MICHIGAN'S MINING FUTURE COMMITTEE FINAL REPORT

10.06.2021

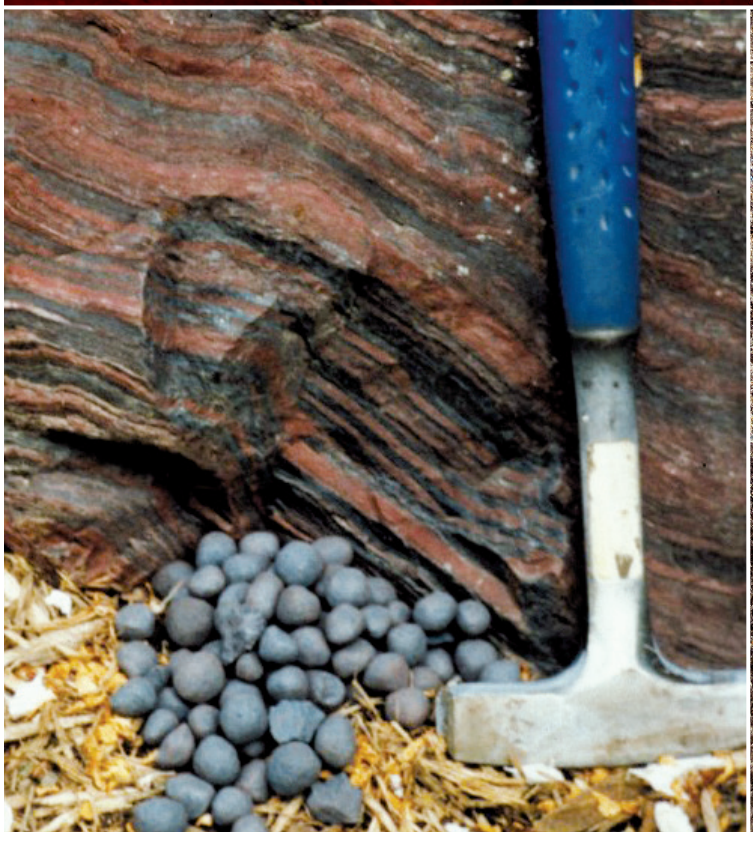

Table of Contents

Executive Summary

This report is the product of the Michigan's Mining Future Committee (the "Committee"). The Committee was created by Act No. 47 of the Public Acts of 2019. It was charged with evaluating the mining industry in Michigan and making recommendations to strengthen and drive innovation and resiliency within the industry while protecting the environment and natural resources — specifically with respect to government and public policies and the development of partnerships.

Mining is an important contributor to Michigan's economy, with mineral production value currently averaging about $2.5 billion annually. Mining takes place in every county of the state and supplies essential materials for manufacturing, construction and other basic products that fuel economic activity. The National Mining Association reports that mining supports 9,100 direct jobs in Michigan and 17,500 indirect and induced jobs; it contributes $1.47 billion to the state's GDP annually.

Mining also has the potential to cause adverse environmental and resource impacts if not conducted properly, and sensibly regulated. Practices of the past and certain high-profile incidents can give the perception that mining is a polluting industry. Furthermore, mining activity can encumber large tracts of land. As a consequence of these factors, it is often contentious, particularly with respect to competing land uses. The goal of this report is to encourage responsible mining and mineral exploration in ways that best address the needs and concerns of Michigan citizens and businesses.

The Committee identified four topical categories that form the basis for evaluation and recommendations in this report:

- **Social, economic and labor opportunities.** The Committee reviewed societal values with respect to the mining industry and addressed how the industry can meet the demand for minerals while upholding those values. It also evaluated public awareness and perception, tribal and public engagement, workforce development and tax structure.
- **Research and mineral mapping.** The Committee focused on the need for mapping and identifying mineral deposits, encouraging innovation and creating a more effective mineral database.
- **Mining methods, environment and reclamation.** The Committee focused on sustainable, socially and environmentally conscious mining, with an emphasis on how materials and land are managed during and after mining. It identified successful examples of mine reclamation, including Minnesota's development of a collaborative planning process.
- **Regulatory policy.** The Committee reviewed and evaluated current and potential new mining regulations and how Michigan compares to other states on regulatory policy. The Committee reviewed environmental, land use, mineral rights and worker safety regulations under federal, tribal, state and local authority.

The Committee solicited input from a wide range of stakeholders and identified three overarching issues that should be considered under each of the topical categories: climate change, cumulative impacts, and tribal property and treaty rights.

Following is a summary of key options and recommendations identified by the Committee:

1. Public and tribal awareness and engagement should be encouraged.
2. Partnerships should be expanded.
3. Workforce development and retention should be fostered.
4. Responsible mining initiatives should be implemented by the industry.
5. The mining tax structure should be evaluated.
6. Government support for research, mapping, and data availability is needed.
7. Mine reclamation should facilitate best land uses, including subsequent mineral development and potential for energy generation and storage.
8. Regulation of sand and gravel mining should be made more consistent while respecting local concerns.
9. Regulations for lakes, wetlands and water discharges should accommodate responsible mining practices.
10. Mine planning and permitting should be coordinated among agencies and interest groups to the extent possible. Evaluation of cultural resources, alternatives analysis, and mine waste disposal should be considered for all types of mining operations.
11. Revisions to mineral test well regulations should be considered.
12. Consistent policy should be applied for determining royalty rates for aggregate mines on state land.
13. Options should be evaluated for aiding the identification of mineral rights ownership status.
14. Act 163 of 1911, Copper and Iron Mine Inspectors, should be updated and clarified.

Definitions

Aggregates: uncrushed or crushed gravel, crushed rock, and sand. Commonly used in concrete, road construction, and building materials.

Brownfield: a site of potential mine development or processing having had previous development or similar mining activities in the past.

Climate change: refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.

Critical minerals: are necessary for the manufacture of high technology devices, national defense applications, and green growth-related industries. A critical commodity is one that is important for these specialized applications yet is at risk for supply disruption. Numerous elements that are defined as critical are recovered as by-products of the production of other mineral commodities.

Element: a material consisting of a single kind of atom. Examples are sulfur (S), native copper (Cu) and iron (Fe).

Environmentally conscious mining: mining technologies, best practices, and mine processes that are implemented as a means to reduce environmental impacts associated with the extraction and processing of metals and minerals.

Ferrous mineral: any mineral having a considerable portion of reduced iron (Fe_2^+) in its composition.

Greenfield: a site of potential mine development or processing having had no development or similar mining activities in the past.

Industrial minerals: minerals other than gemstones, base metals, energy minerals or precious metals used either in their natural state or after physical or chemical transformation. Common examples in Michigan are gypsum, limestone, salt, aggregate and silica sands.

Limestone: a general term for a class of rocks containing at least 80 percent of the carbonates of calcium ($CaCO_3$) or magnesium ($CaMg[CO_3]_2$). Limestone is used for several industrial processes, such as shore protection, building materials and dimension stone.

Mineral: an inorganic substance occurring in nature, though not necessarily of inorganic origin, which has a definite chemical composition or, more commonly, a characteristic range of chemical composition and distinctive physical properties or molecular structure. Examples are halite (NaCl, a sodium chloride), hematite (Fe_2O_3, an iron mineral), chalcopyrite ($CuFeS_2$, a copper mineral).

Mining: the science, technique, and business of obtaining useful minerals from the earth's crust and includes both underground excavation and surface workings as well as ore treatment.

Nonferrous metallic mineral: any ore or material to be excavated from the natural deposits on or in the earth for its metallic content, but not primarily for its iron or iron mineral content, to be used for commercial or industrial purposes.

Ore: any mineral, mineral aggregate or rock that can be mined for profit.

Pumped-storage hydroelectric: a type of energy generation and storage where fluid, usually water, is pumped into a reservoir during periods of lower demands and cost, then released through turbines to generate electricity during peak demand and higher cost periods.

Reclamation: reconditioning or rehabilitation of the mining area or portions thereof for useful purposes and the protection of the natural resources, including the control of erosion and the prevention of land or rockslides, collapses and subsidence, and air and water pollution.

Sand dune: a mound, ridge or hill of loose sand typically formed by wind. For this report, sand dune mining is a specific type of mining for silica sand as an industrial mineral regulated by Part 637, Sand Dune Mining, of the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended.

Tailings: the parts, or part, of any incoherent or fluid material separated as refuse, or separately treated as inferior in quality or value.

Waste rock: barren or submarginal rock or ore that has been mined but is not of sufficient value at time of mining to warrant treatment and is therefore set aside before the milling process.

Abbreviations

DNR: Michigan Department of Natural Resources

DOE: U.S Department of Energy

EGLE: Michigan Department of Environment, Great Lakes, and Energy

EPA: U.S. Environmental Protection Agency

LiDAR: Light Detection and Ranging

MGS: Michigan Geological Survey

MMFC: Michigan's Mining Future Committee

NPDES: National Pollutant Discharge Elimination System

OGMD: Oil, Gas, and Minerals Division

PPI: Policy Perception Index

SMCRA: Surface Mining Control and Reclamation Act of 1977

USGS: U.S. Geological Survey

ZEA: Zoning Enforcement Act

Subcommittee/topical theme abbreviations:

- **SELO:** Social, Economic, Labor Opportunities
- **RMM:** Research and Mineral Mapping
- **MMR:** Mining Methods and Reclamation
- **RP:** Regulatory Policy

Introduction

Mining has been an important contributor to Michigan's economy for more than 125 years. Production has totaled about $50 billion since the mid-1990s, and averages about $2.5 billion annually. We are one of only two states in the nation that mine iron ore for the steel industry, and the only state that produces nickel and cobalt. We produce significant amounts of cement, lime, stone and sand and gravel, much of which is exported to other states by way of the Great Lakes. Michigan's historical copper and silver production is worth about $60 billion at today's prices, and exploration for new deposits continues. We also have large reserves of salt and potash that will almost certainly be mined in the future, as well as potential for the discovery of at least 10 of the critical minerals that have been identified recently by the federal government. Mining takes place in all counties of the state and supplies essential material for manufacturing, construction and other basic economic activity. Today, there is critical emphasis on domestic production. State and federal emphasis has been placed on climate change, electrification, renewable energy development, decarbonization, infrastructure repair and rebuild, and national security. Success in these initiatives necessitate that Michigan maintains and expands its ability to extract and process elements necessary to support these critical endeavors. That is the goal of this report.

Minerals fall into the following categories:

- Ferrous metals: minerals mined primarily for their iron content.
- Nonferrous metals: minerals mined primarily for their content of metals other than iron.
- Industrial minerals: non-metallic minerals such as sand and gravel, limestone, gypsum and salt.
- Fuel minerals: coal, oil, and natural gas. Oil and gas extraction is not considered "mining" and is not addressed in this report.

Minerals can be extracted by three main mining methods: surface, underground, and in-situ. "Surface mining" means excavating a mineral deposit via an open pit at the earth's surface. "Underground mining" means excavating from below the surface of the ground by means of shafts, tunnels, or other subsurface openings. "In-situ" mining (also called solution mining or leaching) involves injecting water or another solvent into the deposit, pumping out the resulting solution, and extracting the mineral. Certain minerals, such as salt and magnesium compounds, can be extracted from natural brines pumped from deep wells. In-situ mining and brine production are more analogous to oil and gas extraction and are not considered as mining in the context of this report.

Mining operations in Michigan vary widely in scale, geographic location, the communities in which they operate, their historic footprint, and the regulations under which they operate. The challenges and perceptions of mining operations vary accordingly.

Mining activity is a significant sector of Michigan's economy and provides raw materials needed for products that we use every day. For example, ferrous minerals are a key ingredient for steel, which is used in automobiles, appliances, and infrastructure for water, energy, and transportation. Nonferrous metallic minerals, including copper, nickel and zinc, are used in electronic components, renewable energy infrastructure, aircraft engines, and hospital equipment, to name a few. Industrial minerals are used for agriculture, construction and manufacturing.

In addition to the ways mining products improve our way of life, mining provides employment, tax revenues and drives economic activity. The National Mining Association reports that metal mining supports 2,900 direct jobs in Michigan and an additional 6,867 indirect and induced jobs. It is estimated to have a $582 million direct contribution to GDP. The organization also reports that non-metallic mineral mining supports 6,210 direct jobs in Michigan and an additional 10,671 indirect and induced jobs. Non-metallic mineral mining is estimated to directly contribute $887 million to GDP.[1]

COMMITTEE CREATION, CHARGE AND DELIVERABLE

Michigan's Mining Future Committee was created October 6, 2019 by Act No. 47 of the Public Acts of 2019 (Act 47) within the Department of Environment, Great Lakes, and Energy (Appendix A). The Committee was specifically charged with four tasks: (a) Recommend actions to strengthen and develop a sustainable, more diversified mining and minerals industry in this state while protecting the environment and natural resources of this state; (b) Evaluate government policies that affect the mining and minerals industry; (c) Recommend public policy strategies to enhance the growth of the mining and minerals industry, especially for research and development in mining and mineral processing technology, including pellet production, for the next generation of mining; and (d) Advise on the development of partnerships between industries, institutions, environmental groups, funding groups and state and federal resources and other entities.

1 https://nma.org/pdf/state-map/mi.pdf

Introduction *continued*

The Committee was further directed to draft a report on its findings and recommendations within two years after the effective date of the Act and submit the report to the governor, the state legislature, this state's U.S. senators, and members of Michigan's U.S. congressional delegation. The Committee is dissolved 60 days after the report is submitted. Appendix A is an excerpt from Act 47, specifically Section 319.163, which describes the duties of the Committee.

The Committee distilled a list of challenges and opportunities into four topical categories that form the basis for the report. Appendix B provides a raw listing of the challenges and opportunities based on initial meetings and presentations from the various mining sectors and stakeholders. Four separate subcommittees were created to address each theme. The remainder of this report is dedicated to sections written on each of the four topics. Appendix C is a summary of additional Committee organizational structure and process. Appendix D is a summary listing of compiled key points from each section and provides suggestions and recommendations to the legislature for moving forward.

The Social, Economic, and Labor Opportunities Subcommittee looked at what people value, including safety, community, social impact and the environment, and how the mining industry can meet the continually growing societal demand for minerals as well as stakeholder expectations. Mining companies must integrate these priorities into operational design, culture, communication and governance. This integration fills the "trust deficit" that mining companies experience with stakeholders and positions mining companies to work towards solutions for societal issues with sustainable outcomes in clean energy diversification, climate change, talent development, technology advancement and tax payments.

The Research and Mineral Mapping Subcommittee focused on the needs for finding new mineral deposits, innovating mining and processing techniques, and creating a robust and current mineral database. The subcommittee assessed the status of mining and mineral related research and mapping in the state and highlight areas that are lacking. The subcommittee addressed a number of challenges facing industry and the government and provided some recommendations to put Michigan on track for a successful and safe mineral industry that all citizens can benefit from.

The Mining Methods, Environment and Reclamation Subcommittee of Michigan's Mining Future Committee focused on sustainable, socially and environmentally conscious mining, with an emphasis on how materials and land are managed during the mining operation and after mining activity has ceased, either temporarily or permanently. The subcommittee addressed how mining should be conducted in Michigan today and in the future to produce the best outcomes for the state.

The Regulatory Policy Subcommittee considered regulations to be inclusive of both statutes (i.e., laws or ordinances passed by a legislative body) and rules (i.e., standards or instructions promulgated by an executive authority or regulatory agency to implement a statute). Regulations can be characterized as two main types: generic, which apply to a variety of industries and activities, and mining-specific, which apply exclusively to mineral exploration and mining operations, including processing.

Several topics explored by the Mining Methods, Environment and Reclamation Subcommittee overlapped with the Regulatory Policy Subcommittee. However, the Regulatory Policy Subcommittee focused on prescriptive statutes and regulations applicable to active mining operations today, while the Mining Methods, Environment and Reclamation Subcommittee was forward-looking and explored best practices and innovative ways to mine safely with a reduced environmental footprint and repurpose mine lands and materials for the benefit of all stakeholders.

Upon completion of a draft final report, the public was notified of a public comment period on the Department of Environment, Great Lakes, and Environment's (EGLE's) calendar and the Committee website. The comment period was from August 23 to September 13, 2021. In all, there were four commentors who submitted comments on behalf of organizations or themselves. The comments were reviewed by the Committee and a "Response to Comments" document prepared and some changes were made to the report. The "Response to Comments" document is presented as Appendix F of this report.

OTHER OVERARCHING MINING CONSIDERATIONS

In identifying options and recommendations under each of the topical categories, the Committee finds that three overarching issues should be considered: climate change, cumulative impacts, and tribal treaties and rights.

Introduction *continued*

CLIMATE CHANGE AND IMPLICATIONS TO MINING, DESIGN AND PERMITTING

Climate change as a result of global warming (warming of the planet due to increases in atmospheric greenhouse gas concentrations) is predicted, and has been observed, to lead to rising sea and lake levels, changes in long-term precipitation patterns, and changes to seasons, among other outcomes. In the Great Lakes region, climate change is impacting local and regional weather by increasing the occurrence of extreme temperature and intense precipitation events, causing declines in snowpack, and disrupting the timing of natural ecological events such as the last spring frost and first fall frost. Understanding climate change impacts in the Great Lakes region requires first acknowledging the interconnections between the five Great Lakes and the region's daily weather and long-term climate conditions. Due to their size, the Great Lakes influence the region's daily weather conditions and climate variability by moderating high and low temperatures and changing seasonal cloud cover and precipitation patterns near the lakes.

The Great Lakes are also directly impacted by climate change. Observable climate change impacts on the waters of the lakes include warming lake surface temperatures, declining ice cover, increasing summer evaporation rates and earlier occurrence of seasonal temperature stratification, or "turnover," in lake waters. Climate change is expected to impact fish and other aquatic species in the Great Lakes and inland waters by changing critically important water temperatures that organisms require at different stages of life, influencing fish growth rates, and increasing the success of some invasive species. An increase of invasive species, both within the waters and on land, results in a loss of biodiversity and a less resilient ecosystem. Lowering the resiliency of an ecosystem means the system is more vulnerable and less likely to recover from disturbances.

Climate change increases the risk of hazardous events. Hazardous weather events can disrupt anthropogenic systems and infrastructure as well as other living systems such as forest health and the timing of natural events non-human species rely on.

Statutory and regulatory requirements related to mining should consider best available climate science. Mining project designs should plan for extreme weather events of a given magnitude considering the effects of climate change and not simply rely on past "climate norms." With respect to the reclamation of mined land, revegetation specifications should include diverse, native forest plantings rather than monocultures. Factoring in climate change implications may result in an increase in project initial start-up costs. However, long-term planning can help avoid unforeseen costs and potential undesirable outcomes for mining companies, the environment and communities.

CUMULATIVE IMPACTS

The Council on Environmental Quality's regulations (40 CFR §§ 1500–1508) implementing the procedural provisions of the National Environmental Policy Act of 1969, as amended (42 U.S.C. §§ 4321 et seq.), define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7).

Cumulative impacts can be a concern when considering mine activity and reclamation. Cumulative impacts are considered by regulatory agencies, particularly in environmental justice communities, and cumulative effects are a common focal point of environmental organizations in appeals of decisions on mineral extraction proposals on public land. One example in state regulations that mimics the above definition is within the nonferrous metallic mineral mining administrative rules, which define "cumulative impact" as "the environmental impact that results from the proposed mining activities when added to other past, present and reasonably foreseeable future activities."

TRIBAL PROPERTY AND TREATY RIGHTS

State of Michigan has shared governance responsibilities with Native American tribes, who have inherent property rights recognized in federal treaties. Federal treaties are recognized as the "Supreme Law of the Land" and this has been upheld through numerous court decisions. Native American tribes are sovereign nations and in addition to their homelands (reservations) they have rights outside these boundaries. The tribes share a traditional and continuing reliance upon fish, wildlife and plants to meet religious, ceremonial, medicinal, subsistence and economic needs (Minwaajimo, 2011 Great Lakes Indian Fish & Wildlife Commission). These relationships are an important part of the identity of the tribes. State of Michigan and these sovereign nations have legal obligations to co-manage, communicate, and coordinate with each other for the health and well-being of the community (Appendix E).

Social, Economic & Labor Opportunities

As a global society, no matter what region of the world, people value safety, community, social impact and the environment. Mining companies must integrate these priorities into operational design, culture, communication and governance. This integration fills the "trust deficit" that mining companies experience with stakeholders and positions mining companies to work towards solutions of societal issues with sustainable outcomes in clean energy diversification, climate change, talent development, technology advancement and tax payments. To address societal demands for minerals and stakeholder expectations of the mining industry, the Social, Economic and Labor Opportunities Subcommittee identified the following areas of focus and recommends further research and action:

MINING INFORMATION, AWARENESS AND EDUCATION

To support broader education, dialogue and understanding around the future of mining in Michigan, the Committee recommends a three-pronged approach to public awareness and outreach.

1. Update State of Michigan's website with a set of non-technical resources for constituents seeking information about mining in Michigan, extending beyond regulation and focusing on the following areas:
   a. Description of what is actively mined in Michigan and where in the state that mining occurs
   b. Identification of companies that own mines in Michigan and links to their public information pages
   c. Description of what the materials mined in Michigan are used for and how those materials impact other industries in Michigan
   d. Description of what regulations apply to mining in Michigan, including employee safety, environmental mitigation, tribal consultation requirements and archaeological assessment requirements
   e. Identification of points of contact within the state for any constituent concerns around mining and its impact
   f. Identification of points of contact within the state tasked with working with the mining industry, tribes, and community stakeholders.
   g. Description of the environmental impact of mining in Michigan and how it is being mitigated through planning activities, regulatory efforts and industry activities
   h. Description of the economic impact of mining in Michigan, both at the local and statewide levels, including employment, revenues through taxation and assessments, and community impacts where mining occurs
   i. Description of the future of mining and how the state is preparing for that future with long-term strategies and planning

2. Partnership between local, regional, and state economic development groups and industry to develop outreach materials around economic opportunities in mining for the state, particularly in regions that have identified mining as a critical industry:
   a. Create information about what types of mining opportunities exist for companies considering Michigan for investment
   b. Identify talent and training opportunities for companies here in the state
   c. Outline the overall process for starting a mine (mirrored on the state's website)
   d. Provide an overview of potential incentives that might be available from state and regional stakeholders
   e. Provide an overview of state and regional assets around mining and proactively address potential challenges in materials, including utility costs
   f. Establish an annual extractive industries summit supported and sponsored by State of Michigan, communities and industry.

3. Industry-led public awareness campaign with accompanying updates on public information pages for industry groups and companies with active mines in the state to provide additional information on the following:
   a. Investment by industry in communities and regions and the impact of those investments
   b. Address public misconceptions about mining
   c. Provide latest information on updates in mining technology and how the industry is using technology and planning to address areas of concern around mining from communities and other stakeholders
   d. Promote responsible mining initiatives and provide information about long-term land use and sustainability
   e. Provide examples of responsible mining initiatives in Michigan
   f. Provide information on the economic opportunities that are available with future mining; identify Michigan's significant role in supplying materials for societal needs, including ongoing potential for identified critical minerals

Social, Economic & Labor Opportunities *continued*

WORKFORCE DEVELOPMENT AND RETENTION

Michigan's geological resources coupled with a responsible and sustainable mining industry has the potential to create widespread meaningful employment in urban and rural areas. Mineral resources are the basic building blocks of technology and decarbonizing our society requires them for a sustainable future. The mining industry requires an array of skill sets to deliver society demands coupled with the values fence-line communities demand while also delivering shareholder value.

For example, technology is driving development of job skills in tele-remote systems and autonomous vehicles used in mining. Michigan's research institutions, auto industry, and skilled trade training programs create partnership opportunities to advance both technology and responsibly mined natural resources by connecting and fostering employee talent that creates shared value.

The MMFC recommends the review and fostering of workforce talent curricula that leverage the value of Michigan's mining industry potential and includes:

- Information, energy and mining technology (integrated operations to drive predictable returns)
- Apprenticeship and externships programs
- Partnerships and collaboration with universities, community colleges, research institutions, skilled trade training and development centers
- Cross-training and continued learning programs in mining-related skill sets
- Mining education programs in Michigan schools
- Land use, planning and GIS specialists

The Committee recommends State of Michigan review opportunities to improve the unemployment benefit amount and duration for laid-off miners due to the cyclical nature of mining. Historic and long-life mining operations throughout the Midwest and Michigan experience production interruptions caused by fluctuations in global supply and demand of mineral resources. These cycles cause temporary layoffs in the mining workforce and can be caused by national and global economics, supply dumping, tariffs, energy costs, regulatory delays, pandemics, etc. Responsible mining frameworks work towards identifying the supply chain and operational disruption risks and creating mitigating measures to ensure production interruptions protect the workforce, their families, and host communities. One of those mitigating measures is to ensure Michigan unemployment benefits coincide with potential mining workforce disruptions, which may require legislative action.

An example would be to have employers within the mining industry, and other industries with a similar cyclical nature, pay their unemployment insurance taxes into an independent account, which could result in an increased benefit amount that has a higher rate than the current state benefit amount and for a longer duration.

Mining is often described as a "boom and bust" industry, ultimately driven by the market price of the material being mined, imports, material availability (global supply and demand) and the costs associated to mine and process the material. The downturn periods of this cyclical pattern are hard to predict, both the timing and the length. The current Michigan maximum unemployment benefit amount of $362/week and length of 20 weeks is often not enough to allow miners to bridge the downturn periods. A mine's production will either decrease, temporarily idle or the possibility of permanent shut down occurs during these periods. This creates job loss, increased unemployment filings and has a negative impact on the economy within the surrounding communities.

As an example, the Empire Mine in Michigan's Upper Peninsula indefinitely idled in 2016. This created job loss and initiated unemployment benefits for over 350 miners. These miners scrambled to provide for their families knowing that their unemployment benefit was certain to run out before they would have a chance at a possible call-back. Many laid-off miners utilized a unique piece of language in their collective bargaining agreements and accepted a transfer to a mine in Minnesota that was within the realm of the same company. When these miners received a recall from their Michigan mine, numerous miners made the decision to remain citizens of Minnesota instead. Many families made the decision to establish residence in Minnesota and were reluctant to move back to Michigan, not knowing when the next downturn could possibly occur. Minnesota has a much higher unemployment benefit than Michigan, making it easier for these miners to get by until the next uptick in mining activity. This influences their decision to remain and not relocate once again.

Social, Economic & Labor Opportunities *continued*

MICHIGAN RESPONSIBLE MINING FRAMEWORK

Sensitivities from regulators, elected officials and the community towards mining results in delays in regulatory decision making. How can the mining industry mitigate or reduce delays in regulatory approvals?

- Promote responsible mining initiatives that provide a blueprint for transparency in communication and engagement.
- Identify what are the local community rights, who is using the land, who is impacted and who is connected to the land and resources. Identify stakeholders.
- Identify best practice opportunities for the future of mining in Michigan.

As companies plan and prepare actions or decisions impacting Michigan communities, a stakeholder identification and engagement process should be implemented prior to project implementation.

TRIBAL ENGAGEMENT

As part of the recommended engagement process, understanding the rights of tribal communities, communicating potential project impacts, and initiating a meaningful consultation process is part of being a responsible and transparent company. Although both federal and state agencies have government to government consultation policies and processes, companies should not rely on government alone to engage with and communicate with impacted communities. The following guide offers recommendations on how companies can begin the process of identification, engagement and consultation:

- Identify treaty rights of tribal communities in the project area. Project impacts are not limited to reservation boundaries.
- Understand "Treatment as a State" jurisdiction identified by the EPA and how it might impact the proposed project.
- Evaluate how an action or decision may impact tribal interests.
- Notify and engage with tribal communities. Introduce the company, the project and acknowledge treaty rights.
- Begin meaningful two-way consultation prior to project implementation.
  a. Proactive engagement and communication allow for project adjustments and coordination.
  b. Agree on a process of who, how and when continued engagement and communication occurs.
- As project implementation moves forward, establish regular communication intervals to ensure impacted communities are informed.

GENERAL RESPONSIBLE ENGAGEMENT ACTIONS

In addition to previously outlined tribal engagement recommendations, the following are general actions for responsible engagement of communities and other stakeholders:

- Respectfully engage relevant stakeholders, early on and regularly.
- Understand local customs, culture and expectations, and how they affect and are affected by the project.
- Work with stakeholders to determine and communicate environmental, social and economic impact solutions.
- Explore opportunities to build local capabilities.
- Work with locals to develop a joint plan to contribute to local development.
- Strategically incorporate responsible engagement measures and information throughout their planning and management structures.
- Incorporate transparent communication standards that regularly inform and provide two-way communication opportunities with fence line communities and other relevant stakeholders.
- Achieve and maintain the public's trust and support of the Committee:
  - » Deliver a report on time
  - » Include areas the Committee had different opinions without consensus
  - » Educate elected officials and the public
  - » Create executive summary with highlights of the report
  - » Create visual graphics explaining the Committee's report

TAXATION AND REVENUE STRUCTURE

In general, mining operations and mining property have been subject to the same state and local taxes applicable to other commercial ventures in Michigan. These taxes include income, sales, use and ad valorem property taxes, among others. However, certain mining operations are subject to "specific" taxes in lieu of ad valorem taxes on the minerals, mineral-bearing land from which the minerals are mined, and property related to the mining operation.

Social, Economic & Labor Opportunities *continued*

For ferrous mineral mining operations, there is a specific tax called Tax on Low Grade Iron Ore, Act 77 of Public Acts of 1951, for low grade iron ore. Mean iron-bearing rock, also known as iron formation, jasper, ferruginous chert, or ferruginous slate, that is not merchantable as ore in its natural state and from which a merchantable product can be produced only by beneficiation, treatment involving fine grinding or additional process changes to meet product standards. There is also a specific tax on underground iron mining called Iron Ore Tax, Act 68 of Public Acts of 1963, for the specific taxation of underground beneficiated iron ore, underground agglomerated iron ore and related property.

In Michigan, mining operations involving nonferrous metallic minerals prior to 2012 were not subject to a specific tax. Instead, the mine property is assessed an ad valorem tax based on the true cash market value (as determined by the state geologist) of the mine property, mineral rights consisting of metallic resources, mineral stockpiles, and personal property that may be used in the operation or development of the mine property. On December 31, 2012, Michigan enacted 2012 PA 409 relating to the taxation of nonferrous metallic minerals (minerals) extracted from the earth in Michigan and the beneficiation of those minerals. This legislation also provided various tax exemptions relating to minerals, mineral mining-related property and property involved in the beneficiation of minerals, and certain income derived from the minerals. For example, with the enactment of 2012 PA 409, a mineral (and any right, claim, lease or option in, or of, a mineral) as well as any shaft, adit or value of overburden stripping located at an "open mine" (i.e., a mine where the shaft, incline, or adit has been started or overburden has been stripped) is exempt from the ad valorem taxes levied under 1893 PA 206. However, surface property, rights in the surface property, surface improvements or personal property located at an open mine, remained subject to ad valorem taxation under 1893 PA 206. Effective December 20, 2012, 2012 PA 409 exempts any "mineral producing property" subject to the minerals severance tax under 2012 PA 410, Nonferrous Metallic Minerals Extraction Severance Tax Act, from the ad valorem taxes levied under 1893 PA 206. In general, "mineral-producing property" includes, but is not limited to:

(i) real and personal property in Michigan that is part of a "producing mine" (or utilized directly in association with a producing mineral mine on a parcel on which the shaft, incline, or adit is located);

(ii) mineral rights, leases, options, and mining rights in or on mineral-producing property and;

(iii) certain property used for beneficiation of extracted minerals. In general, a "producing mine" is a mineral mine located in Michigan at which a taxpayer is producing one or more minerals.

The Nonferrous Metallic Minerals Extraction Severance Tax Act levies a specific "severance" tax on taxpayers that extract minerals from the earth in Michigan or that beneficiate such minerals (as well as taxpayers that remove such minerals to a location outside of Michigan prior to a sale or transfer). In general, the minerals severance tax is levied at a rate of 2.75 percent of the "taxable mineral value" computed at the time of sale or transfer of a "taxable mineral." However, in the first year that the minerals severance tax is levied against a particular taxpayer, the minerals severance tax for that year is the greater of: (i) the tax previously described at the 2.75 percent rate, or (ii) the amount of ad valorem property taxes paid pursuant to 1893 PA 206 on the taxpayer's "mineral-producing property" for that year. For open mines which are opened at any time between January 1, 2011, and June 30, 2013, a credit may be claimed by taxpayers each year for the first five (5) years the open mine is a producing mine and subject to the minerals severance tax. This credit may not exceed 20 percent of the amount of the ad valorem property tax levied on that open mine in 2012, attributable to those minerals valued by the state geologist in 2012, pursuant to 1893 PA 206. A taxpayer that purchases taxable minerals from another taxpayer may claim a credit against the minerals severance tax for the minerals severance tax paid by the seller or transferor for those minerals (as itemized on the invoice). In addition to the exemptions from ad valorem taxes levied under 1893 PA 206, targeted exemptions are also available under 2012 PA 412, 2012 PA 413, and 2012 PA 414, with respect to:

(i) Michigan Sales Tax pertaining to sales of tangible personal property to a qualifying taxpayer for use as or at mineral-producing property;

(ii) Michigan Use Tax pertaining to the storage, use, or consumption of tangible personal property sold to a qualifying taxpayer for use as or at mineral-producing property; and

(iii) Michigan individual and corporate income taxes pertaining to certain income derived from minerals.

This severance tax would be levied in lieu of the ad valorem property tax and possibly other taxes. Finally, it should be noted that Michigan does not have a specific tax on mineral reserves outside of any authorized by the General Property Tax Act, Act 206 of Public Acts of 1893. The Committee

Social, Economic & Labor Opportunities *continued*

looked at this issue as it was raised in initial discussion. The primary problem with taxation of known mineralization or reserves is that those minerals may never be developed as economically viable and produced. There may also be other factors such as permitting that could prohibit extraction. Therefore, taxation of reserves or known minerals could pose an undue tax burden on mineral owners as a highest and best use that may never be realized. The Committee ultimately did not make any recommendations as to changes in tax structure or allocations in this report.

The Committee did acknowledge that more education of the public could be valuable related to the value of mining related taxation to the public and communities. Mine taxation was also generally acknowledged as a potential source of revenue for some recommendations made by the Committee such as for use in mapping, research, addressing legacy issues and supporting reclamation efforts beyond permitting requirements, however no specific changes in allocation have been identified or recommended.

Research and Mineral Mapping

This section assesses the status of mining and mineral related research and mapping in the state and highlights areas that are lacking or obstacles that exist preventing the state from realizing the full potential of its mineral resources. The Committee has considered a number of challenges facing industry and the government and provides some recommendations to put Michigan on track for a successful and safe mineral industry that all citizens can benefit from.

MINING AND MINERAL RESOURCE RESEARCH AND MAPPING IN MICHIGAN

High-quality geologic, geophysical and geochemical data acquired by modern methods are essential to a healthy mining industry. States with comprehensive geologic, geophysical, and geochemical support organizations and data repositories attract mining activities. This information is also critical for identifying potential mineral deposits, evaluating resources, quantifying minable mineral reserves, and for developing efficient and environmentally acceptable mining and processing projects. A well-organized mineral information system with statewide, up-to-date geological, geophysical and geochemical data can be very attractive for all stakeholders including mining companies. Unfortunately, Michigan has an unusually small and poorly funded mineral-information system.

The importance of research is often undervalued, but it is the key to any effort to locate and extract resources. The settings where mineral deposits occur are controlled by geology and are not evenly distributed across the globe. Mapping and research have been key to both finding new mineral deposits and mining known deposits. For instance, long-term geologic mapping in the Lake Superior region by the Michigan Geological Survey and U.S. Geological Survey showed its similarity to the giant Norilsk nickel mining area in Russia. This information was used to guide subsequent exploration that resulted in discovery of the Eagle nickel-copper deposit in Marquette County.

Research is also the primary reason for the continuing importance of iron ore mining in Michigan. After the high-grade ores in Michigan were depleted in the 1950s, the iron mining industry in the state would have come to a halt. While there were vast deposits of iron-bearing rock, most had such low iron content that they could not be simply mined and shipped to a blast furnace. Research in the 1960s and early 1970s by State of Minnesota and the U.S. Bureau of Mines resulted in development of new technologies to convert these low-grade iron-bearing deposits in Minnesota and Michigan into important economic resources. Treatment of these ores after mining is also challenging. In Michigan, the only operating iron ore concentrator is the Tilden plant. This plant uses a specialized process designed in 1975, specifically for the Tilden-type iron ore, which was a direct result of mineral processing research carried out by the federal government. Current research of this type is not occurring at the federal level and is being taken up by universities and other research organizations, often at the state level. Past government support of mineral research has resulted in innovative mining and refining processes. There is currently no or limited funding available and the federal government should restore funding for research in this area.

Mapping and research of this nature requires facilities, expertise and a long-range outlook that corporations are poorly suited to provide entirely on their own. Instead, this is best carried out by federal and state agencies in collaboration with industry. The benefits of a well-planned and well-funded mapping and research program to support mining in Michigan would be primarily in the following areas:

1. **Extended lifespan of existing mines.**
   Research will improve the efficiency of existing methods of mining and mineral processing techniques and introduce new methods and processes to extract ores that would not have been feasible when the mining operation started. Ongoing research also identifies additional resources and possible by-products, such as critical minerals, that can extend mine life. It is beneficial both to the local economy and to efforts to protect the environment to keep existing mines operating rather than closing them down and starting new ones.
2. **Discovery and development of new deposits.**
   By expanding geologic mapping, the state can identify areas of high mineral potential that are ideal for focusing exploration efforts and attracting mining companies to invest within the state. Michigan has diverse mineral geology and high potential for discovery of new mineral deposits including critical minerals. As an example, manganese deposits are known to occur in the Keweenaw Peninsula, but have not been adequately investigated to date. In addition, Michigan has proven reserves of potash (sylvite) that have immense potential and remain largely undeveloped. The state needs to understand what mineral resources it has in order to plan for future development and to manage its resources wisely. This requires a much better framework of geologic and geophysical mapping data than exists at present, as well as cooperative research

Research and Mineral Mapping *continued*

into new mineral processing methods. A summary of currently known produced or available critical minerals including potash, cobalt, graphite, lithium, magnesium and platinum group elements is provided in Appendix G.

3. **Extraction of additional minerals from areas that have previously been mined (i.e., brownfield redevelopment).** Brownfield sites where mining has occurred may have continuing value for production of minerals in the future. In addition to having low-grade ores in the ground, brownfield mine sites have large accumulations of tailings and waste rock that were by-products of mining and processing. Chemical analysis of these resources can potentially result in the recovery of additional value for minerals not recognized as relevant at the time of production. This new analysis can support reprocessing old tailings and waste rock could help sustain the mining industry in Michigan and provide economic benefits. Safe storage (temporary and permanent) or utilization of mine tailings and waste products is a critical concern. Tailings from mining will continue to exist long after a mining operation ceases. The best way to reduce the risk tailings may pose is to confirm the presence of minerals and a commercial use for them.

In addition, the original mining frequently targeted only one particular mineral and left behind lower-grade rock and waste from mineral processing (tailings) containing minerals that might be extracted now with improved technology or have newly perceived value as a result of new technologies or new demand, such as critical minerals. All these activities can contribute to restoring mined lands with future land-use in mind, whether it is future mining, recreation or residential development.

The following sections expand on these points by reviewing the type of information that is needed, the organizations capable of developing the information, how information should be documented and reported and funding recommendations for carrying out mineral-related research in Michigan.

OBJECTIVES OF MINERAL-RELATED RESEARCH

Research in Michigan needs to focus on geologic mapping and mineral processing. This needs to include not just minerals that are currently being extracted in the state, but also those that can potentially be extracted if technology and/or market conditions change.

Geologic maps, with information on the location of rock units and mineral and geochemical concentrations, form the basis for all mineral exploration and planning. Maps of this type can also provide information on water and aggregate resources, as well as engineering geology parameters such as rock stability and porosity-permeability. This information is essential for efficient use of land everywhere.

Modern, detailed geologic map coverage in Michigan is poor and needs to be expanded. In Michigan, most rocks are covered by heavy vegetation and varying thicknesses of glacial sediments, making mapping of the underlying, ore-bearing rocks difficult. High-definition geophysical surveys, which have recently become available, offer us a chance to significantly improve such maps. In a recent cooperative project, the Michigan Geological Survey (MGS) and U.S. Geological Survey (USGS) used aeromagnetic data to resolve complex Precambrian geologic relations in iron-rich areas of Dickinson County. That survey demonstrated just how little of Michigan's geology is known, mapped and accurately located. This type of mapping requires location of rock outcrops that show through the vegetative and glacial cover. High-resolution airborne LiDAR surveys have been extremely useful for locating these critical outcroppings, and they could greatly increase the efficiency and effectiveness of mapping.

LiDAR surveys carried out in cooperation with the Federal Emergency Management Agency and National Oceanographic and Atmospheric Administration, and processed by the Michigan Department of Technology, Management, and Budget also have been used to identify areas of interest for groundwater and aggregate resources, by providing better information on the glacial deposits that cover most of the state. These LiDAR surveys also yield information used in forestry, agriculture and infrastructure studies. Tests have been carried out to combine subsurface data with surface maps to produce 3-D geologic maps. Because these methods have been perfected only during the last few years, and they provide significant new information, now is the right time to invest in improved geologic mapping in the state.

Information is needed on the characteristics of rocks, ores and waste minerals throughout the state. The USGS lists numerous "critical minerals" including lithium and rare earth elements (REEs), that are not currently produced domestically in enough quantities and are needed to support a modern sustainable infrastructure. Michigan has the potential to produce many of these, particularly those that are associated

Research and Mineral Mapping *continued*

with Precambrian rocks in the Upper Peninsula and with evaporites in the Lower Peninsula. Geochemical studies to identify minerals and/or rock units enriched in these elements could be integrated with the geologic mapping described above. Eight of the critical minerals have been produced and/or have been found within geologic formations within Michigan. They are cobalt, graphite, lithium, magnesium, manganese, platinum group metals, potash and rare earth elements (Appendix G).

Research is needed on the nature of accessory minerals in ores and mine wastes. For instance, silica and phosphorous are undesirable impurities common in Michigan iron ores. Industry could benefit from better information on the characteristics of impurities which need to be rejected in processing, and the information would also help in better estimation of long-term statewide iron ore resources. Development of innovative technologies to permit mining of currently unmined resources and possibly even waste stockpiles in the state would provide additional opportunities. For example, new biomining processes could recover manganese in an environmentally sound manner from low-grade ores that are known to exist in the state but that are not economically recoverable with existing technology. Similarly, mapping and identifying the location of potential aggregate resources in priority areas of the state could give producers, county commissioners, planners and developers more information for intelligent land-use planning.

Finally, improved data on land and mineral rights ownership is crucial. For much of the state, determining "who owns what rights" on a case-by-case basis is an expensive, protracted process. Mapping of the mineral rights for the entire state would be a major undertaking, but once completed would remove a major hurdle for planning recovery of mineral resources. Hopefully, industry could provide existing ownership records as a start of a database.

REPORTING AND DOCUMENTATION OF RESEARCH

Improving availability of information on mineral potential in Michigan is key to a healthy minerals industry. Although older maps, drill cores, and other geological data exist throughout the state, access to much of the data has not been formally integrated into a database. Online access to interactive maps that link to data resources would make it much easier to determine where resources may exist, to carry out environmental assessments, and to plan modern mineral exploration. It is also desirable to identify and categorize land in the state in a way that considers the ability to develop long-term land positions to explore for and produce mineral deposits.

Regional information is available on GeoWebFace, an online interactive map application hosted by EGLE, which provides map overlays for oil and gas, mineral exploration and mining activity and basic geology. However, more detailed, site specific information is needed for individual projects. Information of this type is currently limited but could be greatly expanded with appropriate funding to include geologic potential for mineral resources, higher resolution mapping and categorization of local mineral potential. Similar information is needed for brownfield locations along with basic chemical constituents that can assist in determining their potential for additional resource recovery.

Data should include not only target minerals and rock units, but also information on the associated minerals that could have an impact on processing. For example, early direct shipment iron ores vary greatly in content of acid-generating rock and trace elements and, therefore, have vastly different requirements for controlling acid generation or other detrimental environmental impacts. Mapping activities should build on USGS based maps and classify potential geologic environments according to favorability of mining and processing. Industry could provide some of the information and funding for specific projects and data generation, particularly for mineral resources that are currently being mined. Compiling comprehensive borehole locations and data and making it available for reassessment of new or existing technologies could help to identify resources that have geochemical properties different from the ones that were being recovered when the boreholes were originally drilled.

ORGANIZATION AND FUNDING OF RESEARCH

The MGS is the best agency to carry out and coordinate geologic, geochemical and geophysical research in the state. Michigan is the only important mining state that does not have a well-supported geological survey. At present the MGS has one employee, the director. In comparison, the Minnesota Geological Survey operates with about 30 people and an annual budget of about $3 million.

The MGS requires funding for the director, a glacial geologist, a bedrock geologist, a geologic repository coordinator and administrator, a GIS professional, repository, and field and administrative support staff for the current Michigan Geological Repository for Research and Education (MGRRE).

Research and Mineral Mapping *continued*

In total, that is an estimated nine full-time staff. Funds are also needed to cover facility rental and operating costs for MGRRE and MGS. The estimated total cost would be $1.2 million per year. This does not include funding to carry out mapping and research programs on an annual, full-year basis, at least some of which would be sought from cooperative programs with state agencies, U.S. Geological Survey, the Department of Energy, the Bureau of Land Management, the U.S. Forest Service, the National Park Service, other federal agencies and industry.

A large part of the MGS geologic and mining-oriented research would be carried out in university laboratories. These laboratories would be critical for support of mapping activities and for developing an understanding of the rock chemistry and the potential applications of innovative technology to extract mineral resources in the state. Coordination of this research is best carried out by the MGS. Capabilities either exist or can exist for this work at many Michigan universities. This research will be used to evaluate mineral chemistries and mine waste compositions. New mining and mine waste rock or tailings reprocessing approaches, and other technologies relevant to mineral extraction in the state can result in a more favorable environmental chemistry of the waste rock material.

Since mineral exploration, mapping, and processing research is expensive, the state needs to take advantage of work that is being done by industry as much as possible. It is necessary to encourage industries that do mining-related research to make their chemical, geochemical and geophysical results available for study and scrutiny and possible archiving in statewide databases. This will require thinking strategically about anticipating future mineral needs and then linking up with potential mining and manufacturing companies to translate that future need into research to understand Michigan ore chemistries and develop innovative mining, waste rock, and tailings processes to meet those needs. One incentive for examining waste rock and tailings is that these materials frequently contain critical minerals that were not noted at the time of extraction. These minerals may now have become crucial to the U.S. economy.

The steel industry in the U.S. is particularly important to Michigan, and it is changing significantly. The raw material and recycled feed for steelmaking continues to evolve and requires continuing research to meet the quality needs of the industry. Market share of production from conventional blast furnaces is declining and being replaced by production of steel in electric arc furnaces, which do not use the current grade of pellet feedstock. This long-term trend has reduced market demand for the current grade of iron ore (taconite) pellets like those made at Michigan's Tilden Mine. To date, a cost effective technology to produce direct reduction grade pellets from ores found in Michigan has not been developed, or certainly not deployed. Fostering research in development of this process, or incentivizing companies to do so, is necessary if Michigan is to maintain, strengthen and develop a sustainable, more diversified mining and minerals industry (from the duties of the committee).

The trend is clear that iron ore pellet demand is decreasing due to the changing landscape of the steel making industry. For Michigan to grow its mining industry (or maybe even for Michigan to maintain its current level of mining), it must adapt to changing demands of steel-making.

Aside from the need for ongoing legislative appropriations, external resources are available for conducting geologic research and mapping in Michigan. These include competitive grants from the U.S. Geological Survey and other organizations that often require matching funds. In other words, to compete for grants, the state must match the amount requested from the funding source. Recurring, stable state funding for the MGS would provide dedicated staff for working on projects and funds to meet grant requirements. There also are potential funding opportunities associated with critical minerals through the Department of Energy and other federal agencies that also require cost-share.

Industry-state partnerships with the MGS would be beneficial for exploration for new ore bodies, research into mine waste and reclamation, and data compilation. When the state has a better understanding of its resources, it can make decisions proactively rather than reactively. In addition, improved reclamation outcomes benefit all stakeholders (e.g., more economical, fewer issues down the road, returns land to other uses more quickly). Evaluation and exploration in favorable geologic environments, research into mine waste, and reclamation to develop feasible and environmentally acceptable recovery plans could result from such partnerships, often with little or no cost to the state.

MINING RESEARCH AND MAPPING RECOMMENDATIONS

The Committee has identified four primary recommendations to address issues related to mining research and mapping:

- Fund the Michigan Geological Survey on a recurring basis at $1.2 million dollars per annum. This base funding is critical for establishing stable operations and having

Research and Mineral Mapping *continued*

a staffed state geological survey. Currently, Michigan Geological Survey is the only state geological survey in the Great Lakes region without dedicated staff and stable funding.

- To extend lifespan of existing mines, support research to improve the efficiency of mining and processing methods, and to identify additional resources and by-products.
- Discover and develop new deposits. Examples may be potash, cobalt, graphite, lithium, magnesium, and platinum group elements. Discovery of new deposits and identification of new sources of critical minerals requires additional investment in research, mapping, and geophysical surveys. Strategic sourcing of minerals necessary in Michigan can strengthen the state's domestic supply and mineral security.
- Encourage extraction of additional minerals from areas that have been previously mined (i.e., brownfield redevelopment). This can be done by improving research and data accessibility. Information is needed on the location and characteristics of previously stockpiled or mined low-grade ore and tailings. This can lead to full value mining where all usable material is recovered.

Mining Methods, Environment and Reclamation

Despite its essential role in our economy and our way of life, surface mining often disturbs large areas of land. Some sites where mining occurred previously may become known as brownfields and may need to be reclaimed before they can be returned to a useful role in the local and regional economy.

Reclamation can take many different forms and have quite different timelines. In the simplest cases, removal of all mineral material from the land allows complete and final reclamation. In other cases, however, economic, or other factors cause significant amounts of mineral to be left in the ground. In addition, mined areas may contain tailings and other mined byproduct that might have economic value in the future. Thus, many brownfields produced by mining have long-term value as mineral resources and reclamation should be done with this in mind. This does not mean that reclamation should be less complete, but it does mean that mined-land brownfields should be regarded as long-term assets to society. Re-entering previously mined land will cause less overall environmental disturbance and could be placed into production and reclaimed in less time than would commencement of a completely new mine in another location.

Reclamation with these factors in mind should help stakeholders benefit from mining or production activities today and drive renewed alternative economic development and other beneficial land uses that can result in a more expeditious return to a natural state upon completion of production and reclamation. Furthermore, this philosophy supports more sustainable, socially and environmentally conscious mining, which ultimately fosters community support for additional future mining activity.

SCOPE OF WORK

This section of the report will build on this background. First, it will discuss drivers of reclamation activity. Second, it will describe successful examples of reclamation in Michigan, as well as options for alternative land uses. This is followed by a discussion of the use of mine tailings. Finally, the report will discuss an example of how the state of Minnesota developed a formal and collaborative process to plan for mine reclamation and alternative uses through the Mineland Vision Partnership (MVP).

The Committee concludes that Michigan maintains a stringent, predictable and effective regulatory climate that serves as the basis for reclamation, although there may be opportunities to drive new collaborative partnerships and create innovative reclamation and land use opportunities that incorporate community needs and honor native tribal treaty rights and practices. Michigan and the U.S. need to be continually aware of changing demand for mineral commodities and where these commodities may be found.

Importantly, the Committee identifies two topics that should be considered when planning mine activity and closure: (1) cumulative impacts; and (2) climate change. Both topics, which are not necessarily mutually exclusive, were recognized to be impactful, but detailed analysis was outside the scope of the report due to the time and expertise necessary to explore in detail. However, they should serve as a backdrop for considering how minerals and materials are sourced, and the subcommittee offers the following brief insights.

DRIVERS OF RECLAMATION ACTIVITY

Reclamation activity is driven by a combination of factors. While the basis for reclamation standards is found in statute and regulation, modern mining is contingent upon a social license to operate responsibly, and most operators will strive to work cooperatively with stakeholders including government, nonprofit, community and tribal partners.

More recently, investor expectations also drive companies to take a progressive approach to environmental stewardship and incorporate this into a company's core values. Additionally, adjacent landowners may benefit from the improved value of a site after reclamation. As a result, it is important to have a strong regulatory climate, but retain flexibility that can drive innovative projects for the benefit of the community.

The following Michigan statutes from the Natural Resources and Environmental Protection Act (NREPA), Act 415 of 1994, as amended, govern ferrous and nonferrous mine reclamation:

- NREPA Part 631 (Ferrous Mining)
- NREPA Part 632 (Nonferrous Mining)
- NREPA Part 634 (Small Native Copper Mines)
- NREPA Part 635 (Surface and Underground Coal Mine Reclamation)
- NREPA Part 637 (Sand Dune Mining)

Metallic mineral mining and hydrocarbon extraction are subject to clear and consistent state-level regulations and guidelines. In contrast, industrial mineral mining (with the

Mining Methods, Environment and Reclamation *continued*

exception of sand dune mining and solution mining) is not subject to mining-specific state regulations but is regulated primarily under local zoning ordinances. For aggregate mines, the regulatory environment varies widely according to local zoning regulations. Some local jurisdictions have stringent reclamation requirements while others have none. Michigan would benefit from practical, consistent regulations for solid, non-metallic minerals that consider government, industry and public concerns, and that serve to protect and conserve resources, hold producers accountable and ensure a sustainable mineral extraction industry.

SUCCESSFUL EXAMPLES OF MINE RECLAMATION

Michigan's current regulatory environment has proven to be stringent and effective through examples of successful reclamation at closed, indefinitely idled and active mining operations:

Republic Mine (Iron Ore Mine)

The Republic Mine first began operating in 1871 and, after temporary closure, produced 45 million tons of iron ore from 1964 to 1981 under the ownership of Cleveland-Cliffs. The mine closed permanently in 1996, at which time development of the Republic Wetlands Preserve began under the oversight of the U.S. Environmental Protection Agency (EPA) and the Michigan Departments of Environmental Quality and Natural Resources. In this process, Cleveland-Cliffs created 615 acres of new wetlands through aerial fertilization and seeded and planted 60,000 wetland plants and 225,000 wetland trees.

The Republic Wetlands Preserve is an example of sequential land use that transformed a former mine operation into a flourishing wetland. The development of Republic Wetlands Preserve exceeded the reclamation standards required by statute and had multiple benefits. It created a permanent habitat for diverse birds, reptiles and mammals by placing 2,300 acres of land in conservation easement, while providing Cleveland-Cliffs with compensatory wetland credits for unavoidable impacts at the Tilden and Empire mines. The site is also open to the public for non-motorized recreation, such as hiking, biking and skiing.

Empire Mine (Iron Ore Mine)

More recently, Cleveland-Cliffs' Empire Mine was indefinitely idled in August 2016 due to limited economic ore reserves and the expiration of the Empire Iron Mining Partnership. While Empire Mine has substantial ore resources remaining, accessing the ore would require a substantial investment to remove the overburden.

While Cleveland-Cliffs continues to preserve the Empire Mine asset should market conditions and commercial considerations dictate a potential restart, substantial reclamation has taken place. Through 2019, Cleveland-Cliffs planted 2.28 million trees in Michigan as part of its reclamation efforts and reclamation was 90 percent complete when the Empire Mine indefinitely idled. This is due in part to the progressive reclamation that was implemented by the operation when the mine was active.

Tilden Mine (Iron Ore Mine)

Concurrent reclamation is also taking place at the active Tilden Mine. Reclamation activities include application of seed, fertilizer and mulch at the tailings basin. Rock stockpiles are also seeded with grass and wildflower mixes to support a diverse vegetative community. Trees and shrubs are planted to utilize those species that have proven to be successful and mimic regional forest types. In the last 10 years, Tilden has planted over one million trees.

Industrial Mineral Mining

Due to the high demand for aggregate material in areas of active societal growth and associated construction, it is common for mining to occur in or near communities. As a result, landowners typically coordinate reclamation with local townships so that mine sites are transformed into a beneficial reuse for the community. There are countless examples across the state of Michigan where former aggregate mine sites have been reclaimed in a manner that benefits the local community by providing additional areas for farmland, wildlife preserves, golf courses and other recreational uses that enhance or restore the mining site. In many cases, the mining operation enhanced the value of the property owing to the creation of a water body or other attractive terrain feature. Examples in Michigan where former limestone operations have been transformed into communities and tourist/recreation destinations include Bay Harbor in Petoskey and Rockport State Recreation Area near Alpena.

The examples above highlight implementation of successful reclamation activity in recent history. However, the

Mining Methods, Environment and Reclamation *continued*

subcommittee recognized that examples exist throughout the state of older sites from all categories of mining activity where reclamation activity either did not occur or was minimal, emphasizing a need to focus on reclamation planning that goes beyond minimum stabilization and considers conservation of soil, reestablishment of functioning ecologic environments, and viewsheds that are congruent with the surrounding areas.

ALTERNATIVE BENEFICIAL LAND USES

The Mining Methods Subcommittee also explored alternative land uses that merit further exploration. These included new energy development (renewable or otherwise), pumped-storage hydropower within mine workings, or use of mine water discharge for turbines and brownfield development. The subcommittee noted that innovation and need may shape future land use decisions in ways we cannot predict today. For example, climate change should be considered in future planning and may influence alternative land-use decisions.

Energy Development

Mining companies can play a role in helping to transition to a clean energy grid through access to both brownfield and greenfield property. Land access is a key component for energy companies seeking to add renewable energy capacity and potential synergies may exist with mine operators that are also large landholders.

Energy companies have also expressed interest in exploring the potential of developing wind turbines on rock/overburden stockpiles due to their higher elevation. One project exploring this potential was a meteorological tower placed on a rock stockpile at the now indefinitely idled Empire Mine. The meteorological tower was used to obtain two years of wind data that was intended to inform development of a future wind farm. However, an energy project never materialized owing to the lack of a purchase agreement for electric power.

Pumped-storage hydroelectric power is another example of potential energy development. The concept is that an elevated water reservoir could be drained through hydroelectric turbines to generate electrical power. The water used for power generation is collected in a closed loop lower reservoir. At such sites, the electrical generation would occur during peak demand times, when electrical supply to meet demand is limited and is generally expensive. During off-peak periods, when demand is lower and power supply is readily available and less expensive, water is pumped from the lower reservoir and returned to the upper reservoir for later generation use. Michigan has a proven pumped-storage hydroelectric project, unrelated to mining, at Ludington where this application has been functioning since 1973 using Lake Michigan.

It has been contemplated that some mine lands provide a natural topography for development of pumped-storage facilities. Elevated rock stockpiles provide acreage that could be converted to elevated reservoir construction, while mine pits or tailings basins could serve as lower reservoirs. Similarly, it has been contemplated that abandoned underground mineworks could be utilized for the same purpose. Incorporating mine lands in this way, a hydroelectric development would be "closed-loop," recycling water and avoiding potential impacts that may occur if otherwise using a naturally occurring body of water as a reservoir.

To date, while studies have been done on adapting former mine lands for pumped-storage hydropower, no such project has been undertaken. While there are a multitude of economic, engineering and environmental considerations that would be necessary to drive cost-effective development, the Committee feels the concept should not be abandoned.

Mine Water Discharge

Michigan Technological University is studying opportunities to generate electricity by using old mine shafts. Water is gravity fed into the mine shaft that is dropped through a series of turbines. The water is returned to the top of the shaft by using a low voltage pump, creating a loop of continuous electrical generation. A potential opportunity is to research the effectiveness of placing turbines in affluent discharge pipes to generate electricity as the water is released back into the environment at active mining operations, with learnings that could help with brownfield redevelopment after mine closure.

In addition to hydropower opportunities, nearby communities could benefit from solar powered farms built on reclaimed mine sites. Due to existing infrastructure, utilities and roads reclaimed mine sites could be an ideal location to host commercial solar array facilities, which saves the potential of disturbing a greenfield location and avoid land use conflict.

Brownfield Redevelopment

Brownfield mine sites may have potential for additional mining activity as previously unusable minerals and

Mining Methods, Environment and Reclamation *continued*

remaining ore within the deposits may have economic value for future extraction. Brownfields also have the potential to be redeveloped for non-mining purposes. The opportunity to repurpose or reuse brownfield sites should be considered when planning for mine reclamation. In the case of the Republic Mine described earlier, placing land into a conservation easement provided an opportunity to create permanent wetlands habitat and produce significant environmental benefits. However, preserving brownfield lands for future mineral extraction also may minimize environmental impacts of future mine activity, such that interim reclamation opportunities may be appropriate to consider as opposed to permanent restoration. Committee members noted that preserving land for future mining, and any interim reclamation, should also consider opportunities to allow for other stakeholder uses.

MINE TAILINGS

The Committee discussed reclamation opportunities for all aspects of the mining process, including production of tailings. Members of the Committee expressed an interest in exploring productive options to manage waste materials and reduce environmental impacts.

Attempts to mine iron ore tailings and produce concentrate have not been commercially successful to date. However, many of the tailings are from unique iron deposits and secondary minerals, not economical a century ago, may have a potential for iron ore development and new mineral production. This report recommends continued research into this topic and other uses for mine tailings that may be appropriate for consideration by state government and academic institutions in Michigan. It was noted that future research could unlock opportunities to mine tailings for minerals other than those for which the ore body was originally extracted. Initial research has also shown potential opportunities may exist to use tailings for carbon sequestration. Researchers are investigating the potential to use algae in certain types of mine tailings which may be able to capture carbon from the atmosphere and at the same time solidify the tailings into a carbonate rock, sequestering the carbon permanently. In a similar fashion, researchers are investigating methods of fixing carbon captured from sources to mine tailings.

While use of mine tailings may not be commercially viable, other sustainable ways to manage mine tailings exist, and new opportunities should be explored to create partnerships between mine operators and entities that can use mine tailings or tailings sites. For example, a previously active basin at United Taconite in Minnesota was repurposed as a source of alfalfa for a dairy farmer through a partnership that included the University of Minnesota Extension Service of St. Louis County and Western Lake Superior Sanitary District, which provided biosolids for the site. The project provided economic benefits for the dairy farmer, repurposed the tailings basin and provided an alternative beneficial use for the biosolids.

Another example is the tailings basin from the former Humboldt Mine, which is currently being reused at Humboldt Mill in connection with the processing of ore from Eagle Mine. The Eagle Mine ore body was discovered in 2002. After many years of feasibility planning and permitting, the company determined refurbishing the Humboldt Mill brownfield site, located 66 miles from Eagle's mine site, created opportunities to utilize the former tailings facility. The tailings facility was originally an open pit iron mine that started operations in the 1950s and closed operations in the 1980s. The open pit naturally filled with water. The pit was first used as a tailings facility in the 1990s for the former Ropes Gold Mine and was subsequently abandoned. Eagle Mine purchased the facility in 2008 to create a best practice subaqueous process waste tailings disposal facility for Eagle Mine's tailings. Eagle Mine is the third industrial user of the open pit that was built to mine iron, and now houses gold, nickel and copper tailings. Eagle Mine is researching future opportunities for the pit after Eagle's operations close in five years. In April of 2021, Eagle Mine shipped 500 pounds of tails to Michigan Technological University for continued research into post mining extraction opportunities or for the potential of carbon sequestration.

Settling ponds and lakes created at industrial mineral mine sites also have been adapted as water features for residential developments, golf courses, and water-based recreation. For example, a settling pond for an aggregate mine within Waterloo State Recreation Area will be converted into a lake for public recreation within the park. In addition, tailings from metallic mineral mining in Michigan have been repurposed for road aggregate. Active examples of this are in the western Upper Peninsula. Other uses are being explored for copper mine waste products (e.g., for roofing shingles).

There are several best practices that have emerged for tailings management, which should be encouraged in feasibility studies and alternatives analysis. The subaqueous

Mining Methods, Environment and Reclamation *continued*

deposition of tailings into abandoned mine pit lakes that are suitable in depth, size, and containment—such as the project at Humboldt Mill—allows for proper conditions for emplacement and permanent management of sulfide containing tailings within existing mine lands/brownfields and avoids creating an additional footprint on unimpacted lands. Likewise, the potential to manage the tailings waste as paste backfill should be encouraged. This best practice places the tailings back into underground mine workings and can help prevent subsidence of mined areas. Both examples of tailings best practice can have benefits and may be preferred over above ground engineered systems that may impact viewsheds or require future maintenance.

Finally, Committee members expressed an interest in understanding alternatives for tailings dam construction. Detailed review of this topic was outside the Subcommittee's scope and time constraints but was taken up by the Regulatory Policy Subcommittee.

MINELAND VISION PARTNERSHIP (MVP)

The Committee found it useful to consider how mine operators and communities plan for reclamation in other states and found that Minnesota has implemented a formalized and successful process through the Mineland Vision Partnership (formerly known as the Laurentian Vision Partnership).

Like Michigan, the state of Minnesota has a long mining history that spans more than a century. Today it is the only other state that is home to iron ore mining and is the largest producer of iron ore. There are also nonferrous mining projects in various phases of the exploration and permitting process, although not yet operational, and aggregate mines are distributed across the entire state.

The MVP is an organization that was formed in the late 1990s on the Mesabi Iron Range in Minnesota, where six out of seven currently active iron ore mining operations in the U.S. are located. The organization was originally formed through a partnership among U.S. Steel, the University of Minnesota, the Minnesota Department of Natural Resources, and the Department of Iron Range Resources and Rehabilitation. That group expanded to include Cleveland-Cliffs, communities and local governments, land and mineral holders, local businesses and organizations.

The vision of the MVP is to "shape evolving landscapes for future generations." MVP is a regional collaboration that invests in our diverse community by:

- Developing opportunities for dynamic minescapes
- Preserving lands necessary to sustain current and future mining
- Providing resources and education

It promotes the development of productive post-mining landscapes with a dual purpose. One is to preserve lands for mining, such that development does not prohibit future mining. A simultaneous goal is to develop land after mining activity has ceased.

MVP's major accomplishments include a large-scale mapping project. The map allows communities on the Iron Range to view where mineral development is occurring, or expected to occur, and plan economic development around this. Understanding how mineral resources are geographically distributed can assist local governments in making economic development decisions to prevent future impacts based on mining activity.

In fact, the Committee received input that a need exists in Michigan to identify occurrences of quality aggregate deposits and have appropriate cooperation between local municipalities, tribes and aggregate producers with respect to civil planning to prevent development over valuable deposits and the exclusion of other stakeholder uses.

MVP Innovation Grants

In part, MVP has been able to advance projects by awarding Innovation Grants, which are funded through the Minnesota Department of Iron Range Resources and Rehabilitation and amount to approximately $350,000 annually. Grants are awarded to local government and non-profit organizations to promote the mission and vision of the MVP.

Innovation grants incentivize and create opportunities for companies and communities to invest in projects that go beyond reclamation standards required by state statute. Grants have funded multiple design projects for mine stockpiles located along highway corridors and public roads. The grants drive collaboration between mining companies, academia and regulatory agencies so that stockpiles are engineered and vegetated to integrate with the surrounding landscape and environment.

Mining Methods, Environment and Reclamation *continued*

Innovation grants have also supported the development of community assets. One example includes relocation of a mine view operated by City of Hibbing, which provides an overlook for visitors to view an active mine pit at Hibbing Taconite. Another example is development of the Redhead and Tioga mountain bike parks. The mountain bike trail system is being constructed surrounding former mine pits and stockpiles that create a unique topography. The trail systems are expected to improve recreational opportunities for residents, while driving additional tourism and economic activity that will support local businesses.

One aspect driving the success of MVP-supported projects is the common recognition that mining is an integral part of the region. Mining companies and communities invest in projects with the understanding that the landscape is continually evolving and being reshaped through mining. Projects are planned, so that areas where mineral resources exist can be adapted in the future to accommodate mining activity.

Other direct and secondary community benefits from mining operations, especially on state owned mineral lands are royalty and severance tax payments. Royalties are paid to State of Michigan's Natural Resources Trust Fund (NRTF) when minerals are extracted from state-owned mineral lands. The trust fund provides a percentage of its annual holdings in the form of grants that communities can apply to receive to protect recreational land for generations to come.

In 2014, the Department of Natural Resources, Eagle Mine and Marquette County negotiated a new mining severance tax for nonferrous mining operations. The new tax act encompasses property tax and mineral value into one set rate of 2.75 percent of the NSR. The tax revenue is split 65 percent with the local unit of government hosting the mining and milling operations with 35 percent being received by the Michigan Department of Agriculture's newly created Rural Development Program. Tax revenue received by the Rural Development program is available in grant opportunities for local communities and industry seeking to enhance land-based industries. Eagle's severance tax payment to the Rural Development Program averages $1 million annually.

Both the trust fund and severance tax programs allow communities to protect and enhance land-based industries and recreational use, which highlights how the Michigan mining industry builds community capacity during active mining operations and long after closure.

SUMMARY AND RECOMMENDATIONS

The Mining Methods Subcommittee assembled a list of successful reclamation and land-use projects in mining communities in Michigan and Minnesota. Those projects showed that:

- The existing stringent and effective state regulatory climate serves as the basis for reclamation.
- However, innovative projects that exceed reclamation standards can result from collaborative public/private partnerships.
- A convener of industry, government, tribal and community partners can help facilitate these types of innovative reclamation and land use projects.
- Reclamation activity can be conducted on a spectrum that preserves land for future mining or creates permanent conservation areas. Long-term land-use decisions should consider what level of reclamation activity is appropriate.

In Minnesota, the organization facilitating long-term land use planning on the Iron Range is the Mineland Vision Partnership.

Recommendation:

The first Mining, Methods and Reclamation recommendation of this Committee is that a similar convener would benefit reclamation and land use planning in Michigan. In doing so, it will be important to have continued acknowledgment, honoring and supporting treaty rights and practices in any regulation, statute and/or model that would be considered. It also will be important to explore the similarities and differences in mining activity in Michigan and Minnesota to determine how best to structure such a committee. In order to strengthen and develop a sustainable, more diversified mining and minerals industry (from the duties of the committee), the state needs to recognize the intense infrastructure needs necessary to do so. This industry is dependent on roads, rail, energy (natural gas and electricity), and be cognizant that decisions made with regard to infrastructure can affect Michigan's ability to mine critical resources. For example, Minnesota's Iron Range is geographically larger than Michigan's, with more mines and mine operators. Communities are also in closer proximity to mining activity. Minnesota mining communities have been receiving

Mining Methods, Environment and Reclamation *continued*

percentages of the tax revenues to support the current and future infrastructure of roads, schools and recreation for nearly a decade now.
Additionally, the focus of MVP projects in this report was limited to repurposing of iron ore mines. In contrast, the MMFC addresses all types of mining activity, including ferrous, nonferrous and industrial minerals. The MMFC recommends future work to understand whether one or more conveners of mine stakeholders would be most effective. The planning process may be different based on the type of mining activity. For example, iron ore mining tends to occur over multiple generations of time, emphasizing that "planning for the end in mind" may need to be an adaptive process.

Modern nonferrous mines in the Midwest tend to be high grade with less ore tonnage compared to historic nonferrous and ferrous mining operations. Nonferrous short-term mining operations with a mine life of 10–30 years must envision closure during the design phase of the project. Market volatility, environmental, landscape change, social, and economic impacts should be part of the feasibility and design of the overall operation and today there is a need to look at more effective processing and reclamation and documentation of any trace elements.

Aggregate deposits are further differentiated due to their widespread distribution throughout the state. In some locations the deposits are in upland areas and other locations are below the water. Some are smaller in size, like sand and gravel, and are typically mined in shorter durations, while limestone deposits may be larger with a longer mine life. As with any mining activity, changes in material characteristics during the mining operations may require the reclamation plan to be modified.

Additionally, a key tool implemented by the MVP is the Innovation Grant program, which is funded by the Minnesota Department of Iron Range Resources and Rehabilitation. Further exploration would also be needed to understand whether a convening group in Michigan would have the capability to provide grant funding and what effectiveness this would have on the organization.

Recommendation:
The second recommendation of the Committee with respect to mining methods and reclamation is that state policy and future mine stakeholder groups recognize brownfields as an asset in the state (including the mine and waste product) and accordingly value and manage them as resources.
The Committee acknowledged the diverse ways in which brownfields can be repurposed and how doing so drives innovative projects and creates overall less environmental disturbance. In taking this approach, the Committee recognized that brownfield sites can provide potential benefits, but also cause potential harm if not developed or managed properly. As a result, future brownfield management and development should focus on finding win/win solutions that provide both economic and environmental benefit.

Recommendation:
In order to strengthen and develop a sustainable, more diversified mining and minerals industry (from the duties of the committee), the state needs to recognize the intense infrastructure needs necessary to do so, including roads, rail, energy (natural gas and electricity), and be cognizant that decisions made with regard to infrastructure can affect Michigan's ability to mine critical resources.

Regulatory Policy

In this section, the Committee considers regulations as including both statutes (i.e., laws or ordinances passed by a legislative body) and rules (i.e., standards or instructions promulgated by an executive authority or regulatory agency to implement a statute). Regulations can be characterized as two main types: generic, which apply to a variety of industries and activities, and mining-specific, which apply exclusively to mineral exploration and mining operations.

Regulations may be carried out under federal, tribal, state or local authority. Each level of government plays a vital role in the regulation of mineral exploration and production in Michigan.

Federal regulations that apply to mining are promulgated under the federal authority to regulate interstate or international commerce or the authority to regulate activities on federal land.

Authorities not specifically reserved to the federal government fall to the tribes or states. Native tribes, as sovereign nations, have primary regulatory authority on reservation lands, and generally have legal standing to engage in issues of regulation of off-reservation activities that may affect a reservation or treaty rights on other lands. There are 12 federally recognized tribes in Michigan. There are also tribes outside of Michigan that have treaty rights that apply to lands in Michigan.

At the state level, EGLE regulates many types of mineral exploration and mining to provide for orderly development of mineral resources and protection of the environment, natural resources and public health and safety. The regulations implemented by EGLE apply to lands owned by private entities as well as lands owned by the federal, state and local governments. The Department of Natural Resources (DNR) manages state-owned land to provide reasonable access to state-owned minerals while protecting other valuable natural and cultural resources.

Authority of local governmental units—i.e., counties, cities, villages and townships—is defined by that specifically granted to them by the state. Local authority over mining operations is generally expressed as zoning ordinances. The primary concern of local governmental units should be to protect local citizens from actions or practices that would interfere with the use or enjoyment of their property.

CATEGORIES OF REGULATIONS

There are many regulations at every level of authority that address issues of business conduct and taxation for mining operations. Those regulations are not addressed in this section of the report; rather, the focus here is on environmental, land use, mineral rights and worker safety regulations.

ENVIRONMENTAL REGULATIONS

Environmental regulations include regulations to protect environmental media, such as air, water and soils, and regulations to protect natural and cultural resources.

There are many federal environmental regulations that apply to mining operations. Some of the major federal statutes are:

- Clean Air Act
- Clean Water Act
- Water Pollution Control Act
- Safe Drinking Water Act: Underground Injection Control provisions
- Resource Conservation and Recovery Act (RCRA)
- Toxic Substances Control Act (TSCA)
- National Environmental Protection Act (NEPA)
- Federal Endangered Species Act
- Wilderness Act
- National Historic Preservation Act
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Surface Mining Control and Reclamation Act (SMCRA)

Federal agencies—mainly the U.S. Environmental Protection Agency (EPA)—have promulgated rules to implement these statutes. The statutes and their associated rules apply generically to a variety of activities. However, some of them include provisions that apply specifically to mining.
The EPA has delegated responsibility for implementing many of the federal environmental regulations to State of Michigan. This includes many of the responsibilities under the Clean Air Act, Clean Water Act, Water Pollution Control Act, and Resource Conservation and Recovery Act.

The EPA has approved one tribe in Michigan—the Keweenaw Bay Indian Community—to administer water quality regulations and to implement provisions of the federal Clean Water Act. In neighboring states, four tribes in Wisconsin and two tribes in Minnesota have been granted such approvals.

Regulatory Policy *continued*

State of Michigan has a variety of environmental regulations that apply to mining—both generic and specific. These regulations are codified in statute as "Parts" of the Natural Resources and Environmental Protection Act of 1994 (NREPA). The major generic environmental Parts of the NREPA are:

- Part 13, Permits
- Part 17, Michigan Environmental Protection Act
- Part 31, Water Resources Protection
- Part 55, Air Pollution Control
- Part 91, Soil Erosion and Sedimentation Control
- Part 201, Environmental Remediation
- Part 301, Inland Lakes and Streams
- Part 303, Wetlands Protection
- Part 315, Dam Safety
- Part 351, Wilderness and Natural Areas
- Part 353, Sand Dunes Protection and Management
- Part 365, Endangered Species Protection

Mining-specific environmental regulations vary considerably according to the types of minerals to be mined. The mining-specific environmental Parts of the NREPA are:

- Part 35, Use of Water in Mining Low-Grade Iron Ore
- Part 625, Mineral Wells
- Part 631, Ferrous Mineral Mining
- Part 632, Nonferrous Metallic Mineral Mining
- Part 634, Small Native Copper Mines
- Part 635, Surface and Underground Coal Mine Reclamation
- Part 637, Sand Dune Mining

EGLE has promulgated rules to implement most of the above Parts of the NREPA. For most of the mining-specific Parts of the NREPA, the subject matter is self-explanatory. Metallic mineral mining is covered by Parts 35, 631, 632 and 634. Part 625 regulates wells for solution mining, which is utilized for mining of salt and potash; it also regulates wells for production of natural brine, which are used for extraction of salt and magnesium. Part 625 also regulates wells for exploration for all types of minerals. Part 637 regulates mining of sand in designated areas within two miles of Great Lake shorelines.

There are two Parts of the NREPA that prescribe the authority of the DNR to manage mining activities on state-owned lands:

- Part 5, Department of Natural Resources
- Part 641, Peat Extraction from State-Owned Lands

ZONING AND LAND-USE REGULATIONS

As noted above, Michigan indigenous tribes have authority as sovereign nations to regulate activities, including land use, on reservations. The Committee did not analyze or review land use regulations for the tribes that have reservations in Michigan; however, the subcommittee did not identify any tribal mining-specific regulations in Michigan.

The Michigan DNR manages use of lands where the state owns surface or mineral rights. The DNR issues leases to explore for and develop state-owned minerals and promulgates administrative rules to guide the mineral leasing process. It ensures that the state receives fair market value for any mineral production, and reviews proposed mineral exploration or development activity involving state-managed land to mitigate adverse impacts to the environment or cultural resources. Not all state-owned land is open to the same level of mineral development. As part of the process of leasing state-owned mineral rights, the DNR reviews and classifies parcels according to whether surface-disturbing activities may be allowed. Some state-owned mineral rights may only be accessed via the subsurface from adjacent land and other state properties may have restrictions on where and what types of activities may be allowed on the surface.

Local units of government regulate land use primarily under the authority of the Michigan Zoning Enabling Act (ZEA). The ZEA authorizes counties, townships, cities and villages to establish zoning ordinances and establish zoning districts for the regulation of land development.

There are 83 counties, 544 cities and villages, and 1,240 townships in Michigan. Some counties and most cities and townships have zoning ordinances. The Committee has not reviewed local zoning ordinances in detail with respect to their subject matter; however, at least some townships have zoning provisions that specifically apply to mining.

MINERAL RIGHTS REGULATIONS

The right to develop minerals in Michigan is based mainly on common law, i.e., English law derived from custom and judicial precedent. In some cases, the common law doctrines have been modified or clarified by Michigan statutes.

Regulatory Policy *continued*

WORKER SAFETY REGULATIONS

Mine worker safety is regulated independently at both the state and the federal levels. County mine inspectors are responsible for worker safety at iron and copper mines under Public Act 163 of 1911, Copper and Iron Mine Inspectors. Federal authorities are responsible for mine worker safety at all mines under the provisions of the Mine Safety and Health Act.

ISSUES, OPTIONS AND RECOMMENDATIONS

A list of issues related to mining regulation was initially developed by Michigan's Mining Future Committee. The Regulatory Policy Subcommittee subsequently identified some additional issues during its discussions and added several other issues that were raised by interested parties and presented to the subcommittee. The result is a list of 13 issues, each of which is addressed below as they relate to each category of minerals:

1. Review of current regulations and comparison to other states
2. Assurance of balanced, reasonable, and effective regulations
3. Reduction of the potential for legal challenges
4. Policy on cultural resources
5. Mine shut down and reclamation
6. Alternatives analysis and greenfield/brownfield options
7. Mining of waste rock, tailings, and mill wastes
8. Permitting of below grade tailings disposal
9. Standards for above-ground tailings disposal facilities
10. Regulation of mineral exploration test wells
11. Zoning and land use
12. Identification of mineral rights ownership
13. Review and evaluation of Act 163 of 1911, Copper and Iron Mine Inspectors

Some of these issues overlap with issues addressed by the Mining Methods, Environment, and Reclamation Subcommittee. The Committee has identified recommendations for each issue. Where there may be several options to address the issue, those are also identified.

Review of Current Regulations and Comparison to Other States

The Committee reviewed statutes and rules currently in effect in Michigan and reviewed and evaluated comments and recommendations on regulatory issues from a variety of interest groups.

Michigan's regulatory climate with respect to ferrous and nonferrous metal mining is stringent, straightforward, and effective. This is important for maintaining an operations' social license and competitiveness. Michigan's mining-specific nonferrous mining regulations are modern, comprehensive, and effective. They cover planning, operation, reclamation, and monitoring. Michigan's mining-specific iron mining regulations are focused primarily on reclamation. However, the concerns with other environmental impacts from iron mining are adequately addressed through other existing federal and state regulations.

Michigan does not have state-level mining-specific regulations for industrial minerals other than solution-mined minerals and dune sand. There is a range of opinions on the issue of whether Michigan should have consistent, statewide regulation of industrial mineral operations. For the most part, there has been minimal controversy over these operations. The exception is sand and gravel operations. The locating and operation of these surface mines have raised concerns in some parts of the state, primarily associated with competing land use and quality of life issues. That topic is addressed under the issue of zoning and land use.

Iron ore deposits in the United States are currently mined only in Michigan and Minnesota. For most other minerals of interest in Michigan, deposits generally occur in a range of other states, and every state produces construction aggregates. Government regulation is not an impediment to investing in iron mining in Michigan; investment decisions are driven by geology and economics even if there is a strong regulatory climate and community support for mining.

For the purpose of comparing Michigan's regulatory climate to that of other states, the Committee reviewed the 2020 Annual Survey of Mining Companies by the Fraser Institute (the "Fraser Survey"). The institute is a Canadian think tank that conducts research on a variety of issues. The 2020 Fraser Survey incorporates results of the annual surveys for 2016 through 2020. The surveys cover most types of mining, but do not address construction aggregate mining. The 2020 Fraser Survey ranks 13 states, as well as 64 provinces and nations, on how public policy factors such as taxation and regulatory uncertainty affect mineral exploration investment. Specifically, the survey's policy perception index (PPI) assesses regulatory uncertainty, duplication, and inconsistencies; environmental regulation; taxation; land claims and protected areas; infrastructure; socioeconomic agreements; political stability;

Regulatory Policy *continued*

labor issues; geological database; and security. The number of jurisdictions and the number of respondents varies from year to year, and rankings vary accordingly. The 13 states included in the 2020 Fraser Survey were: Alaska, Arizona, California, Colorado, Idaho, Michigan, Minnesota, Montana, Nevada, New Mexico, Utah, Washington, and Wyoming.

Michigan's overall PPI score falls in the middle of the surveyed states. Following is a summary of Michigan's ranking for the five most recent years except for 2019, for which no data were available. For each of those years, the same 13 states were surveyed.

Survey Year	2016	2017	2018	2020
Average PPI Score (Surveyed States)	81.70	79.25	88.42	88.13
Michigan Score	90.49	89.18	90.20	82.26
Michigan Rank	5	2	8	8

Below are the details on Michigan's ranking in the 2020 Fraser Survey on the various factors that make up the PPI. Factors that relate to regulatory policy are in bold.

Geological database	1
Taxation regime	2
Labor regulations/employment agreements and labor militancy/work disruptions	2
Security	3
Legal system	9
Uncertainty concerning disputed land claims	9
Uncertainty concerning the administration, interpretation and enforcement of existing regulations	**10**
Socioeconomic agreements/community development conditions	10
Political stability	10
Availability of labor/skills	10
Uncertainty concerning environmental regulations	**11**
Uncertainty concerning protected areas	11
Quality of infrastructure	11
Trade barriers	11
Regulatory duplication and inconsistencies	**12**

The Fraser Survey does not cover construction aggregate mining, so we cannot draw conclusions from the survey as to Michigan's comparative standing in that area. Some other states have clear statewide standards for construction aggregate mining reclamation, whereas in Michigan, the regulations vary according to the local jurisdiction.

To remain relevant to current mining practices, rules should be reviewed on a regular basis and updated as needed to assure they are streamlined and efficient and keep up to date with current technologies and processes. Any updates should involve all stakeholders in a collaborative process to both strengthen and develop the mining industry while protecting the environment, natural resources and public health and safety.

The Committee identified seven issues with existing regulations: (1) Regulation of industrial minerals; (2) Inland lakes and wetlands created by mining; (3) Water quality limitations exceeding background water quality; (4) Part 632 rule promulgation; (5) Coordination of various environmental permits; (6) Royalty rates for leases on state-owned minerals; and (7) Specific tribal concerns.

(1) Regulation of industrial minerals

Some parties advocate for a consistent, statewide approach for regulation of mineral exploration and extraction that includes all mineral categories—metallic, industrial and fuel—that considers local, state and tribal government, industry and public concerns. Other parties believe that regulation of most industrial mineral mining, particularly aggregate operations, is better left to local government. In any event, there is consensus that Michigan needs to protect and conserve resources, hold mineral producers accountable and ensure a sustainable mineral extraction industry.

Recommendations:

Michigan should consider input from all affected stakeholders and determine whether regulation of industrial mineral mining operations should be done at the state or the local level and take appropriate actions to address that issue.

(2) Inland lakes and wetlands created by mining

Inland lakes and wetlands are subject to regulation under Parts 301 and 303 of the NREPA, respectively. Some mine operators feel frustrated when they are restricted from making changes to an inland lake or wetland that was created by the mining operation.

Regulatory Policy *continued*

Recommendations:
Michigan should review its regulations under Parts 301 and 303 and determine whether an exception should be made to allow for subsequent development of lakes and wetlands created by mining operations without prohibitive additional permitting requirements.

(3) Water quality limitations exceeding background water quality

The EPA sets water quality limitations for discharges into surface waters through National Pollutant Discharge Elimination System (NPDES) permits under authority of the Clean Water Act. NPDES permits are administered by EGLE by delegation from the EPA. In some cases, NPDES permits set maximum concentrations for specific constituents in discharge water that are lower than background water quality. On rare occasion, a mine operator must treat discharged water that is withdrawn and exceeds NPDES standards to make ambient water quality in receiving waters better than if the mining operation were not even there. In some cases, particularly for aggregate operations, the mine operation is simply withdrawing the water to dewater the mine excavation and then discharging it without adding any constituents. There may not be control methods to decrease the constituent concentrations in a way that the industry believes to be cost-effective, and even if concentrations in their discharges could be reduced, it would result in a cost to properly dispose of the resulting waste stream.

Options:
The NPDES is a federal program and Michigan cannot make changes to the program requirements without federal approval. However, the EPA states: "When developing effluent limitations for an NPDES permit, a permit writer must consider limits based on both the technology available to control the pollutants…and limits that are *protective of the water quality standards of the receiving water* (NPDES Permit Limits). Also, applications for NPDES permits for new mining discharges must include information on the expected *intake and effluent* characteristics.

Recommendations:
Michigan should review its NPDES regulations and determine whether a limited exception should be made regarding certain constituents that may be discharged from mine dewatering.

(4) Part 632 rules

Michigan's mining-specific regulations are generally deemed to adequately address concerns with ferrous and nonferrous metal mining, although some entities advocate for some specific changes, which will be discussed below as separate issues. However, Part 632 specifically prohibits promulgation of any additional rules after February 15, 2006. Two concerns have been expressed with respect to existing provisions of Part 632 rules: First, Part 632 has been amended from its original version, but the rules under Part 632 have not been revised to reflect those changes. Second, Part 632 allows for modification of a permit with limited public review if EGLE determines the modification does not constitute a meaningful change from the original permit. Some citizens and interest groups believe the term "significant" needs to be defined. If that were determined to be feasible and reasonable, it would require an amendment to the rules. In addition, other rules revisions might be needed in the future to address new or unforeseen conditions that may arise.

Options:
The Michigan legislature can either (1) amend Part 632 to allow promulgation of new rules, or (2) open Part 632 for amendment each time the need arises for new rule promulgation. This would allow for revisions to make the rules consistent with statutory changes. It would also allow for consideration of clarifying the meaning of "significant changes."

Recommendations:
It would be most efficient for the Michigan legislature to amend Part 632 to allow promulgation of new rules.

It is difficult to define the term "significant" as used in Part 632, and there is no brief and concise definition in relevant state or federal law. EGLE may want to refer to the Council on Environmental Quality rule, 40 CFR §1508.27, for the process for determining what may be considered "significant" by federal agencies under the National Environmental Protection Act.

(5) Coordination of various environmental permits

Mining operations typically require multiple environmental permits, which may include a mining permit, water quality permit, wetland permit, air quality permit, and others. Each permit may have its own timeline and application review process. Permitting of some operations may entail input from sources outside of the permitting agency, such as input from Indian tribes on impacts to natural and cultural resources. This can create confusion for persons engaged in various permit processes. It can also result in complications if one permit has been issued and is being challenged administratively while the application for another permit that may affect the first permit is being processed. EGLE

Regulatory Policy *continued*

follows the 2002 Government-to-Government Accord and Executive Directive 2019-17 on consultation with Indian tribes on mining issues. EGLE also establishes a "mining team" comprising representatives from various permitting programs as well as non-regulatory entities to review and coordinate mining permits.

Recommendations:
Permitting agencies should coordinate application review and permit issuance to the extent allowed by law.

(6) Royalty rates for leases on state-owned minerals

Other states have clear policies or procedures establishing fixed royalty rates or the calculation of variable rates for construction aggregate resources extracted from state land. Michigan does not have the same clear guidance regarding state-owned aggregate minerals.

Recommendations:
The state, industry, and the public would benefit from a modern study focused on royalty rates in Michigan that could inform sensible policy related to state-owned construction aggregate minerals.

(7) Specific Indian concerns

Indian tribes identified several concerns with existing mining regulations, including access to land and resources, cumulative impacts, perpetual care, impacts to the landscape, climate change and protection of water quality on a watershed basis. Indian tribes should be consulted when governmental agencies are considering permitting and follow-up activities for mining operations. In 2002, State of Michigan entered a Government-to-Government Accord with the 12 federally recognized Indian tribes in Michigan. The Accord acknowledges each tribes' sovereignty and right to self-governance and self-determination and commits the State to use a process of consultation with the tribes. Governor Whitmer issued Executive Directive No. 2019-17 to reaffirm, implement, formalize, and extend the commitments in the Accord. EGLE has issued Policy and Procedure 09-031 to implement the accord and directive, titled consultation and coordination with Indian tribal governments.

Recommendations:
Michigan state agencies should continue to adhere to the provisions of the 2002 Government-to-Government Accord and Executive Directive 2019-17 and should consider the concerns of potentially affected Indian tribes in regulation of mining operations.

Assurance of balanced, reasonable and effective regulations

Regulations are essential in balancing the need to encourage development of mineral resources with the need to protect the environment, natural and cultural resources, public health and safety, property rights and alternate land uses. Regulations must be reasonable, balanced and effective to meet that objective. When a mineral developer is deciding on whether to initiate a development project and how to conduct an operation, the cost to comply with regulatory requirements is just one of many considerations. It is not usually a major determinant in such decisions provided the regulations are reasonable, balanced and effective.

Regulations must be balanced. They must consider the rights and interests of all potentially affected parties in an equitable manner. They should treat all regulated entities impartially, minimizing any opportunity for an entity to cause harm to gain an unfair business advantage.

Regulations must be reasonable. Regulations should be designed to prevent worst case scenarios and to provide necessary protections for the environment, natural resources, public health and safety and property. Regulations should take into account the variations in use of resources among user categories and provide protection for the most vulnerable. For example, tribes may have different uses of plants, animals or water than the public. Reasonable regulations can drive innovations in industry while providing the necessary protections. Compliance costs for permitting, reporting and meeting operational requirements should be proportionate to the desired effect.

Regulations must be effective. Regulations must be written in clear, consistent and concise terms to minimize differences in interpretation. At the same time, they must be flexible enough to deal with the variety of situations that may be encountered in mineral development. They must be comprehensive enough to address all the concerns of affected entities. Regulations must be amenable to amendment or revision as may be needed to address new and unforeseen circumstances or conditions, including recent technology and mining and processing methods that are not effectively covered by existing regulations. Mineral developers must have reasonable assurance that regulatory requirements and the associated costs will be relatively stable and predictable. Landowners and other users of land and resources must have assurance of predictability to support property values and quality of life expectations. To be effective, regulations must be

Regulatory Policy *continued*

interpreted and implemented in accordance with their intent. Some interest groups believe that EGLE (the Department of Environmental Quality at the time) has not interpreted Part 632 correctly; however, Michigan courts have repeatedly upheld the agency's decisions.

Regulatory language and the interpretation of regulations should take into account Indian property rights and treaty rights.

Recommendations:

Some interests would like to see some changes made in the regulations, which are discussed elsewhere in this report; however, Michigan regulations in general are balanced, reasonable and effective. Michigan should strive to maintain these standards in any new regulations that may be implemented.

Reduction of the potential for legal challenges

There will always be a potential for legal challenges to the locating and permitting of mineral exploration and extraction operations. Ideally, these challenges will occur along the margins of the law and not in the core of these laws. Clear, concise and comprehensive regulations help to minimize conflicting interpretations of regulations and regulatory actions. Regulations should also, to the extent possible, specify in enough detail how affected parties can engage in the regulatory process and in challenging regulatory outcomes.

Recommendations:

Michigan mining regulations are generally clear, concise and comprehensive. One exception is in the interpretation local zoning ordinances. That issue is discussed under "Zoning and Land Use."

Policy on cultural resources

Protection of cultural resources can be a significant concern in planning the location and operation of a mine. A good definition of "cultural resources" is that used by the Natural Resources Conservation Service:

Cultural resources are tangible remains of past human activity. These may include buildings, structures, prehistoric sites, historic or prehistoric objects or collections, rock inscription, earthworks, canals or landscapes.

Many natural resource features are also considered to be cultural resources by Indian tribes.

The administrative rules under Part 632 require an environmental impact assessment that includes "cultural, historical, or archaeological resources" as well as specified natural resources. "Cultural, historical or archaeological resource" is defined as a structure or site that is listed on specific national, state or local registry. Other Michigan state-level mining-specific regulations do not reference cultural resources. The subcommittee has not determined whether any local zoning ordinances address cultural resources per se.

Recommendations:

Identification of known or potential impacts on cultural resources should be a part of planning mining projects and must be incorporated in the mining permit application review process where it is provided for in regulations. This is an issue that encompasses much more than mining operations. Michigan should evaluate ways to incorporate evaluation of impacts on cultural resources for mining as well as other major projects that alter the landscape.

Mine shutdown and reclamation

Proper shutdown and reclamation of mine sites using best management practices and design improves public trust in industry and government. Reclamation should be incorporated in mining plans prior to commencement of operations, and should consider future land use, local community needs and the environment. Michigan's state-level mining regulations properly address those issues; however, local regulations, which affect primarily construction aggregate mining, may or may not address them.

A major goal of mine reclamation is to leave the land in a condition such that it can be used for other purposes. Reclamation can be concurrent, i.e., it is conducted as mining is proceeding on another part of the operation; or it can be done as a last action after all mining is completed. In either case, where reclamation is taking place the mineral subject to mining has generally been exhausted, i.e., it is not economical to mine any additional mineral if indeed there is any left. However, sometimes economic conditions change—commodity prices or demand can go up, or technology can change, making it economical to mine minerals in concentrations or quantities that were previously unprofitable. It is in the interest of Michigan citizens and mining companies that reclamation be conducted in ways that allow for subsequent mining when that is feasible. That goal may in some cases conflict with the goal of minimizing potential impacts to the landscape or the environment. For

Regulatory Policy *continued*

instance, backfilling of mining waste into abandoned workings may be the preferable methodology to minimize impacts; however, that may work to preclude additional mining from the abandoned workings in the future.

The Republic and Empire iron mines are examples of successful reclamation. The Republic Mine was closed in 1981. The tailings basin was converted to a wetland preserve. About 700 acres of new wetlands were created, with 225,000 wetland trees planted and 2,300 acres placed in conservation easement. It is now a habitat for diverse birds, reptiles and mammals. The Empire Mine was indefinitely idled in August 2016. Reclamation was already 90 percent complete at that time. Through 2019, the mine operator, Cleveland-Cliffs, had planted 2.28 million trees in Michigan as part of its reclamation work.

The Eagle Mine, a nickel-copper mine in Marquette County, is an example of reducing impacts by effective management of waste rock. The mine began operating in 2010. The operation places waste rock in mined-out underground workings and cements it in place. This accomplishes two objectives: it allows for more complete extraction of the ore body, and it reduces any impact that might result from storing waste rock on the surface.

Michigan's mining-specific regulations for dune sand mines have requirements for grading, sloping, revegetation, and stabilization and provide for designation of a subsequent use of the sites. Regulatory requirements for reclamation at other industrial mineral mine sites vary widely according to local ordinances. In many cases there is a monetary incentive for operators to reclaim industrial mineral mining sites for other uses, especially for conversion to residential development where a water body has been created.

Recommendations:

Regulation should consider creative and flexible reclamation options to allow for site-specific future use, whether for future mining or reprocessing of tailings or other mine wastes or to create unique recreational or residential development opportunities. Michigan should encourage mine reclamation that allows for subsequent mineral development, in balance with the goal of minimizing impacts to natural resources and the environment. Michigan may want to consider consistent standards for reclamation of industrial mineral mines sites—particularly construction aggregate mines—that apply on a statewide basis but can be adapted for local conditions (see the zoning and land use topic below). Such standards could be implemented either through requirements for local ordinances in the ZEA or through state-level regulation.

Alternatives analysis and greenfield/brownfield options

While a mineral may occur over a widespread area, it generally can be developed only where the concentrations or quantities are high enough to be economic. Obviously, there are limitations as to where a mining operation can be located. However, there may be a range of alternative means of extraction that have different impacts. Also, there is often some flexibility in the location of associated mineral processing facilities, truck routes, etc. Locating mining operations in areas that have been previously developed (brownfields) is advantageous in reducing the impacts of the operation.

Alternatives analysis should identify options that can reduce environmental and safety impacts while also considering issues of costs and liabilities. Part 632 of the NREPA requires an alternatives analysis as part of the planning and permit application process for nonferrous metal mines; however, alternatives analysis requirements are not common for other mining operations.

Recommendations:

Michigan should utilize alternatives analysis in permitting of mining operations where it may be applicable in the siting and operation of mines and processing facilities. The application of alternatives analysis will vary according to the type of mining operation and the regulatory authority.

Mining of waste rock, tailings and mill wastes

Michigan regulations in most cases are intentionally designed to address mining of virgin mineral deposits. However, there may be potential in some cases to reopen mining waste repositories to extract metallic minerals that may not have been recovered in the initial mining and processing operations. This mining waste may consist of waste rock (crushed or excavated rock with low concentrations of valuable metals), tailings (ground rock from which most of the valuable metals have been removed by milling and processing), and other milling and processing wastes. Reprocessing of mining wastes can have substantial benefits—it can provide mineral products without initiating new mining, and in some cases, it can result in environmental improvements by reclaiming old legacy waste repositories and leaving them in better condition subject to modern regulatory requirements.

Regulatory Policy *continued*

It may be inferred that Parts 631 and 632 would apply to excavation or reprocessing of mining or milling wastes; however, the language in those statutes is not clear and specific in that regard.

Recommendations:
Michigan should review Parts 631 and 632 to determine if they should be amended to specifically address extraction of minerals from mining and processing wastes. Michigan should explore opportunities for funding and public/private partnerships to research technologies and develop solutions for disposal of mining and processing waste products, and to identify approaches to economically mine lower-grade mineral resources. There are numerous examples around the world of successful efforts by public/private partnerships to convert former mining brownfield sites into sites that benefit local communities while realizing new economic benefits from secondary recovery of mineral products.

Permitting of below grade tailings disposal

There are, in general, three options for storage or disposal of tailings: below grade (in abandoned underground mine workings), above grade (either dry stacked or in a slurry impoundment), and subaqueous (below the water level generally in a waterbody created by mining operations).

Where it is feasible, below grade disposal is generally considered a best management practice. In many instances it is the best option for protection of the environment, and it does not require perpetual care.

Under the Underground Injection Control (UIC) program of the Safe Drinking Water Act, the EPA regulates injection of liquids into the subsurface. The UIC permitting process can be quite onerous and can entail lengthy periods for application review. If a mine operator places tailings in a slurry form through a pipeline into abandoned workings, a UIC permit is required. However, if the operator trucks tailings for emplacement, a UIC permit is not required. This does not make sense—the result is the same.

Recommendations:
Michigan should assure that its metallic mineral mining regulations encourage and facilitate below grade tailings disposal where applicable. Michigan should work with its partners to advocate with the EPA for an exception from UIC requirements for slurry pipelines for below grade emplacement of tailings.

Standards for above-ground tailings disposal facilities

New international standards for above-ground tailings disposal facilities have been developed and some states such as Montana have recently updated their regulations to ensure they have appropriate standards, review and monitoring for these facilities. Mine tailings impoundment dams are a specific concern. Michigan's dam safety regulations, under Part 315 of the NREPA, do not have standards specifically for tailings impoundments. Tailings dams involve some special considerations that may not be pertinent to other types of dams.

Recommendations:
Michigan should review its mining regulations to assure they incorporate appropriate standards and protections for above ground tailings disposal facilities.

REGULATION OF MINERAL EXPLORATION TEST WELLS

Mineral exploration test wells are regulated by EGLE under Part 625, Mineral Wells, of the NREPA. There are three concerns with the test well regulations: (1) Exceptions for test wells in the western Upper Peninsula; (2) Bonding requirements; and (3) Confidentiality.

(1) Exceptions for test wells in the western Upper Peninsula

Test wells that are more than 50 feet deep and penetrate bedrock or go below the deepest fresh water require permits and bonds, with one exception: Test wells in areas where Precambrian age rocks directly underlie surface deposits (approximately the western half of the Upper Peninsula) do not require a permit or bond, although drillers are required to submit records within two years after completion of drilling. There is an expectation by the public for EGLE to track these wells and assure they are safely drilled and properly plugged. However, companies drilling wells in the western Upper Peninsula do not pay any fees and are not obligated to notify EGLE in advance when and where the wells are being drilled, although test well drillers typically keep EGLE staff advised of their activities on a voluntary basis.

(2) Bonding requirements for certain test wells

For wells in the eastern Upper Peninsula and the Lower Peninsula, the regulations allow for blanket permits (i.e., one permit for multiple wells) and blanket bonding for test wells that do not penetrate below the deepest fresh water and are 250 feet or less in depth. For other test wells, the regulations

Regulatory Policy *continued*

require individual well permits and bonds. It is common for a company to drill 100 to 200 wells for a project in those areas with depths that nominally exceed 250 feet but do not go below fresh water. In those cases, a disproportionate and unnecessarily large bond is required for wells that have minimal potential environmental impact. For a 200-well project the bond would be $1.1 million as compared to $22,000 if the wells were less than 250 feet deep.

(3) Confidentiality

The current Part 625 confidentiality provisions are burdensome and unnecessarily restrictive for the public and for EGLE. The administrative rules require permit applicants to provide basic location information and permit type to township clerks; however, the confidentiality requirements do not grant authority to EGLE staff to share basic details directly with the public. This has led to conflict and distrust.

Recommendations:

Michigan should consider revisions to Part 625 and rules to:

a. Require permits, fees and bonding for test wells in the western Upper Peninsula. Permits could be on a blanket basis and would not have to specify exact locations, thus protecting confidentiality.
b. Allow blanket permits and bonds for test wells that exceed 250 feet in depth but are still relatively shallow and do not penetrate below freshwater.
c. Allow EGLE to share basic information on mineral wells with the public while still protecting the proprietary interests of the operators.

ZONING AND LAND USE

As noted above, Michigan does not have state-level, mining-specific regulations for industrial minerals other than solution-mined minerals and dune sand. Regulation of other industrial minerals involves primarily issues of competing land use and quality of life, and currently is under the authority of local government. This has led to a patchwork of policies and regulations and a lack of coordination across state and local governments regarding mining and reclamation.

There are some specific limitations on local government authority over mining. Under the ZEA a local unit of government cannot totally prohibit a land use if there is a demonstrated need for the land use within their jurisdiction or the surrounding area, unless an appropriate location does not exist, or the use is unlawful. Specifically, with respect to mining, the ZEA states that a local ordinance shall not prevent mining of valuable natural resources unless very serious consequences would result. It places the burden of proof on a person challenging the zoning decision and sets criteria for determining "very serious consequences." It explicitly does not limit a local ordinance from reasonable regulation of hours of operation, blasting hours, noise levels, dust control measures, or traffic.

There is currently a distinct difference of opinion on the issue of local control of aggregate mining operations. Some in the aggregate industry are frustrated with lengthy and sometimes prohibitive permitting processes at the local level. Local units of government want to retain control over the locating and operation of mines, and attribute permitting delays in some cases to applications that are vague or inadequate. Citizens in some areas of the state want the ability to prohibit mining operations in their community. Some citizens and interest groups believe that at least some mining-specific regulations should be left with the local government; others believe there should be comprehensive regulations at the state level. Appendix H is a more comprehensive overview of aggregate mining in Michigan and some unique challenges around this type of mining.

Legislation has been introduced that would amend the ZEA to prohibit a local unit of government from denying a permit if the applicant met certain specified criteria. Other legislation has been introduced that would vest most regulatory authority over aggregate mining in EGLE. None of the legislation has been enacted as of the date of this report.

It was suggested that alternative dispute resolution be utilized to address permitting issues. The parties in a dispute can volunteer to undergo mediation, and there is a statewide system of alternative dispute resolution under the authority of the Michigan Supreme Court.

Studies or mapping to identify mineral resources could help address this controversy by providing information that could be incorporated in zoning planning and decisions. The DNR has had discussions with the Michigan Geological Survey on potential studies of mineral locations on state land. Kasson Township in Leelanau County undertook aggregate mapping at their own expense. It has included the results in its zoning with satisfactory results. The obstacle to conducting studies and mapping is lack of funding. This issue overlaps with the "Research and Mineral Mapping" section.

Regulatory Policy *continued*

Indigenous tribes are concerned that they are not regularly consulted when considering zoning and planning at the local level.

Options:

1. Maintain status quo.
2. Enact new legislation amending the ZEA that would restrict local units of government from imposing unduly burdensome conditions in the permitting process and restricting their ability to prohibit aggregate mining.
3. Enact new legislation vesting authority to regulate mining operations with the state. Authority to regulate specific aspects of mining operations, such as noise levels, trucking routes, etc., could be reserved for local government.
4. Provide for state level standards that could be implemented by local governments in a predictable and consistent manner. The standards could include some issues that typically may not be addressed by local government, including reclamation of topsoil and effects on water flow.

Recommendations:

Michigan should seek a resolution to the issue of local control that assures there are adequate sources of construction aggregates close to the areas where they are needed but respects the needs of local government units to protect the interests of their constituents. Permitting authorities should consider using alternative dispute resolution. Michigan should consider actions to assure that Indigenous tribes have adequate opportunities to engage in zoning and planning decisions.

Identification of mineral rights ownership

Under common law mineral rights may be owned separately from surface rights, resulting in what is commonly referred to as "severed" mineral rights or a "split estate." Also, the right to explore for and develop minerals on a parcel may be leased or assigned to another person or company. The owner or lessee of the mineral rights has a right to reasonable use of the surface to explore for and extract minerals. A common complaint of landowners is that they are unable to ascertain the ownership or leasing status of mineral rights on their property, and title companies usually will not guarantee title to minerals. Determining the status of mineral rights also can be challenging for a person or company interested in developing the minerals. If a mineral transaction took place many years ago, it may be difficult to determine or locate the current owner of the interest. This is particularly true if the interest has been inherited by multiple descendants of the original owner.

A person can determine the status of mineral rights to a parcel by searching the records of the county's Register of Deeds if the mineral transactions were recorded. Two Michigan statutes have pertinent provisions on the recording of interests in lands. Under the provisions of Chapter 565, "Conveyances of Real Property," Revised Statutes of 1846, as amended, an instrument establishing severed mineral rights or transferring mineral rights is not required to be recorded; however, if it is not recorded, it is not effective against any subsequent good faith purchaser of the property or mineral interest.

Searching property records can be more difficult in some counties than in others. Some counties have property records online and may offer free access, while others still utilize paper records and may charge a fee to access them.

Under the Marketable Record Title Act, Public Act 200 of 1945, a person who has an unbroken chain of title of record for 20 years for a severed mineral interest and 40 years for surface or other interests, has a marketable record title to that interest. As used in the act, "mineral interest" does not include an interest in oil, gas, sand, gravel, limestone, clay or marl.

Options:

1. Require recording of property transactions within a certain short timeframe.
2. Consider enacting a statute stipulating that severed mineral rights revert to the surface owner after a specific period (e.g., 20 years) unless mining has commenced, the severed interest is transferred to another party by a recorded instrument, or the owner of the severed interest files and records a notice of intent to retain the interest. This would be like Public Act 42 of 1963, Termination of Oil or Gas Interests in Land (sometimes referred to as the dormant minerals act).
3. Take actions to make access to county property records easier and more consistent. Additional funding for counties to digitize parcel and property records would be beneficial. Recently, the state has developed a partnership with many Michigan counties for sharing digital parcel boundary and land ownership records. The advantages of this collaboration extend beyond the minerals industry.

Regulatory Policy *continued*

Recommendations:
Pursuing any of the options above would assist landowners in determining their mineral rights; however, they would affect a wide variety of stakeholders beyond those directly involved in mining and could entail some impacts not fully identified by the Committee. All stakeholders should be a part of any action that may be considered to address this issue.

REVIEW AND EVALUATION OF ACT 163 OF 1911, COPPER AND IRON MINE INSPECTORS

Act 163 of 1911 provides for the election of mine inspectors and appointment of deputy inspectors in counties where there are iron or copper mines. Under the Act, a mine inspector must be able to read and write in English, have at least 10 years' experience in mining or have a degree in mining engineering or an equivalent degree, and have practiced as a mining engineer for at least two years. The compensation for mine inspectors is determined by the county board of supervisors, with a minimum of $15 per day. The responsibilities of the mine inspector are to:

- Inspect all mines at least once every 60 days, condemn places where employees are in danger from any cause, and require shutdowns for unsafe conditions.
- Inspect a mine before it is re-opened and issue a certificate of safety before any employee or person is permitted to enter the mine.
- Conduct an inspection in response to a request from any miner and protect such requests from disclosure.
- Require certain safety provisions in operating mines.
- At idle or abandoned mines, require fencing or railings around shafts or open pits and erect such barriers if the mine operator fails to do so.
- Submit an annual report to the board of supervisors and the department of labor.

For operating mines, Act 163 overlaps with federal regulation under the Mine Safety and Health Act. The provisions of the Mine Safety and Health Act are administered by the Mine Safety and Health Administration (MSHA). MSHA regulations extend beyond metallic mining operations and include all lands from which minerals are extracted from natural deposits in non-liquid form for their intrinsic value. MSHA authority covers not just mines, but also associated mineral processing facilities, stockpiles, and private roads that serve mining sites.

Both county mine inspectors and MSHA inspectors are responsible for mine worker safety. MSHA inspectors inspect surface mines at least twice a year and underground mines at least four times a year. States may enforce mine safety but cannot conflict with MSHA.
County mine inspectors are also responsible for public safety at closed mines, whereas federal safety regulations do not apply to closed mines.

The Regulatory Policy Subcommittee identified five issues associated with Act 163: (1) Applicability; (2) Qualifications of mine inspectors; (3) Overlap with federal regulations; (4) Liability of mine inspectors and counties; and (5) Beneficial reuse of abandoned mine sites.

(1) Applicability

The Act applies only to counties where there are iron and copper mines. It is difficult today to determine the intent of the statute when it was written in 1911; however, it is reasonable to assume that the concerns for worker and public safety associated with iron and copper mines would also apply to mines for other metallic minerals. Marquette is the only county that currently has an operating iron or copper mine (or other metallic mineral mine, for that matter). Many of the same concerns might also apply to mines for some industrial minerals, such as rock quarries.

The Act requires inspectors to inspect "all the mines of his or her county." The term "mines" is not defined (in fact, there are no definitions in the Act). While it is assumed that the Act was intended to cover only copper and iron mines, it is not clear in that respect. Some mine inspectors have interpreted the Act to require them to inspect and carry out enforcement on all mines in their county, including sand and gravel and other mining operations.

It is not clear whether the duties of the mine inspector extend to mine roads, milling and processing plants, and other ancillary facilities.

The Act imposes a duty on mine inspectors to "…condemn… places where he or she shall find that the employees are in danger from any cause…" While it may be assumed that this requirement applies only to working mines, the statute is unclear; it could be interpreted as requiring inspectors to oversee employee safety at abandoned mines that have been converted to other uses, such as for recreation.

(2) Qualifications of mine inspectors

The qualifications for mine inspectors are quite stringent. This has made it difficult in some instances to find persons willing to run for election as mine inspector. The statutory

Regulatory Policy *continued*

qualifications may be appropriate for overseeing operating mines but are probably overly restrictive for closed mines. Act 163 does not provide for alternatives if there are no candidates for mine inspector or if the position is vacated.

(3) Overlap with federal regulations

For operating mines, the Act duplicates requirements under federal law implemented by MSHA, except that the MSHA regulations are much more detailed, clear and concise.

(4) Liability of mine inspectors and counties

Act 163 creates significant liability for inspectors and counties for acts or omissions of the inspector. This is exacerbated by the vagueness and uncertainty in the terms and requirements under Act 163, which create room for multiple interpretations of the statute.

(5) Beneficial reuse of abandoned mine sites

Abandoned mines are often used for other unrelated purposes after mining activity has ceased. Open pit mines that naturally fill with water are typically used for recreation; in some cases, these sites are operated by local governmental units for public access. For abandoned mine areas that have very steep or vertical edges or abrupt underwater drop-offs, fencing or barriers are needed public safety; however, it is not necessary or appropriate to require fencing or barriers around abandoned mine areas that do not pose such hazards. Act 163 does not make that distinction.

Options:

Amendment of Act 163 would be required to address the issues related above. Act 163 was last amended in 1984.

Legislation was introduced in early 2021 that addresses mine inspector qualifications and some of the concerns with applicability of the Act. It would amend Act 163 to do the following:

- Apply the provisions of the Act to any county where a metallic mineral mine is located.
- Allow a county to designate as mine inspector a mine inspector from another county.
- Reduce the experience qualification for mine inspector in a county where there is only an abandoned, closed or idled metallic mineral mine.
- Specify that a person elected to another public office is not eligible to be an inspector of mines, except for a person who is a mine inspector in another county.

As of the date of this report, the legislation has not been enacted. Additional legislation would be needed to address the remaining concerns, as follows:

- Add pertinent definitions to the Act, including a definition of "mines" to clarify that the Act applies only to metallic mines, and to which associated features it should apply, such as haul roads, processing facilities, ore and waste rock storage facilities, etc.
- Clearly distinguish which provisions of the Act apply to operating mines versus inactive or closed mines.
- Exempt inspectors from responsibilities and liability for overseeing inactive mines except to provide for fencing or barriers at sites where there is a hazard due to steep slopes, open shafts, or sharp underwater drop-offs, etc. Minnesota's mine inspector law (Chapter 180 [180.01-180.13]) may be a model for such an exemption.

The legislature may want to consider whether to eliminate the duplication of effort with MSHA for overseeing worker safety at operating mines.

Recommendations:

The Michigan legislature should enact Senate Bill 119 and should consider additional amendments to Act 163 as outlined on the options above.

SUMMARY AND RECOMMENDATIONS

As used in this report, regulations include both statutes and rules. They can be characterized as either generic (applying to a variety of activities) or mining specific. Mining regulations may be federal, tribal, state or local and can be categorized as environmental, land use, mineral rights and worker safety regulations.

The Regulatory Policy Subcommittee identified a list of 13 issues regarding regulatory policy and identified recommendations to address each issue.

The regulatory issues and recommendations are summarized as follows:

1. Michigan should take the following actions with respect to its current regulations on mining:
   (a) Determine whether regulation of industrial mineral mining operations should be done at the statewide or the local level, and take appropriate actions.

Regulatory Policy *continued*

(b) Review its regulations for inland lakes and wetlands and determine whether an exception can be made to allow for subsequent development of lakes and wetlands created by mining operations.
(c) Work to review options under the delegated federal water discharge program so that mine operators do not have to clean up discharge water to levels better than background quality.
(d) Allow amendment of rules under the nonferrous metal mining statute.
(e) Coordinate permit application review and issuance to the fullest extent possible.
(f) Establish policies for royalty rates for construction aggregate mines on state land.
(g) Continue to adhere to the 2002 Government-to-Government Accord and Executive Directive 2019-17 for consultation with Indian tribes on mining issues.

2. Michigan should strive to maintain balanced, predictable, reasonable and effective standards in existing and future regulations.
3. Michigan's generally clear, concise and comprehensive mining regulations act to reduce potential legal challenges; one exception is in the interpretation of local zoning ordinances.
4. Michigan should identify known or potential impacts on cultural resources as part of planning and permitting of mining projects; this issue extends well beyond mining operations.
5. Michigan should use mine reclamation options that allow for future beneficial use of closed mines, whether for additional mining or recreational or residential development.
6. Michigan should utilize alternatives analysis in permitting of mining operations where applicable.
7. Michigan should evaluate amendment of Parts 631 and 632 to address mineral extraction from mining and processing wastes and investigate opportunities for research on extraction technologies.
8. Michigan should facilitate below grade tailings disposal where applicable and work to advocate for an exception from EPA requirements for emplacement via slurry pipelines.
9. Michigan should review its mining regulations to assure they incorporate appropriate standards and protections for above ground tailings disposal facilities.
10. Michigan should consider revisions to Part 625 and rules on mineral test wells to require blanket permits, fees, and bonding in the western Upper Peninsula; allow blanket permits and bonds for certain low-impact wells; and reduce confidentiality requirements.
11. Michigan should seek a solution to the controversy over local control of aggregate mining that assures that resources will be available where needed while respecting the role of local government units to protect their constituents' interests.
12. Michigan should engage all stakeholders in considering actions to address challenges of identifying mineral rights for property owners and mining interests. Actions could include strengthening of property transaction recording requirements, stipulating that severed mineral rights revert to the surface owner after a specific period and improving access to county property records.
13. Michigan should amend Act 163 of 1911, Copper and Iron Mine Inspectors, to (1) make it apply to counties where any metallic mineral mine is located; (2) allow a mine inspector to serve in multiple counties when necessary; and (3) reduce the experience needed for mine inspector in a county with no active mines. Michigan should consider additional amendments to clarify applicability of the Act, particularly with respect to closed mines that may be used for other purposes and to address potential liability issues.

Appendix A

***** Act 47 of 2019 THIS ACT IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

MICHIGAN'S MINING FUTURE COMMITTEE
Act 47 of 2019

AN ACT to create a Michigan's Mining Future Committee; to provide for the powers and duties of certain governmental officers and agencies; and to repeal acts and parts of acts.
History: 2019, Act 47, Eff. Oct. 6, 2019.

The People of the State of Michigan enact:
***** 319.161 THIS SECTION IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

319.161 "Committee" defined.
Sec. 1. As used in this act, "committee" means the Michigan's Mining Future Committee created in Section 2(1).
History: 2019, Act 47, Eff. Oct. 6, 2019.

***** 319.162 THIS SECTION IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

319.162 Michigan's Mining Future Committee; creation; membership; appointment; removal; quorum; public meetings; writings; compensation.
Sec. 2.:
(1) The Michigan's Mining Future Committee is created within the Department of Environment, Great Lakes, and Energy.
(2) The committee shall consist of the following members:
(a) Ten members appointed by the governor as follows:
(i) A member of a local chapter of an international steel workers union representing workers at an ongoing ferrous mining operation in this state or workers from an idled ferrous mining operation in this state.
(ii) A member representing a ferrous mining operation in this state.
(iii) A member representing a metallic nonferrous mining operation in this state.
(iv) A member representing an aggregate mining operation in this state.
(v) Two members, each representing an environmental nonprofit organization in this state, with expertise in mining.
(vi) Two current or former research faculty members at a university in this state that hold a master's or doctorate degree in mining or geology.
(vii) A member representing a municipality in this state where a ferrous, metallic nonferrous, or aggregate mining operation is located.
(viii) A resident of this state who is a member of a federally recognized Indian tribe that has trust lands in this state.
(b) The directors of the following, or their designees:
(i) The Michigan Economic Development Corporation, as defined in Section 4 of the Michigan Strategic Fund Act, 1984 PA 270, MCL 125.2004.
(ii) The Department of Natural Resources.
(Iii) The Department of Environment, Great Lakes, and Energy.
(c) A designee of each of the following:
(i) The state senator for the Senate District with the highest production from metallic mineral mines in this state in the calendar year preceding the year in which the appointment is made.
(ii) The state representative for the House District with the highest production from metallic mineral mines in this state in the calendar year preceding the year in which the appointment is made.
(3) The members first appointed to the committee under subsection (2)(a) shall be appointed within 30 days after the effective date of this act.
(4) If a vacancy occurs on the committee for a position under subsection (2)(a) or (c), the vacancy shall be filled in the same manner as the original appointment.
(5) The governor may remove a member of the committee appointed under subsection (2)(a) or (4) for incompetence, dereliction of duty, malfeasance, misfeasance, or nonfeasance in office, or any other good cause.
(6) The first meeting of the committee shall be called by the director of the Department of Environment, Great Lakes, and Energy, or his or her designee. At the first meeting, the committee shall elect from among its members a chairperson and other officers as it considers necessary or appropriate. After the first meeting, the committee shall meet at least quarterly, or more frequently at the call of the chairperson or if requested by three or more members.

Appendix A *continued*

(7) A majority of the members of the committee constitute a quorum for the transaction of business at a meeting of the committee. A majority of the members present and serving are required for official action of the committee.
(8) The business that the committee may perform shall be conducted at a public meeting of the committee held in compliance with the Open Meetings Act, 1976 PA 267, MCL 15.261 to 15.275. A writing prepared, owned, used, in the possession of, or retained by the committee in the performance of an official function is subject to the Freedom of Information Act, 1976 PA 442, MCL 15.231 to 15.246.
(9) Members of the committee shall serve without compensation. However, members of the committee may be reimbursed for their actual and necessary expenses incurred in the performance of their official duties as members of the committee.

History: 2019, Act 47, Eff. Oct. 6, 2019.

***** 319.163 THIS SECTION IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

319.163 Duties of the committee.

Sec. 3. The committee shall do all of the following:
(a) Recommend actions to strengthen and develop a sustainable, more diversified mining and minerals industry in this state while protecting the environment and natural resources of this state.
(b) Evaluate government policies that affect the mining and minerals industry.
(c) Recommend public policy strategies to enhance the growth of the mining and minerals industry, especially for research and development in mining and mineral processing technology, including pellet production, for the next generation of mining.
(d) Advise on the development of partnerships between industries, institutions, environmental groups, funding groups, and state and federal resources and other entities.

History: 2019, Act 47, Eff. Oct. 6, 2019.

***** 319.164 THIS SECTION IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

319.164 Report.

Sec. 4. Within 2 years after the effective date of this act, the committee shall submit a report on its work to the governor, the legislature, this state's United States senators, and members of this state's United States congressional delegation.

History: 2019, Act 47, Eff. Oct. 6, 2019.

***** 319.165 THIS SECTION IS REPEALED BY ACT 47 OF 2019 EFFECTIVE JANUARY 4, 2022. See MCL 319.165 *****

319.165 Dissolution of committee; repeal of act.

Sec. 5.:
(1) The committee is dissolved 60 days after the report is submitted under Section 4.
(2) This act is repealed 90 days after the deadline for the report to be submitted under Section 4.

History: 2019, Act 47, Eff. Oct. 6, 2019.

Appendix B

LISTING OF TOPICS AND ISSUES CONSIDERED BY THE COMMITTEE

SOCIAL, ECONOMIC AND LABOR OPPORTUNITIES TOPICS

- Assemble and disseminate information on the economic and social impact of all types of mining (extractive industries) in the state.
- Encourage community education.
- Utilize energetic and bright workforces, including students, researchers and faculty members, to solve diverse, mining-related problems.
- Due to the cyclical nature of mining, improve the unemployment benefit amount and benefit duration for laid-off miners.
- Increase enrollment in mining-related programs, due to limited in-state job opportunity.
- Achieve and maintain the publics' trust and support of the Committee.
- Make the public aware of its heavy dependency on mineral resources and the important role and social obligation that Michigan can play in supplying some of these.
- Address public misconceptions about mining.

RESEARCH AND MINERAL MAPPING TOPICS

- Improve availability of information on mineral potential in Michigan.
- Encourage statewide research fund (need for stable funding for Michigan Geologic Survey and universities to do statewide mineral and geological research).
- Set up statewide land-use classification that encourages exploration and mining.
- Explore new ore bodies and research into mine waste and reclamation.
- Well-equipped laboratories to conduct field and laboratory-based studies related to mining.
- Set up a mining research program that will allow us to maintain information on what exists in the state and develop methods for processing it at a profit in an environmentally acceptable way, using a mixture of industry sponsorship and state-provided funding.
- Leverage existing (or new) research opportunities to "level the playing field." Research and ultimately implement technologies to process Michigan's reserves more effectively and efficiently would be helpful. More efficient silica and phosphorus rejection are examples.
- How can we encourage industries that do mining-related research to make their results available to other companies, who may be their competitors?
- Conduct freeze/thaw testing.
- Inadequate state funding to conduct mining research.
- The steel industry in the U.S. is changing significantly. Market share of production from conventional blast furnaces is declining and being replaced by production of steel in electric arc furnaces (which do not utilize taconite pellet feedstock). This long-term trend has reduced markets for iron ore pellets like those made at Michigan's Tilden Mine.
- Identify and categorize land in the state in a way that accounts for the long-term need to explore for and produce mineral deposits.

MINING METHODS, ENVIRONMENT AND RECLAMATION TOPICS

- Environmental stewardship
- Provide for post-mining beneficial land use.
- Deal with mining wastes by methods other than dumping them and bring together waste producers with waste users so that we can avoid producing pollution.
- Backfilling: Reducing waste through best management practices. Sustainable Mining Practices.
- The Tilden Mine in Michigan is the only hematite mine across all domestic U.S. iron ore operations in Minnesota and Michigan; all others mine magnetite. Production of hematite iron ore pellets presents additional mining and processing challenges when compared to other producers/competitors.
- Reclamation: Strengthening requirements would help the industry.
- Find better ways to remediate legacy mining sites.
- Impacts of climate change (e.g., changing weather patterns) to permitting, baseline data collection, water protection, wetlands protection, etc.
- Cumulative impacts.
- In order to strengthen and develop a sustainable, more diversified mining and minerals industry (from the duties of the committee), the state needs to recognize the intense infrastructure needs necessary to do so. This industry is dependent on roads, rail, energy (natural gas and electricity), and be cognizant that decisions made with regard to infrastructure can affect Michigan's ability to mine critical resources.

REGULATORY POLICY TOPICS

- Review current regulations and economic/environmental requirements for mineral exploration—especially as they compare to those in other states

Appendix B *continued*

- Evaluate and recommend policy regarding cultural resources at proposed mining sites (consider sites eligible for listing as well as those listed).
- Discourage frivolous lawsuits. Protect taxpayers and the company's investment.
- Evaluate current Mine Inspector Law and potential changes to reflect current regulation, activity, and beneficial reuses of old mine workings.
- Update the state statute related to county mine inspector. Act 163 of 1911 to my understanding, has pretty much been unchanged for the past 40 years. It is also my understanding that Marquette County Commissioners are looking at reducing the salary and eliminating the benefit package of our Marquette County mine inspector. Maybe it's time that this statute is updated.
- Preserve the current reasonable, fair, and effective business and regulatory environment that currently exists in Michigan so that Michigan-based mining remains competitive if future market conditions warrant idling or retirement of excess U.S. iron ore pellet production capacity. In doing so, Michigan will keep the Tilden Mine, with its supportive contributions to the economy of the state (employment, spending, tax contributions, etc.), viable among its peers in the industry.
- How can we balance environmental protection with encouragement of mining activity, without either making the regulations so onerous that industry is driven out, or having to give the industry massive tax breaks or other benefits to convince them to stay?
- Rulemaking authority for Part 632, one current need is to eliminate any conflict between recent statute language and original rule language.
- Permit the correct reserves (Explanation Greenfield)
- Modernize statutes to address mining in places like tailings basins, waste rock piles, and areas for remediation (stamp sands).
- Address sensitivities from regulators, elected officials and community towards mining; consequences are a delay in regulatory decision making. How do we move away from being treated differently than other industries?

Appendix C

COMMITTEE PROCESS DISCUSSION

The first meeting of the Committee was held on January 7, 2020, at the Michigan Economic Development Corporation offices in Lansing. Eleven of the 12 appointed members were present, as were six attendees representing the directors and representatives of the state agencies and commission. Representative Sara Cambensy, Mary Wardell (Rep. Cambensy's office), and Anna Ediger (Cleveland-Cliffs). Adam Wygant (Director, Oil, Gas, and Minerals Division, Department of Environment, Great Lakes, and Energy) was elected as chair; Matt Johnson (representing metallic nonferrous mining) was elected as vice-chair; and Tim Eisele (appointed by Rep. Cambensy) was elected recording secretary.

Each member presented the perspective of the group(s) they represent. There was then general discussion about mining in Michigan, state funding (or lack thereof) in other Great Lakes states with metallic mining, taxation and existing expertise and assets for mining and exploration within the state. A robust discussion ensued on committee priorities and approaches. It was decided that members would compile lists of most pressing needs related to mining and that these needs would be compiled and discussed at the next meeting. Action items were determined, presentations were arranged for subsequent meetings, and dates were set for the next four quarterly meetings. The first meeting ended with a presentation on the Open Meetings Act and the responsibilities and requirements of the Committee to abide by the Act.

Four topical areas were identified to form the basis of the report, and the Committee divided into four subcommittees to discuss and debate the following topics and to develop a report outline for each category:

- Regulatory Policy
- Research and Mineral Mapping
- Social, Economic, and Labor
- Mining Methods, Environment, and Reclamation

Owing to the amount of work needed to accomplish the goals set forth in the legislation, it was decided that quarterly meetings likely would not suffice to meet the Committee's goals. To that end each subcommittee decided to meet monthly, and to call committee of the whole meetings as needed between the regularly scheduled quarterly meetings.

Subcommittees and their members were:

- **Regulatory Policy Committee** (Voting members: Hal Fitch [Chair], Sean Hammond, Adam Wygant, Jerry Maynard; Ad hoc members: Sharon Schafer, Jim Kochevar)
- **Research and Mineral Mapping Committee** (Voting members: Tim Eisele [Chair], Steve Keslar, Snehamoy Chatterjee; Ad hoc members: Adam Wygant, Sharon Schafer, John Yellich)
- **Social, Economic, and Labor Opportunities Committee** (Voting members: Matt Johnson [Chair], Chad Korpi, Rick Becker, Evelyn Ravindran, Amanda Bright-McClanahan; Ad hoc members: Adam Wygant, Sharon Schafer)
- **Mining Methods, Environment, and Reclamation Committee** (Voting members: James Kochevar [Chair], Hal Fitch, Evelyn Ravindran; Ad hoc members: Steve Kesler, Adam Wygant, Sharon Schafer)

Appendix D

FULL LIST OF COMMITTEE RECOMMENDATIONS

SOCIAL, ECONOMIC, AND LABOR OPPORTUNITIES

Mining Information, Awareness and Education

- Update the state website with a set of materials that are approachable for constituents seeking information about mining in Michigan.
- Partner with local, regional and state economic development groups and industry to develop outreach materials around economic opportunities in mining for the state, particularly in regions that have identified mining as a critical industry.
- Develop an industry-led public awareness campaign with accompanying updates on public information pages for industry groups and companies with active mines in the state.

Michigan Responsible Mining Framework

- Promote responsible mining initiatives that provide a blueprint for transparency in communication and engagement.
- Define "Responsible Mining," what are community rights, who is using the land, who is impacted, who is connected to the land and resources. Identify stakeholders.
- Identify best practice opportunities for the future of mining in Michigan.

Workforce Development

The Committee recommends the review and fostering of workforce talent curricula that leverage the value of Michigan's mining industry potential:

- Integrate information, energy and mining technology operations to drive predictable returns
- Develop apprenticeship and externships programs
- Partner and collaborate with universities, colleges, research institutions, skilled trade training and development centers
- Develop cross-training and continued learning programs in mining-related skill-sets
- Review and enhance mining education programs in Michigan
- Land use, planning and GIS specialists
- Increase unemployment benefit amount and duration for laid-off miners

Effective Consultation

- Identify treaty rights of tribal communities in the project area. Project impacts are not limited to reservation boundaries.
- Understand "Treatment as a State" jurisdiction identified by the USEPA and how it might impact the proposed project.
- Evaluate how an action or decision may impact tribal interests.
- Notify and engage with tribal communities. Introduce the company, the project and acknowledge treaty rights.
- Begin meaningful two-way consultation prior to project implementation.
  - » Proactive engagement and communication allow for project adjustments and coordination.
  - » Agree on a process of who, how and when continued engagement and communication occurs.
- As project implementation moves forward, establish regular communication intervals to ensure impacted communities are informed.

General Responsible Engagement Actions:

- Respectfully engage relevant stakeholders, early on and regularly
- Understand local customs, culture and expectations, and how they affect and are affected by the project
- Work with stakeholders to determine and communicate environmental, social and economic impact solutions
- Explore opportunities to build local capabilities
- Work with locals to develop a joint plan to contribute to local development
- Strategically incorporate this information throughout their planning and management structures
- Incorporate transparent communication standards that regularly inform and provide two-way communication opportunities with fence line communities and other relevant stakeholders
- Achieve and maintain the public's trust and support of the Committee
  - » Deliver a report on time
  - » Potentially include areas the Committee had different opinions without consensus
  - » Educate elected official to help educate the public
  - » Create executive summary with highlights of the report
  - » Create visual graphics explaining the report of the future of mining in Michigan

Appendix D *continued*

Achieving and maintaining the publics' trust and support of the Committee

- Deliver a report on time
- Potentially include areas the Committee had different opinions without consensus
- Educate elected official to help educate the public
- Create executive summary with highlights of the report
- Create visual graphics explaining the report the future of mining in Michigan

RESEARCH AND MINERAL MAPPING

- Fund the Michigan Geological Survey on a recurring basis at $1.2 million dollars per annum
- Extend lifespan of existing mines (research to improve the efficiency of mining and processing methods, identify additional resources and by-products)
- Discover and develop new deposits (Potash, cobalt, graphite, lithium, magnesium, platinum group elements)
- Extract additional minerals from areas that have been previously mined (i.e., brownfield redevelopment); (Research and GIS exercises show where additional opportunities may be for tails, previous low-grade or other remaining ore)

MINING METHODS, RECLAMATION AND THE ENVIRONMENT

- The existing stringent and effective state regulatory climate serves as the basis for reclamation. (Think also about mining best practices, climate change implications)
- Innovative projects that exceed reclamation standards can result from collaborative public/private partnerships. (Mineland Vision Partnership, education, focus on productive lands post mining)
- A convener of industry, government, tribal and community partners can help facilitate innovative reclamation and land use projects. (Mineland Vision Partnership, Michigan version may be a bit different due to hard rock, aggregate, and limestone)
- Reclamation activity can be conducted on a spectrum that preserves land for future mining or creates permanent conservation areas. (Education and Planning)
- Long-term land use decisions should consider what level of reclamation activity is appropriate

REGULATORY POLICY

Michigan should take the following actions with respect to its current regulations on mining:

- Determine whether regulation of industrial mineral mining operations should be done at the statewide or the local level and take appropriate actions.
- Review its regulations for inland lakes and wetlands and determine whether an exception can be made to allow for subsequent development of lakes and wetlands created by mining operations.
- Michigan should review its NPDES regulations and determine whether a limited exception should be made regarding certain constituents that may be discharged from mine dewatering.
- Allow amendment of rules under the nonferrous metal mining statute.
- Coordinate permit application review and issuance to the fullest extent possible.
- Establish policies for royalty rates for construction aggregate mines on state land.
- Continue to adhere to the 2002 Government-to-Government Accord and Executive Directive 2019-17 for consultation with Indian tribes on mining issues.
- Michigan should strive to maintain balanced, reasonable and effective standards in existing and future regulations.
- Michigan's generally clear, concise, and comprehensive mining regulations act to reduce potential legal challenges; one exception is in the interpretation of local zoning ordinances.
- Michigan should identify known or potential impacts on cultural resources as part of planning and permitting of mining projects; this issue extends well beyond mining operations.
- Michigan should use mine reclamation options that allow for future beneficial use of closed mines, whether for additional mining or recreational or residential development, in accordance with applicable state and federal regulations.
- Michigan should utilize alternatives analysis in permitting of mining operations where applicable.
- Michigan should evaluate amendment of Parts 631 and 632 to address mineral extraction from mining and processing wastes and investigate opportunities for research on extraction technologies.
- Michigan should facilitate below grade tailings disposal where applicable and work to advocate for an exception from EPA requirements for emplacement via slurry pipelines.
- Michigan should review its mining regulations to assure they incorporate appropriate standards and protections for above ground tailings disposal facilities.

Appendix D *continued*

- Michigan should consider revisions to Part 625 and rules on mineral test wells to require blanket permits, fees and bonding in the western Upper Peninsula; allow blanket permits and bonds for certain low-impact wells and reduce confidentiality requirements.
- Michigan should seek a solution to the controversy over local control of aggregate mining that assures that resources will be available where needed while respecting the role of local government units to protect their constituents' interests.
- Michigan should engage all stakeholders in considering actions to address challenges of identifying mineral rights for property owners and mining interests. Actions could include strengthening of property transaction recording requirements, stipulating that severed mineral rights revert to the surface owner after a specific period, and improving access to county property records.

Michigan should amend Act 163 of 1911, Copper and Iron Mine Inspectors, to:

1. Make it apply to counties where any metallic mineral mine is located
2. Allow a mine inspector to serve in multiple counties when necessary
3. Reduce the experience needed for mine inspector in a county with no active mines. Michigan should consider additional amendments to clarify applicability of the Act, particularly with respect to closed mines that may be used for other purposes and to address potential liability issues.

Appendix E

INHERENT RIGHTS OF NATIVE AMERICAN TRIBES

Throughout the state of present-day Michigan, the United States federal government negotiated a series of treaties with Chippewa (Ojibwa), Ottawa (Odawa), and Potawatomi (Bodewadmi) nations to establish peace alliances, cede (or sell) territories, and create Indian reservations (CHL n.d.; Kappler 1904): Greenville Treaty (1795), Detroit Treaty (1807), Foot of the Rapids Treaty (1817), Saginaw Treaty (1819), Sault Ste. Marie (1820), Chicago Treaty (1821), Carey Mission (1828), Chicago Treaty (1833), Washington Treaty (1836), Cedar Point Treaty (1836), La Pointe Treaty (1842), Treaty With the Chippewa (1854), Treaty of Detroit (1855), Saginaw Chippewa (1864).

Twelve federally recognized tribal nations within present-day Michigan have resided in the Great Lakes region for millennia (Doherty 1990). Many are part of a larger Indigenous group known as the Anishinaabe, meaning "original person" (Benton-Benai 1988). Although treaties granted access and shared rights to large tracts of land to the federal government, many tribal nations retained their sovereignty and their ancestral rights to hunt, fish, and gather, along with other usual privileges of occupancy, within the ceded lands and waters (Kappler 1904). These rights continue today (See U.S. Constitution, Supremacy Clause) and have been reaffirmed in a series of judicial mandates (see McCammon-Soltis and Stark 2009). In accordance with the provisions of the Indian Reorganization Act of 1934, the following Indian tribes achieved federal recognition which established the tribes as legal and political entities (SOM 2021).

- Bay Mills Chippewa Indian Community (1974)
- Grand Traverse Band of Ottawa and Chippewa Indians (1984)
- Hannahville Potawatomi Indian Community (1937)
- Huron Potawatomi-Nottawaseppi Huron Band of Potawatomi (1995)
- Keweenaw Bay Indian Community (1936)
- Sault Ste. Marie Tribe of Chippewa Indians (1972)
- Little Traverse Bay Band of Odawa Indians (1984)
- Little River Band of Ottawa Indians (1994)
- Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan (1994)
- Pokagon Band of Potawatomi Indians (1994)
- Saginaw Chippewa Indian Tribe (1937)
- Lac Vieux Desert Band of Lake Superior Chippewa Indians (1988)

In addition to the12 federally recognized tribes within Michigan, there are also four (4) state recognized Indian tribes within the state of Michigan which are:

- Burt Lake Band of Ottawa and Chippewa Indians
- Swan Creek Black River Confederated Ojibwa Tribes
- Grand River Band of Ottawa Indians
- Mackinac Band of Chippewa and Ottawa Indians

Two particular treaties ceded lands in what is now the state of Michigan, on which a number of tribes continue to exercise off-reservation hunting, fishing and gathering rights. The Treaty of 1836 has been the subject of litigation in a case known as U.S. v. Michigan and involves five tribes that are part of an intertribal agency, known as the Chippewa-Ottawa Resource Authority (CORA). CORA assists its member tribes in implementing their shared, ceded territory rights pursuant to court mandates and a consent decree governing the exercise of inland rights.

The Treaty of 1842 ceded lands in what is now the western half of Michigan's Upper Peninsula. Although no formal litigation has occurred in the Sixth Judicial Circuit, the 1842 signatory Tribes' rights (which extend into Wisconsin) were affirmed in the Seventh Circuit in Lac Courte Oreilles v. Wisconsin. It should be noted that some of the signatory tribes to the 1842 Treaty have reservations in Wisconsin but hold ceded territory rights in Michigan.

The tribes' 1836 and 1842 based rights mean that the signatory tribes regulate their citizens when they leave the reservation to hunt, fish, and gather. Tribal regulations may differ from state regulations, but all are meant to protect public safety and conserve the species being harvested or regulated. The tribes' treaty rights also mean that they have a say in how ceded territory resources are managed, since management is shared between tribes and State of Michigan. Consultation and cooperation are needed so that management goals can be harmonized. These interactions are informed by state and federal laws, court decisions and policies.

In addition to treaty rights, there are religious and spiritual considerations for tribes. There are several federal laws currently in place that contain policy and legal requirements. The first is the American Indian Religious Freedom Act (AIRFA), which was passed through a joint resolution in 1978.

Appendix E *continued*

"[H]enceforth it shall be the policy of the United States to protect and preserve for Native Americans their inherent right of freedom of belief, expression, and exercise of traditional religions of the American Indian…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites." (Pevar 2012)

AIRFA did not include any consequences for not conforming to its intent. Thus, there are many court cases involving American Indian Religious Freedoms and sacred sites. The Native American Graves Protection and Repatriation Act was enacted in 1990. It had the following two purposes:

1) to allow tribes to recover religious and cultural items belonging to them or their members that were held in federally funded institutions, and
2) to protect the right of tribes to safeguard all human remains and artifacts that might be found or excavated on federal or tribal land in the future." (Pevar 2012)

In 1996, President Clinton signed Executive Order 13007 that required federal agencies to avoid causing unnecessary harm to the physical integrity of Indian sacred sites and to accommodate whenever possible requests by Indian religious practitioners to access sacred sites on federal land (Pevar 2012). States adopted their own consultation process after the President's Executive Order was signed. In 2002, State of Michigan entered into a Government-to-Government Accord with the 12 federally recognized Indian tribes located in Michigan, acknowledging tribes' sovereignty and right to self-governance and self-determination, and as a commitment by the state to use a process of consultation with the tribes to minimize and avoid disputes. This was reaffirmed in Governor Whitmer's Executive Directive No. 2019-17.

Also significant was the 1996 enactment of the National Historic Preservation Act, which protects historic and sacred sites (Pevar 2012). Tribes often have their own tribal historic preservation offices (THPOs) that document their historic and sacred sites and can determine whether ground disturbing activities can be allowed in those areas.

Furthermore, in 2007, the United Nations voted on the Declaration on the Rights of Indigenous Peoples (UNDRIP). Article 12, Section I of UNDRIP states that indigenous people have *"the right to maintain, protect, and have access in privacy to their religious and cultural sites."*

While the Unites States voted against this declaration in 2007, it subsequently reversed its decision. However, the Senate has not ratified the treaty, so it is not binding on the United States.

REFERENCES:

Benton-Banai E. *The Mishomis Book: The Voice of the Ojibway.* St. Paul, Minn.: Red School House; 1988.

Clarke Historical Library (CHL) (n.d.). *Michigan Related Treaties.* Mount Pleasant, Mich.: Central Michigan University. Available at https://www.cmich.edu/library/clarke/researchresources/native_american_material/treaty_rights/text_of_michigan_related_treaties/pages/default.aspx

Doherty R. *Disputed Waters: Native Americans and the Great Lakes Fishery.* Lexington, Ky.: University Press of Kentucky; 1990.

Kappler, Charles J., editor (1904). *Indian Affairs: Laws and Treaties. Vol. II (Treaties).* Washington: Government Printing Office. Available at https://dc.library.okstate.edu/digital/collection/kapplers/id/25853

McCammon-Soltis, Ann and Kekek Jason Stark (2009). *Fulfilling Ojibwe Treaty Promises: An Overview and Compendium of Relevant Cases, Statutes and Agreements. Great Lakes Indian Fish & Wildlife Commission, Division of Intergovernmental Affairs.* Available at https://glifwc.org/minwaajimo/papers/legal%20paper%20-%20dia.pdf

Pevar, Stephan L., *The Rights of Indians and Tribes, Fourth edition,* New York, N.Y.: Oxford University Press; 2012

State of Michigan (SOM) (2021) *Michigan Tribal Governments.* Available at https://www.michigan.gov/som/0,4669,7-192-29701_41909---,00.html

2002 Government-to-Government Accord between State of Michigan and the federally recognized Indian tribes in the state of Michigan

State of Michigan Executive Directive No. 2019-17

United Nations Declaration of the Rights of Indigenous Peoples. https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html

Appendix F

RESPONSE TO COMMENTS

Michigan's Mining Future Committee (Committee) was created by Act 47 of Michigan Public Acts of 2019 (Act). The Committee completed its work in a series of full committee and subcommittee meetings which were open to the public as required by the Act. The draft final report of the Committee was prepared and offered for public review and comment. The public was notified of a comment period on the Michigan Department of Environment, Great Lakes, and Environment's (EGLE's) calendar and the Committee website. The comment period was from August 23 to September 13, 2021. In all, there were four (4) respondents who submitted comments on behalf of organizations or themselves.

The following "Response to Comments" document captures the essence of comments and the Committee responses. The Committee thanks the respondents for their input. Each comment was reviewed, discussed and a determination made of the appropriate response to be included in this "Response to Comments" document. If the comment resulted in changes to the report, that was also noted.

A couple important clarifications are applicable to several comments. First, the Committee received its member makeup and charge/duties from the authorizing statute, which presumed that mining will be necessary for the foreseeable future to provide the minerals our society needs. Beyond that, it is assumed that innovations in materials management and recycling may reduce the need for mining. Even then, mining may be required at some level to blend some amount of new minerals into processes with recycled materials. The Committee acknowledges there appears to be a pro-mining bias throughout the report to the extent that resources needed by society need to be identified, environmentally conscious mining practices pursued, and mining thought of in strategic ways with a long-term view. Further, nothing in the Committee recommendations represents advocacy for lessening of environmental protections. In fact, the report focuses on recommendations that promote environmentally conscious mining practices and regulations. The Committee was careful to take a balanced approach and craft recommendations such that there was consensus throughout the document rather than have dissenting or divergent viewpoints.

Several comments were submitted where applicable to mining but apply to a much wider range of industries that may or may not include mining. For example, design requirements or considerations related to climate change should apply universally. For this reason, it is noted in some responses that the comment is beyond the scope of this report.

RESPONSE TO COMMENTS

1. **Comment:** Place a copy of the original bill into the executive summary to make clear the charges of the committee to readers.
   Response: The Committee determined that the executive summary would become too long if the entire Act was placed within the Executive Summary or Introduction. The Committee did determine that the entire Act should be placed in Appendix A rather than the excerpt of the duties of the Committee.

2. **Comment:** Recommend organizing report into the three mining types as identified in legislation, then outline each recommendation under each mining type.
   Response: The Committee determined that it would review the document to ensure all three mining categories are referred to appropriately but that the report could not at this point be restructured to accomplish this recommendation. In addition, the report addresses several types of mining that do not fit strictly into the three categories of mining suggested, such as solution mining, scram mining, salt and gypsum mining, and other dimension stone. The Committee does believe that there may be a need, and certainly a benefit, to creating companion documents to the final report, such as concise one-pagers and shorter summary documents that highlight the Committee recommendations. These resources could be prepared prior to the Committee being dissolved or in future efforts by agencies or workgroups.

3. **Comment:** Technical report should focus on mining first. Other considerations such as climate change, tribal, and environment/sustainability be given their own sections following sections of the three main types of mining.
   Response: The Committee acknowledges this comment and the reason behind it. Because there are more than three types of mining discussed in the report and because so many themes and recommendations apply to more than one type of mining, the report is not organized along those themes. The Committee, early in the process, determined that the best structure was along the four major themes noted in the report. The over-

Appendix F *continued*

arching themes of cumulative impact, climate change, and tribal considerations are topics with implications throughout the report. The Committee did not want these important topics to eclipse the mining-focus of the report, but rather to inform how they should be considered throughout the report and recommendations.

4. **Comment:** A survey should be sent to individual mining companies to see what they view as main strengths, weaknesses, threats, and opportunities.
   Response: Early in the Committee's work there was a discussion of surveys as a method to capture industry perspectives. The mining community in Michigan, particularly across different mining areas, does not have a common trade association with which to work. There are primary mining companies that have active mine sites, plus an entire industry of mining exploration companies doing work that may not be widely known. The Committee noted the importance of properly structuring questions on surveys as well. Ultimately, the Committee determined the best path forward would be to have each mining sector give presentations to the Committee to understand the industry's status, challenges, recommendations, and future opportunities. The Committee also received similar presentations from the environmental and tribal communities to gain their important perspectives on mining. Those presentations informed a master list of topics to be researched by the Committee and the four major thematic areas that are the major sections of the report. Further, the Committee meetings were open to the public to participate, and notices of the public comment period was forwarded to the Michigan Chamber of Commerce and to the Michigan Manufacturing Association, which has a Mining Policy Subcommittee.

5. **Comment:** Should the Committee be spending more time on the direct reduction iron (DRI) process and other specific recommendations for the extension of mine life and projected lifespan, which includes expansion? It was noted that the Minnesota report does an excellent job outlining the shift from pellets to electric arc furnace (EAF) technology.
   Response: The Committee acknowledges this question and changes. Changes in industry technology, including DRI and EAF were discussed at length. The Committee has added more discussion and highlighted the need for research and innovation in order for Michigan to hold market share as an iron ore producing state in a constantly changing steel-making industry. The report also notes the more generic need for additional research (geology and technology) and coordination among stakeholders to position Michigan to provide a secure domestic supply of many minerals needed by society.

6. **Comment:** Permitting needs to be objective, clear and give industry certainty. Standards and benchmarks used in permitting need to be understood, they should not be undefined and subject to political swings and unknown climate change goals.
   Response: The Committee agrees with this comment and noted it as a recommendation. The Committee also noted the comprehensive and predictable suite of regulations already in effect in Michigan. The Committee agrees that political swings and climate change have the potential to impact permit decisions, and therefore introduce risk into permitting processes. However, the Committee has attempted to make note of complex issues like cumulative impacts, climate change, and tribal rights so that they could be considered in over-arching ways within the context of the Committee's recommendations. Any changes to permitting statutes should be clear on how these over-arching topics are to be addressed and they should not involve ambiguous or amorphous goals that create regulatory uncertainty.

7. **Comment:** Legislators need to know the need for regional infrastructure, what part our state plays in national and global manufacturing security and how the legislature should work to make that more secure.
   Response: The Committee agrees with this comment and has looked at the report and added some content related to the need to have a strategic and long-term view of potential needs related to mining and related infrastructure. It is beyond the Committee's abilities to know what specific infrastructure needs there will be, although they noted the importance of harbors/ports, railways, and roadways to possible future mining projects. The Committee noted in general that Michigan's mining industry contributes $1.47 billion to Michigan's gross domestic product. However, the Committee did not research or create summaries of how those dollars impact different areas of Michigan's economy. Other existing resources show Michigan's ranking in production by commodity, but those rankings and reports are often incomplete due to lack of standard production reporting amongst states or nations. The Committee was launched just prior to a major national

Appendix F *continued*

renewed interest in critical minerals and the need to identify domestic sources of important minerals. For the first time in many decades, it is likely that considerable resources will be spent at the federal and state levels to strategically evaluate domestic mineral supplies and related areas of technological innovation.

8. **Comment:** Legislators are interested in recycling. Should the Committee consider legislation that implements a flat recycling fee per each device bought and sold? How are we to think about that side of metal use/need and sustainability?
   Response: The Committee agrees with this comment and has added additional content to the report to discuss the interaction of mining with recycling. The result is a recommendation for additional work to think holistically about an integrated approach to metals management which includes sourcing of needed metals from new mine sites, tailings, and waste rock sources, as well as new sources such as reworking of landfills and recycling opportunities.

9. **Comment:** Recommendation for the Committee to go back to Minnesota's mining future document for guidance and layout. Commentor also presented example of document that summarizes financial impact of mining tax dollars to various funds in Minnesota.
   Response: The Committee acknowledges the recommendation and notes the same response as for comments No. 2 and No. 3. The Committee does not believe a major revision of the report content or structure at this point is feasible. Future work of subcommittees or a multi-stakeholder partnership could move this recommendation further, and companion documents can include financial summaries similar to those created in Minnesota.

10. **Comment:** Recommendation to delay delivery of the report until January 1, 2022.
    Response: The Committee does not believe it has statutory authority to delay submission of the report beyond October 6, 2021, and the Committee will be dissolved 60 days following report submission.

11. **Comment:** Concern about above ground tailings dams and noted that the Committee avoids controversial issue of tailings dam safety. The commentor provided several good references to studies and global standards for tailings dams.
    Response: The Committee did discuss this topic at length in development of the report and had consensus on a recommendation that Michigan should review its mining regulations to ensure they incorporate appropriate standards and protections for above ground tailings disposal facilities. That recommendation encompasses the need for regulations that incorporate recent global best practices for design, independent engineering review and oversight, and inclusion of safety factors to account for climactic changes that includes greater precipitation and more frequent, intense storm events. The Committee acknowledges the commentors' extensive comments on this important topic and believes the report recommendation specifically addresses them.

12. **Comment:** Concern over the definition used by Michigan's Mining Future Committee (MMFC) for climate change and inclusion of volcanic contribution. Recommends using international panel on climate change statements.
    Response: The Committee specifically reached out to EGLE's Office of Climate and Energy to request they provide a definition which they view as appropriate. The definition provided is one that captures the essence of climate change in a balanced way that does not weight the definition toward natural or anthropogenic sources, only what it is. The climate change section of the introduction notes the anthropogenic contributions and need to consider climate in decision making.

13. **Comment:** Concern over conflicting statements on the damage of mining; how the mining industry is regulated differently and should not be treated different from other companies; and that the report dismisses the fact that mining has created significant environmental issues.
    Response: The Committee acknowledges this concern and notes that the Committee has recommended several areas of regulation that are unique to mining and that all regulations should be applied consistently across regulated industries. The Committee has not recommended a lessening of environmental regulation for the mining industry and has made recommendations that promote environmentally conscious mining and processing practices.

Appendix F *continued*

14. **Comment:** Michigan Department of Natural Resources (DNR) has a conflict of interest as land manager and mineral lease administrator.
Response: Additional language has been added to the report to clarify the DNR parcel classification process. The Committee would also note that conflict of interest can exist at some level in any process or situation. The DNR's land manager and mineral leasing roles are supported by separate divisions working together and are separate still from the environmental regulations administered by EGLE. Moreover, it is the mission of the DNR to manage public lands and the natural resources associated with those lands for the use and benefit of all Michigan residents.

15. **Comment:** With respect to the Research and Mineral Mapping section and Michigan Geological Survey, mapping of mineral resources needs to be accompanied by regulations that adequately protect the environment from mineral exploration and mining; certain areas should be off limits (including cities and towns).
Response: The Committee acknowledges this recommendation but believes the commentor may not recognize the extent of mining regulation, and that this recommendation is focused on identifying the need for mapping and research to support societal needs. There are regulations on exploration, and the Committee has recommended additional changes be considered for mineral well exploration test hole regulations to improve environmental outcomes and provide additional oversight. The Committee also notes that there are complex mineral rights and economics with some mining locations, which have sometimes resulted in moving entire communities to access minerals. Therefore, the Committee does not find that certain areas should be "off limits." However, recommendations have been made to identify sensitive environmental areas and other geopolitical areas which can be overlayed with geological mapping and mineral potential maps to essentially identify areas which would be best suited for mining such as brownfield areas and areas with less environmental and cultural concerns. This sort of overlay would also show areas which have greater permitting and operational risk based on environmental and cultural concerns.

16. **Comment:** Concern over statement of brownfield use for renewable energy sources to the exclusion of nonrenewable. Brownfield use should not preclude use of non-renewable sources of energy. A statement in the report pertaining to the proposed Superior Solar Project was misleading. It is not brownfield use for solar, rather would result in further destruction of 1,500 acres of former state forest land used for hunting and recreation.
Response: The Committee does not suggest preclusion or exclusion of any specific use in its recommendations. Brownfields could be used for any number of innovative projects. The details of the Superior Solar Project are outside the scope of this report and reference to the project has been removed from the report as an example of alternative post-mining land use because the proposed project area has not been mined and is not currently proposed for mining.

17. **Comment:** Focus of the report should be on reclamation and post mining land use. Concern over a reservation clause in a past land exchange agreement that has an exception for future mining.
Response: Land managers handle language for land exchanges and DNR negotiates reservations and conditions on a case-by-case basis. A party to a land transaction may negotiate a clear exception that mining may reoccur, as part of their agreement.

18. **Comment:** Objection to statement on page 32 of the report that says, "some interest groups believe that EGLE has not interpreted Part 632 correctly" and concern with Committee recommendation, "Michigan state agencies should continue to adhere to the provisions of the 2002 Government-to-Government Accord and Executive Directive 2019-17 and should consider the concerns of potentially affected Indian tribes in regulation of mining operations."
Response: The Committee acknowledges this concern, and specifically made the recommendation because of the known concern and sentiment that EGLE does not follow or interpret Part 632 properly. Part 632, "Nonferrous Metallic Mineral Mining," of the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended, was a statute passed unanimously and had administrative rules developed by broad stakeholder consensus between 2004 and 2006. Since then, EGLE has had several court decisions uphold its administration of and decisions related to Part 632. The Committee has received other comments on the same concern, but from the perspective that it over protects

Appendix F *continued*

beyond the statute at times. The Committee specifically made the balanced recommendation about how it is written because it addresses both concerns, those that believe the department may regulate too strongly and those that believe the department does not apply the protections strongly enough. The recommendation means EGLE should apply the statute and administrative rules as they were written and approved by consensus.

19. **Comment:** Tribal concerns are often ignored and recommends identification of cultural issues. Recommendations in the report for tribal concerns and cultural resource issues are inadequate and should include that State of Michigan should pass legislation which upholds the National Historic Preservation Act within the state.
Response: The Committee acknowledges these concerns and recommendations. The Committee notes that the comments are related to land development, so while it applies to mining, the issue has broader land use implications as well and therefore is beyond the scope of the report. The Committee did make considerable mention of Tribal issues, including existing policies and accords for government-to-government consultation, and EGLE and DNR policies provide for engagement with tribes so that identification of cultural resources occurs in advance and can be part of project planning and permitting.

20. **Comment:** Concerns over tailings dam management. There need to be more mine inspectors with proper training. Recommends certification program for inspectors.
Response: As noted previously in comment No. 11, the Committee has recommended that above ground tailings management regulations be reviewed and modernized to address these concerns. The recommendation is likely to result in the concept of third-party engineering review of permits and operations, as noted in recent global standards or best practices for above ground tailings management. The need for knowledgeable inspectors is noted. The Committee is concerned there may be confusion between the concepts of qualified EGLE staff and with the education and experience requirements discussed related to county mine inspectors proposed legislation.

21. **Comment:** Agrees with options and recommendation of the report that the state needs to fund an accurate property records system and provide free or nominally priced access to records.
Response: The Committee acknowledges this comment and made the recommendation recognizing the need. The Committee could not go much further with the recommendation because it has implications beyond mining in several other areas such as infrastructure right-of-way, real estate, and county records management. Such a system would be a major statewide effort that would need to include a diverse set of stakeholders beyond the mining sector.

22. **Comment:** The Committee's recommendation on page 45 of the report regarding reclamation plans should note that plans must also meet federal and state recommendations/regulations.
Response: The Committee acknowledges the comment and has added some clarifying language to the report. Nothing in the Committee recommendations diminishes or preempts adherence to state and federal regulations.

23. **Comment:** More focus should be on recycling of materials rather than focusing on how to improve pellet grades and extend life of energy intensive mining industry.
Response: The Committee acknowledges this recommendation, which is similar to Comment 8. The Committee agrees with this comment and has added additional content to the report to discuss the interaction of mining with recycling. A detailed handling of recycling or integrated metals management concepts would involve multiple stakeholders and goes beyond the scope of this Committee to address in detail.

24. **Comment:** Concern over the goal of the report being to encourage responsible mining and mineral exploration. Believes the prominent bias shows up in every section, downplaying environmental legacy and concerns.
Response: The Committee acknowledges this comment and highlights that the charge of the Committee was to evaluate the future of mining in Michigan, which involves an understanding that society continues to need minerals and domestic production would likely occur. As noted in the introductory paragraphs of this "Response to Comments" document, although that charge is present throughout the Committee's work and recommendations, the Committee has not recommended a diminution of environmental protections and has recommended environmentally conscious regulations and best practices

Appendix F *continued*

for mining and processing. The Committee has added a definition of "Environmentally Conscious Mining" and has made recommendations regarding responsible mining frameworks. The Committee did consider all comments and attempted to present a balanced approach and suite of recommendations reflective of the Committee's diverse perspectives.

25. **Comment:** The report is absent of reference to meaningful engagement with tribes, and the current level of regulatory oversight and involvement is inadequate.
Response: The Committee acknowledges this viewpoint and did address engagement with tribes, recommending not only adherence to existing government-to-government accord and consultation policy, but also added sections on tribal rights and what proactive engagement should look like for companies, in addition to what is required for State of Michigan in its administration of regulatory programs.

26. **Comment:** Report fails to critically look at current mining practices within ceded territory and fails to make recommendations to make mining practices safer and less harmful. Report puts financial burden of further mining research and mapping on the citizens rather than the companies that benefit.
Response: The Committee acknowledges this comment and viewpoint. Please see the introductory paragraphs of this "Response to Comments" document. The Committee attempted to present balanced recommendations related to environmentally conscious mining in the state irrespective of where mining may occur. A section was added specifically on tribal rights, which includes those rights tribes have on ceded lands. A more detailed treatment of the topic is beyond the scope of this report.

27. **Comment:** Concern over MMFC makeup, noting that one tribal representative cannot represent the viewpoints of nearly 20 sovereign tribal governments.
Response: The Committee did not have control over the makeup of the Committee, as it was dictated by the Act. Meetings were held in a format that was open for all stakeholders to engage. Further, the Committee made sure that the draft report link was circulated amongst all known tribes with rights within Michigan. The Committee attempted to give due consideration to tribal rights and consultation in acknowledgment of tribal interest in mining activities.

28. **Comment:** Commentor expressed report short comings, including no current discussion on climate changes current impact on mining operations, void of discussion on cumulative impacts and inability of State to address cumulative impacts on treaty rights, sacred landscapes, and other cultural features.
Response: The Committee acknowledges this viewpoint and agrees that more work could be done in several of these areas. These over-arching topics also go beyond mining and apply to a variety of land uses. The Committee attempted to present a balanced set of recommendations and discussion of how these over-arching topics impact the various mining sectors. Similar comments have been addressed previously in this document.

29. **Comment:** The use of alternatives analysis is not critically analyzed in the report. Reports should include multiple feasible options and should not include unfeasible options which can be misleading.
Response: The Committee acknowledges this viewpoint and recommendation. Alternative analyses vary in complexity and content depending on project scope which often depends on standard held by reviewing agency or government. The Committee notes that the quality of the alternatives analysis is what matters, it should be a comprehensive and honest attempt to consider all alternatives. The Committee does not agree that alternatives which are determined to not be feasible should not be included in analysis. Including or not including them could be considered misleading depending on one's opinion and all alternatives should be presented to have a complete analyses summary.

30. **Comment:** Report focuses on reclamation but very little substance to what constitutes a reclaimed site. Commentor concerned that report suggests mine sites should not be fully reclaimed to allow potential future mining.
Response: The Committee acknowledges this concern and attempted to take a balanced approach to reclamation. Nothing was intended to suggest a lower standard of reclamation. The Committee recommendations encouraged putting more importance on reclamation planning even ahead of permitting so that end use of the property be considered and ensure that reclamation result in usable, productive land. Further, anything less than final reclamation is concurrent

Appendix F *continued*

reclamation as a proactive best practice during mining or interim stabilization due to mine idling, which is addressed in various statutes. The Committee did discuss the need for education of public that reclaimed mine lands may become active mine sites in the future if the geology and economics result in future projects.

31. **Comment:** Commentor notes that the policy section should be clear that there "ARE" tribes with rights within Michigan, not that there "MAY" be.
Response: The Committee took a critical look at this to ensure the language is clear as the Committee is aware that there are tribes located outside of Michigan that have rights within Michigan. In the introduction, the Committee makes the statement "Native American tribes are sovereign nations and in addition to their homelands (reservations) they have rights outside these boundaries" and the word "May" has been deleted in the document in acknowledgment of commentors concern.

32. **Comment:** Commentor expressed concern over recommendation to look at emplacement via pipe being an underground injection control (UIC) exemption and that it should be held to the same standards.
Response: The Committee acknowledges this concern and added some clarifying language in the report. The Committee is not suggesting a lower level of protection as some may fear when the word "exemption" is used. The context of the issue is that emplacement of tailings within mine workings is a mining best practice where appropriate and preferred alternative to above ground tailings disposal if feasible. Companies can emplace the tailings by methods such as truck, but emplacement by a pipe which is most economical triggers underground injection control regulations of the federal Safe Drinking Water Act. Permitting and compliance with those regulations may be an unintended barrier or determent to using a best practice that can result in less environmental risk.

33. **Comment:** The Commentor noted several concerns within the "Mining Methods, Environment and Reclamation" section. Recommends that "Tribes must be the ones to make such a determination" and makes specific recommendation for modification of bullet points 1, 3, and 6 (1. Identify treaty rights and cultural resources in the project area and area of potential effected as determined by treaty territory tribes; 3. Accept how treaty tribes assess a projects potential impact to tribes' treaty rights and cultural resources; 6. Project implementation cannot move forward without the consent of treaty tribes. If treaty tribes give consent, then project implementation moves forward, and regular communication intervals are established to ensure impacted communities are informed.) Commentor indicates recognition of "consent" is crucial.
Response: The Committee acknowledges the concern and is not recommending a diminution of current standards, nor advocating beyond the current policies in place regarding government-to-government accords or consultation. Engagement with tribes with rights within a project area by both mining companies and agencies administering regulatory programs is encouraged by the Committee throughout the report. The concept of consent as a standard has implication for all land uses and is beyond the scope of this report.

Appendix G

MICHIGAN CRITICAL MINERAL RESOURCES DOCUMENTATION

Cobalt is currently being produced as a byproduct from the Ni/Cu mining at the Eagle and Eagle East properties. It has an estimated concentration of about 0.01% (20 pounds per ton).

Graphite was historically produced in 1911–1912. Lower Slate Member of Michigamme Fm. 20–30% graphite.

Lithium is not commercially mined but is found in oil field brines up to 120 ppm. It is also a trace constituent in some Precambrian pegmatites and granites.

Magnesium is currently being mined from brines and has a long history of significant production. In the 1920s and the 1930s, Michigan produced magnesium metal. Currently, the production is classified as magnesium compounds—1974 was the last year that state mineral statistics reported magnesium compounds separate from other brine derived products.

Manganese was historically produced as a byproduct from some iron mining operations. From 1917, sporadically through 1963, Michigan reported ferruginous Manganese ore (10–35% Mn) and manganiferous iron ore (5–10% Mn).

Platinum Group Elements are currently being produced as a byproduct of Ni/Cu mining at Eagle and Eagle East properties. Elemental concentrations are estimated at less than 1 ppm (1.5 grams/ton). Other deposits like Eagle have been reported to have nearly 4 grams per ton in assay samples.

Potash was reported as extracted from brines from 1951 to 1970 (average 3,500 tons per year). Solution mining production from Salina A-1 Salt occurred from late 1980s until 2013 (mostly at around 100,000 tons per year). This commodity probably holds the best potential and greatest overall value of the minerals in this appendix and any other "critical minerals." This potash prospect has been recognized as a data preservation success by the USGS through the National Geologic Geophysical Data Preservation Program. Here's an example of how data preservation has economic value: www.usgs.gov/center-news/mineral-discovery-could-mean-billions-michigan

Rare Earth Elements: No commercial rare earth elements are currently commercially produced in Michigan. The value and demand for rare earth elements is enough justification for continuing research into their production potential.

Appendix H

AGGREGATE MINING OVERVIEW

Aggregates are a vital natural resource that we all depend on daily. In fact, each American will use an average of 1.3 million pounds of stone, sand and gravel in their lifetime. While other natural resources may receive more attention, such as drinking water, products created with aggregates are working for local communities in a wide range of applications.

Most people think of construction when they hear the word aggregate. That is because vast amounts of aggregate are necessary in the building of basements, driveways, sidewalks, septic fields, roads, bridges and sewers. Without stone, sand and gravel, there would be no concrete or asphalt to complete those projects and no development in our cities and towns.

There are many more uses for aggregates outside of construction, as well. For example, unique forms of aggregate are used in agriculture for fertilizer and farm animal bedding, and in athletic ball fields and parks. Aggregates are also key to the production of a variety of consumer products used by local families every day, such as toothpaste, paint, kitty litter, glass and computer chips.

Even beyond the many important benefits of producing aggregates, mining operations provide local communities several positive economic benefits. These include increased employment opportunities, indirect job creation, community involvement, increased tax revenue, and royalty revenue. Additionally, local aggregate mining provides a cost benefit by making aggregates available for public and private construction close to local markets, avoiding the detrimental effects of trucking materials long distances.

Every year a mine is active, local units of government receive personal property tax revenue from the tangible assets of the mining business as it relates to fixtures and equipment, such as processing machinery, office buildings, maintenance shops, etc.

In addition to the added personal property tax benefit, local communities often benefit from a higher taxable value on the land in question when the property is purchased by the mining company and once the mining operation has been completed. This is because the property is usually more valuable after it is restored and redeveloped than it was prior to mining.

Based on a survey of properties in southern Michigan, reclaimed properties have a tax rate of approximately $138 per acre, active mine properties have a tax rate of approximately $64 per acre, while vacant farm properties have a tax rate of approximately $43 per acre.

Landowners, including state and local governments and municipalities, often receive royalty revenue from aggregate mining operations, with royalty rates varying depending on several factors such as proximity to the market and the characteristics and quality of the material. If an aggregate producer leases land for the mining operation, it is common to provide a uniquely negotiated royalty rate to the property owner. In addition, aggregate producers often participate in community activities and efforts. These have ranged from improving athletic fields, to helping fund and build community centers.

One of the greatest community benefits is the reclamation and improvement of a mining site after the operation is complete. In many instances, the land is restored to a condition that is more beneficial to the community than it was prior to mining. For example, there are many housing subdivisions built around lakes that formed because of aggregate mining. We also see golf courses, community parks, trails and wetlands developed because of mining activity.

These benefits not only yield increased natural beauty, new housing and recreational opportunities for residents, but they also create the higher taxable value mentioned previously.

Aggregate mining benefits local communities by making construction development and growth possible, contributes to the production of consumer goods and food that families need, provides direct local economic benefits through royalties and job creation, and creates opportunities for new property uses that ultimately can boost the tax base of local governments.

Appendix I

MICHIGAN'S MINING FUTURE COMMITTEE MEMBERS

Richard Becker
Representing an aggregate mining operation in this state (Monroe)

Snehamoy Chatterjee, Ph.D.
Representing current or former research faculty members at a university that hold a master's degree in mining or geology (Houghton)

Timothy C. Eisele, Ph.D.
Designee of State Representative Sara Cambensy (Atlantic Mine)

Harold R. Fitch
Designee of State Senator Ed McBroom (Lansing)

Sean Hammond
Representing an environmental nonprofit organization in this state with expertise in mining (Lansing)

Matthew D. Johnson, *Committee Co-chair*
Representing a metallic nonferrous mining operation in this state (Marquette)

Stephen Kesler, Ph.D.
Representing current or former research faculty members at a university in this state that hold a master's or doctorate degree in mining or geology (Ann Arbor)

James M. Kochevar
Representing a ferrous mining operation in this state (Marquette)

Chad J. Korpi
Representing a member of a local chapter of an international steel workers union, representing workers at an ongoing ferrous mining operation in this state or workers from an idled ferrous mining operation in this state (Ishpeming)

Jerome Maynard
Representing an environmental nonprofit organization in this state with expertise in mining (Marquette)

Deborah L. Pellow
Representing a municipality in this state where a ferrous, metallic nonferrous, or aggregate mining operation is located (Ishpeming)

Evelyn H. Ravindran
Representing a member of a federally recognized Indian tribe that has trust lands in this state (L'Anse)

STATE MEMBERS

Amanda Bright-McClanahan
Michigan Economic Development Corporation

State Representative Sara Cambensy

Daniel Eichinger, *Director*
Department of Natural Resources

Liesl Eichler Clark, *Director*
Department of Environment, Great Lakes, and Energy

Kirk Lapham
Department of Natural Resources

Sharon Schafer
Department of Natural Resources

Adam W. Wygant, Committee Chair
Oil, Gas, and Minerals Division,
Department of Environment, Great Lakes, and Energy

ADMINISTRATIVE SUPPORT

Michael Sweat, *Retired*
Department of Environment, Great Lakes, and Energy

Trisha Hagerman
Department of Environment, Great Lakes, and Energy