



## Agenda - Recharge the Range

### Natural Resources

Monday, October 24<sup>th</sup>, 2016

3:00 p.m. – 5:00p.m.

Mining and Reclamation Building – 1003 Discovery Drive, Chisholm, MN 55719

- |   |  |
|---|--|
| 1. Welcome  | Rolf Weberg, Mike Mlinar & Julie Lucas |
| 2. Safety Moment  | Rolf Weberg, Mike Mlinar & Julie Lucas |
| 3. Introductions  | All                                    |
| 4. Purpose of Session   | All                                    |
| <ul style="list-style-type: none"><li>• Introduce Planned Process</li><li>• Discuss Participants Role</li><li>• Review Progress</li><li>• Solicit Input</li><li>• Plan Next Steps</li></ul> |  |
| 5. Closing Remarks  | Rolf Weberg, Mike Mlinar & Julie Lucas |
| 6. Next Meeting   | All                                    |

## Natural Resources

### Mineland Reclamation

October 24<sup>th</sup>, 2016

3:00 p.m. – 5:00 p.m.

**In Attendance:** Rolf Weberg, Mike Mlinar, Julie Lucas, Mary Finnegan, Sara Ferkul, Lorrie Janatopolous, Paul Kess, Dan Jordan, Jim Glowacki, Jim Swearingen, Mike Perala, Doug Learmont, Mark Lorenz, Julie Marinucci, Tamara Lowney, Katy Lofquist, Kelsey Johnson and Bill Whiteside

General Introduction by Rolf. And then individual introductions.

Took a moment to discuss accomplishments in safety. Rolf and Mike both gave examples.

#### Planned Process:

- Initial Planning Forum – Original Recharge the Range events
- Review Phase – IRRRB took all the ideas and narrowed it down to the critical few
- Analysis Phase – Group meets to narrow down and identify existing and planned actions.

Sector Group #1 – Review sector goals and priority strategies, offer feedback on existing and planned actions and engage the community to share information and gain broad understanding and input.

Sector Group #2 – Refinement phase.

Goal: Support Natural Resources initiatives to address strategies and challenges. Help natural resources evolve – Ferrous, Non-Ferrous, Timber and Water.

Possibly working with the DRI Coalition, we may be able to work with this group.

## **Ferrous Mining:**

### **Active Programs and Projects:**

- (NRRI) Construct high-value iron product process simulator to aid industry in optimization of processes to match various ore bodies and various high value products processes (DRI, Nuggets, etc.), (NRRI and others) Optimize and implement high yield flotation technologies for separating all iron from Minnesota Ores. High value iron coalition report, Magnetite as passive solar, Cooperative Minerals Research Fund – need to leverage vs. opportunities, consider application to innovation vs. reinvestment into current operations.

### **Gaps and Opportunities:**

- Consider iron ore concentrates as independent market – high value additives to other materials/media/processes, consider as small business with high value, need to know market size and value. Consider iron ore concentrate as additive to materials/concrete as heat sink for construction. Horizontal heat storage/passive heat storage. Cooperative Minerals research Fund. Laurentian Vision Partnerships – look at land use planning to preserve ore body access for future. Educate public/stakeholders on energy impact on industry, targeted marketing effort.

## **Non-Ferrous Mining:**

### **Active Programs and Projects:**

- (NRRI) Collaborative development of reduced impact hydrometallurgical techniques to isolate copper and nickel concentrates. (NRRI) Kinetic leaching studies for finely ground copper/nickel ores to characterize process timescale-relevant relationships between contact time, acid generation, floatation additives, leaching rates, etc. (NRRI) Evaluate manganese deposits and approaches to

development of value added products. (NRRI) Ilmenite processing demonstration project – demonstrate utility of emerging technologies to isolate high purity titanium dioxide, iron oxide, manganese and vanadium from low-sulfur Minnesota Ilmenite deposits.

Gaps and Opportunities:

- Waste stream issue solutions. Communicate with the U of M and other activities and progress in bioremediation, absorption, chemical processes. Laurentian Vision Partnerships – look at land use planning to preserve ore body access for future.

**Secondary Mining Products:**

Active Programs and Projects:

- (NRRI) Delver road patch compound technology utilizing taconite mining waste materials. Use of taconite waste as roadbed base (Highway 5).

Gaps and Opportunities:

- Use slag as concrete aggregate.

**Forestry and Land Management:**

Active Programs and Projects:

- (NRRI) Deliver red pine thinning study data to deploy new practices to optimize yield. (NRRI) Develop approaches utilizing LIDAR data to model timber location, quality, quantity and availability. Characterize the “true wood basket” and availability. (NRRI) Wildlife and ecosystem characterization to inform sustainable forestry practices. EAB tree harvest, how to access, quarantine, treat and market. Private forest education effort current on Range.

### Gaps and Opportunities:

- Regional Forest Product Alliance – Provide support for logging industry, financing/business/planning/workforce planning. Beneficial reuse of Minelands for biomass generation; how to better leverage – include tailings basins, buffer lands etc. How can these opportunities support emerging bio-economy opportunities? Offer free forest planning to private landowners. Need to communicate available programs. How to leverage scarce resources? Minnesota Forest Industries needs to have a presence in these conversations. American forestry and paper association. Mining and Forestry have challenges regarding transportation (rail) – Regional Rail Initiative. Also invite – Duluth-Superior Port Authority.

### **Forest Products and Bio-Economy:**

#### Active Programs and Projects:

- (NRRI) Material characterization of Minnesota wood species to identify compositional makeup, match with industry desires and requirements for biomass feedstock process, clarify industry opportunities. (NRRI) Pursue funding for biofuel gasification and production of liquid biofuels (jet fuel, diesel fuel and chemicals).

### Gaps and Opportunities:

- Is furniture manufacturing a possibility in Minnesota? How does Minnesota utilize substandard wood?

### **Water:**

#### Active Programs and Projects:

- (NRRI) Development of peat based absorbents to remove heavy metal contaminants from Minnesota waters. (NRRI) Collaborate with industrial partners to partners to pilot and demonstrate high volume physical/chemical processes to remove sulfate from Minnesota waters.

### Gaps and Opportunities:

- How to consider water as an opportunity itself rather than just an enabler for mining, timber, energy etc. How do we monetize water? Prevention/remediation technologies or other? How to maintain local control of MN waters in terms of water resources?

### **Energy:**

#### Active Programs and Projects:

- (NRRI) Demonstration of compressed air energy storage as means for onboarding renewable energy for industry utilization. (NRRI) Biomass based energy laboratory to demonstrate biomass solid fuels in high volumes for industrial testing. (NRRI) Develop hydrothermal carbonization processes to convert wet woody biomasses to fuels.

### Gaps and Opportunities:

- Understand the true cost of energy to support industries, educate public on the cost of being “green”

### **Social License’:**

#### Active Programs and Projects:

- (MCC, IMA and MM) Development of “Social License” approach to mine management. (NRRI) Develop “Map of Opportunity” overlaying characterized mineral resources and material challenges with water resources, municipalities, utilities, parks, protected areas, forests industry – to help identify challenges and define mining districts.

### Gaps and Opportunities:

- Harness Interest in maintaining Minnesota jobs towards solving the non-ferrous mining impacts on water. Need to carefully identify who delivers the message, makes a difference to the reception. Also can look for opportunities to leverage

communications proactively. RAMS – Leading discussions within the community leaders, they may be good to be a part of the conversation. Non-Ferrous communication is difficult. Need to lead discussion on state-wide basis, need comprehensive statewide strategy. Need to engage stakeholders proactively. Drive pride in Minnesota mining industries, doing it right is a differentiator – Mined in Minnesota. Need to be able to tell the story of how the industry operates today vs. past years. Can be a powerful message, address perceptions proactively. Must develop ambassadors for natural resources industries and target with key messages. Mobilize education approaches.

**Other:**

Demographic shortcomings – we need young engineers/operators that are actually a part of the natural resources industry to be a part of this group. Possibly working towards changing the workforce dynamics in the natural resources industry. Promote sharing of investment in environmental protection for new natural resource development by recipients of royalties and payments.

Possibility of breaking into subgroups so we can be more focused.

**Moving Forward:**

Plan to meet at the beginning of December – Actual date to be determined.

Summary of Strategic Activities - Proposed Focus

Natural Resources Focus Statement

Support natural resource initiatives to address strategies and challenges

GOAL: HELP NATURAL RESOURCE INDUSTRIES EVOLVE

Identified Strategies	Active Programs & Projects					Gaps & Opportunities		
FERROUS MINING	(NRRI) Construct high-value iron product process simulator to aid industry in optimization of processes to match various ore bodies and various high value product processes (DRI, nuggets, pig, etc.)	(NRRI, others) Optimize and implement high yield flotation technologies for separating all iron from Minnesota ores.	High Value Iron Coalition report (4Q, 2016)	Magnetite as passive solar	Cooperative Minerals Resarch Fund; need to leverage vs. opportunities. Consider application to innovation vs. reinvestment into current operations.	Consider iron ore concentrates as independent market; high value additives to other materials/media/proce sses; consider as small business opportunities with high value. Need to know market size/value. (Jim Glowacki)	Consider iron ore (concentrate) as additive to materials/concrete as heat sink for construction. Horizontal heat storage/passive heat storage.	Cooperative Minerals Resarch Fund
NON-FERROUS MINING	(NRRI) Collaborative development of reduced-impact hydrometallurgical techniques to isolate copper and nickel concentrates.	(NRRI) Kinetic leaching studies of finely ground copper/nickel ores to characterize process timescale-relevant relationships between contact time, acid generation, floatation additives, leaching rates, etc.	(NRRI) Evaluate manganese deposits and approaches to development of value-added products.	(NRRI) Ilmenite processing demonstration project - demonstrate utility of emerging technologies to isolate high purity titanium dioxide, iron oxide, manganese and vanadium from low-sulfur Minnesota Ilmenite deposits.		Wastestream issue solutions. Communicate UofM and other activities and progress in bioremediation, absorption, chemical processes, UF.		
SECONDARY MINING PRODUCTS	(NRRI) Delver road patch compound technology utilizing taconite mining waste materials	Use of taconite waste as roadbed base (St. Louis County)				Use slag as concrete aggregate.		



FORESTRY AND LAND MANAGEMENT	(NRRI) Deliver red pine thinning study data to deploy new practices to optimize yield.	(NRRI) Develop approaches utilizing LIDAR data to model timber location, quality, quantity and availability. Characterize the "true wood-basket" and availability.	(NRRI) Wildlife & ecosystem characterization to inform sustainable forestry practices (bats, moose, water, etc.)	EAB tree harvest; how to access, quarantine, treat, market.	Private forest education effort current on Range	Regional forest product alliance - provide support for logging industry; financing/business planning/workforce planning	Beneficial reuse of minelands for biomass generation; how to better leverage: include tailings basins, buffer lands, etc. How can these opportunities support emerging bioeconomy opportunities?	Offer free forest planning to smaller private landowners; need to communicate available programs. How to leverage scarce resources (DNR).
FOREST PRODUCTS AND BIOECONOMY	(NRRI) Material characterization of Minnesota wood species to identify compositional makeup; match with industry desires and requirements for biomass feedstock processes; clarify industry opportunities.	(NRRI) Pursue funding for biofuel gasification and production of liquid biofuels (jet fuel, diesel fuel, chemicals)				Is furniture mfg a possibility in MN? How does MN utilize substandard (structural) wood?		
WATER	(NRRI) Development of peat-based absorbants to remove heavy metal contaminants from Minnesota waters.	(NRRI) Collaborate with industrial partners to pilot and demonstrate high volume physical/chemical processes to remove sulfate from Minnesota waters.				How to consider water as an opportunity itself rather than just an enabler for mining, timber, energy, etc. How do we monetize water? Prevention/remediation technologies or other?	How to maintain local control of MN waters in terms of water resources? Not applicable to Great Lakes.	
ENERGY	(NRRI) Demonstration of compressed air energy storage as means for onboarding renewable energy for industry utilization.	(NRRI) Biomass-based energy laboratory to demonstrate torrefied biomass solid fuels in high volumes for industrial testing.	(NRRI) Develop hydrothermal carbonization processes to convert wet woody biomass to fuels.			Understand true cost of energy to support industries; educate public on cost of "green".		

SOCIAL LICENSE	(MCC, IMA, MM) Development of "Social License" approach to mine management.	(NRRI) Develop "Map of Opportunity" overlaying characterized mineral resources and material challenges with water resources, municipalities, utilities, parks, protected areas, forests, industry, etc. to help identify challenges and define mining districts.				Harness interest in maintaining MN jobs towards solving the non-ferrous mining impacts on water.	Need to carefully identify who delivers the message; makes difference to the reception. Also can look for opportunities to leverage communications proactively.	RAMS - leading discussions among community leaders; may be a good medium for these conversations.
OTHER						Demographic shortcoming; where are the young engineers who will be carrying out these long-term actions? May also want to include operator demographic as well. Engage scam mining participants. Need the collective, entrepreneurial voice. Need the hands-on voice.	Changing workforce dynamics in NR industries.	Promote sharing of investment in environmental protection for new natural resource development by recipients of royalties, payments, etc.



LVP: look at land use planning to preserve ore body access for future.	Educate public/stakeholders on energy impact on industry; targeted marketing effort.		
LVP: look at land use planning to preserve ore body access for future.			

MN Forest Industries needs to have a presence in these conversations; MFRC as well.	American forestry and paper association	Mining & Forestry have challenges regarding transportation (rail). Note Regional Rail Initiative.	Include Duluth Superior Port Authority in NR discussions

<p>Non-ferrous communication is difficult. Need to lead discussion on state-wide basis; need comprehensive statewide strategy. Need to engage stakeholders proactively.</p>	<p>Drive pride in MN mining industry; doing it right is a differentiator; Mined in Minnesota.</p>	<p>Need to be able to tell story of how the industry operates today vs. yesterday; can be a powerful message; address perceptions proactively.</p>	<p>Must develop ambassadors for natural resource industries and target with key messages. Mobilize education approaches.</p>