway and construction aggregate materials. Matching funds from various organizations including Iron Range Resources, Minnesota Power, Blandin Foundation and the University were also secured for this study. A key part of this investigation is to develop an understanding of the potential market for aggregates on a broad basis and to establish appropriate contacts with potential key stakeholders regarding these opportunities. Various initiatives in this regard have been undertaken during this project. Visits have been made to the offices of the Departments of Transportation throughout the Midwest Region of the United States. In addition, various highway construction firms have been contacted and state and federal highway officials have heard presentations by both contracted consultants to the project and by University researchers on the properties of our taconite aggregate materials. The results from these discussions show that a hard and durable aggregate material is very desirable throughout the region. There are various hurdles in taking this opportunity further and these are actively being addressed. The first hurdle is use certification in the potential user locality. This is being addressed by full aggregate characterization of the taconite materials using various protocol test procedures required by the various state jurisdictions. The second hurdle is development of potential mix compositions using local and taconite materials for actual application in a given highway application. This work is also underway at the University of Minnesota's Civil Engineering department at the Twin Cities Campus. The next hurdle is establishing actual demonstration of the materials under highway conditions and developing past usage information on the materials within the state of Minnesota. The MNRoad facility near the Twin Cities is being used to demonstrate the materials at the current time and a historical document on past use of the materials in Minnesota has been developed to show where the materials have been used in the past. Other demonstrations beyond those noted are being planned at the current time. These demonstrations will expand beyond Minnesota.

Next Steps and Target Dates

Complete this research project

Strategy 4: Development and Commercialization

Recommendation 5: Minerals Opportunities Meetings

Strategy #4 Development and Commercialization - Support the development and commercialization of mineral projects by partnering with other public and private entities to create a climate where private investment is encouraged and new technology and process innovation is supported

Recommendation and Lead Agency

5. Minerals Opportunities Meetings – The state should support the MCC’s proposal to sponsor a series of meetings to identify processes and strategies that could increase the probability of development of economically significant and environmentally responsible minerals industry sectors in Minnesota. **Minerals Coordinating Committee (MCC)**

Summary Progress

The Minerals Coordinating Committee (MCC) assisted in organizing Mineral Opportunity meetings to promote exploration and possible development of natural gas, petroleum, industrial minerals, diamonds, sulfide minerals (i.e. copper, nickel, and precious metals), and titanium in Minnesota. These meetings were well attended. MCC also sent representatives to several conferences to promote exploration of these resources in Minnesota. MCC developed mineral opportunity brochures that were used to promote Minnesota minerals at exploration conferences.

Minerals Opportunities Meetings: A broad set of meetings was organized and implemented across a full set of minerals and fuel-related opportunities. In addition, information from these meetings was presented at various mining and petroleum symposia.

Next Steps and Target Dates

Completed

Strategy 5: Transportation and Energy

Recommendation 1: Taconite Aggregate Transportation Study

Strategy #5 Transportation and Energy – Initiate proactive measures to improve the transportation and energy infrastructure for all Minnesota industries to make Minnesota a more attractive location for investment by existing and new industries.

Recommendation and Lead Agency

1. **Taconite Aggregate Transportation Study** – The state should commission a study to determine the facility and transportation needs to bring taconite aggregates to the Twin Cities metropolitan area. **Iron Range Resources (IRR) and Natural Resources Research Institute (NRRI), in conjunction with the Metropolitan Council**

Summary Progress

The Natural Resources Research Institute (NRRI) performed a taconite aggregate transportation study that was funded using DNR Mineral Diversification funds and was supported by the Minerals Coordinating Committee. The study report is available on the NRRI website. NRRI is also involved in a federally funded project to study taconite byproducts for use as aggregate. This project will have a transportation component as part of the study.

The University's Natural Resources Research Institute obtained a significant US Department of Commerce Grant through the Economic Development Agency to investigate the potential use of by-product rock from taconite mining operations as highway and construction aggregate materials. Matching funds from various organizations including Iron Range Resources, Minnesota Power, Blandin Foundation and the University were also secured for this study. A key part of this investigation is the study of logistics of material movement from the various taconite operations to various potential aggregate consumers throughout the US Midwestern region and into adjacent Canadian provinces. Various University and private consulting resources have been involved in the logistics studies. The preliminary results from the study indicate that a combination of rail and ship or barge movements may be economically viable for movement of the aggregate materials to various Midwest locations. In addition, current study is underway to determine if barge backhaul possibilities can be exploited to enhance the potential of moving aggregate materials on the Inland river system to the US Gulf coast. As part of this investigation, an innovative bi-modal shipping technology, *Railmate*, is also being investigated with actual trial shipments of aggregate material to the Twin Cities metropolitan area.

Next Steps and Target Dates

Complete this research project

Strategy 5: Transportation and Energy

Recommendation 2: Transportation Infrastructure for New Rock Business

Strategy #5 Transportation and Energy – Initiate proactive measures to improve the transportation and energy infrastructure for all Minnesota industries to make Minnesota a more attractive location for investment by existing and new industries.

Recommendation and Lead Agency

2. Transportation Infrastructure for New Rock Businesses – The state should support transportation infrastructure for innovative new stone businesses in Minnesota that utilize stockpiled waste stone products for aggregate or other applications. **Department of Natural Resources (DNR)**

Summary Progress

Companies have requested leases for cut stone quarrying in mine pit areas of the former LTV mine. The Department of Natural Resources is currently working with these companies. One company is selling the waste rock as decorative stone and trying to market cut stone produced from taconite and taconite waste rock.

Next Steps and Target Dates

Continue to support the new rock business development to demonstrate the need for adequate transportation and energy infrastructure for all Minnesota industries.

Strategy 5: Transportation and Energy

Recommendation 3: Alternative Energy

Strategy #5 Transportation and Energy – Initiate proactive measures to improve the transportation and energy infrastructure for all Minnesota industries to make Minnesota a more attractive location for investment by existing and new industries.

Recommendation and Lead Agency

3. **Alternative Energy** – The state should support the use of alternative energy resources in mining and other industries through new tax incentives, money to support research in this area, investment funding for energy projects and improvements to environmental regulatory processes that make them more efficient.
Iron Range Resources (IRR) in conjunction with the Department of Commerce

Summary Progress

Researchers from the Natural Resources Research Institute have investigated the use of alternative energy for both heat induration of iron ore pellets and for electrical energy generation. Various modeling activities to support alternative energy use in mining have been completed or are in progress for the taconite industry. In addition, logistical studies on wood supply and the creation of dedicated woody biomass crops for energy conversion have been completed. The Institute has actively supported the procurement studies for the Laurentian Energy Authority and other power generation companies in the region. In addition, the Coleraine Minerals Research Laboratory has purchased a pilot scale gasifier and is adding wind power capability in order to study the potential combined potential of biomass and wind on a distributed basis for our region. This organization is also investigating the potential of deep geothermal energy for power generation and the potential for carbon capture from current carbon fuels.

Next Steps and Target Dates

Continue to support and promote alternate energy use.