



MINNESOTA ENVIRONMENTAL QUALITY BOARD

October 19, 2016

**Meeting Location: MPCA Board Room
St. Paul, Minnesota
1:00 p.m. – 4:00 p.m.**

AGENDA

General

This month's meeting will take place in the Minnesota Pollution Control Agency board room at 520 Lafayette Road in St. Paul. The Environmental Quality Board (EQB or Board) meeting will be available via live webcast on October 19 from 1:00 p.m. to 4:00 p.m. You will be able to access the webcast on our website: www.eqb.state.mn.us

The Jupiter Parking Lot is for all day visitors and is located across from the Law Enforcement Center on Grove Street. The Blue Parking Lot is also available for all day visitors and is located off of University and Olive Streets.

Public comment is taken on all agenda items. Time allocated for discussion is at the discretion of the Board Chair.

- I. *Adoption of Consent Agenda**
Proposed Agenda for October 19, 2016 Board Meeting
September Meeting Minutes
- II. Introductions**
- III. Chair's Report**
- IV. Executive Director's Report**
- V. The Minnesota Academy of Family Physicians Petition for Rulemaking to the Environmental Quality Board**
- VI. Public Comment**
- VII. Adjourn**

* Items requiring discussion may be removed from the Consent Agenda



520 Lafayette Road
St. Paul, MN 55155-4194

MINNESOTA ENVIRONMENTAL QUALITY BOARD

Phone: 651-757-2873
Fax: 651-297-2343
www.eqb.state.mn.us

October 19, 2016

**Meeting Location: MPCA Board Room
St. Paul, Minnesota
1:00 p.m. – 4:00 p.m.**

ANNOTATED AGENDA

General

This month's meeting will take place in the Minnesota Pollution Control Agency board room at 520 Lafayette Road in St. Paul. The Environmental Quality Board (EQB or Board) meeting will be available via live webcast on October 19 from 1:00 p.m. to 4:00 p.m. You will be able to access the webcast on our website: www.eqb.state.mn.us

The Jupiter Parking Lot is for all day visitors and is located across from the Law Enforcement Center on Grove Street. The Blue Parking Lot is also available for all day visitors and is located off of University and Olive Streets.

Public comment is taken on all agenda items. Time allocated for discussion is at the discretion of the Board Chair.

- I. *Adoption of Consent Agenda**
Proposed Agenda for October 19, 2016 Board Meeting
September Meeting Minutes
- II. Introductions**
- III. Chair's Report**
- IV. Executive Director's Report**
- V. The Minnesota Academy of Family Physicians Petition for Rulemaking to the Environmental Quality Board**

Issue before the Board:

The EQB received a petition for rulemaking in accordance with Minn. Stat. 14.09 and Minn. R. 1400.2040 and 1400.2500.

** Items requiring discussion may be removed from the Consent Agenda*

The petition requests rulemaking to amend Minn. R. parts 4410.1200 and 4410.2300 to do the following:

- Minn. R. 4410.1200 EAW Content

The proposed amendment would change the content of an environmental assessment worksheet (EAW) for non-ferrous mining projects to include “a major issues section identifying human health impacts that may require further investigation before the project is commenced, including identification of cumulative potential effects.”

- Minn. R. 4410.2300 Content of EIS

The proposed amendment would change the content of an environmental impact statement (EIS) for non-ferrous mining projects to include “a thorough health risk and health impact assessment of potentially significant adverse or beneficial effects generated, be they direct, indirect, or cumulative.”

The issue before the Board is to hear background information that will inform the future decision item. No Board action will be taken at the October 19, 2016 meeting.

Background:

On June 3, 2016, the EQB received a petition for rulemaking from the Minnesota Academy of Family Physicians (MAFP). The petition is described above and a copy of the petition is in the enclosed materials (See “MAFP_Petition for Rulemaking”, “MAFP_Resolution Letter 2016” and “MAFP_Petition for Rulemaking Supporting Documents”).

The aforementioned petition for rulemaking has potential implications for the environmental review process for nonferrous mining projects in the state. Understanding the scope of the proposed changes requires expertise from multiple fields, including public health, environmental review and nonferrous mining. This Board meeting is an opportunity to better understand the petitioners’ request for rulemaking and to hear from state agencies and citizen experts.

Presenter: Courtney Ahlers-Nelson
 Planning Director, Environmental Review
 Environmental Quality Board (651-757-2183)

EQB staff will describe the issue before the Board.

Presenters: Dania Kamp, MD,
 President,
 Minnesota Academy of Family Physicians (651-387-1195)

Deb Allert, MD
 Lake Superior Chapter President,
 Minnesota Academy of Family Physicians (218-834-6598)

Emily Onello, MD
 Lake Superior Chapter Member,
 Minnesota Academy of Family Physicians (218-729-7820)

Materials Enclosed:

- “MAFP_Petition for Rulemaking”
- “MAFP_Resolution Letter 2016”

- “MAFP_Petition for Rulemaking Supporting Documents”

Doctors Kamp, Allert and Onello will present the Board with their petition for rulemaking.

Presenter: Kristin Raab
Supervisor, Environmental Impact Analysis Unit
Minnesota Department of Health (651-201-4893)

Materials Enclosed:

- “MDH_HIA Projects in Minnsota_October 2016”
- “MDH_HIA_TalkingPoints_final”

MDH staff will provide the Board with information regarding health impact assessments (HIA) and health risk assessments (HRA).

Presenter: Randall Doneen
Supervisor, Environmental Review Unit
Department of Natural Resources (651-259-5159)

Materials Enclosed:

- “DNR_MorthMet FEIS_section 7.3.4_Human Health Considerations”

DNR staff will provide the Board with information regarding nonferrous mining EAWs and EISs completed in Minnesota.

Presenter: Frank L. Kohlasch
Manager, Air Assessment Section
Minnesota Pollution Control Agency (651-757-2500)

MPCA staff will provide the Board with an overview of the methods the MPCA uses to address environmental risks to human health in environmental review.

VI. Public Comment

VII. Adjourn

**MINNESOTA ENVIRONMENTAL QUALITY BOARD
MEETING MINUTES**

**Wednesday, September 21, 2016
MPCA Room Board Room
520 Lafayette Road North, St. Paul**

EQB Members Present: Mike Rothman, John Saxhaug, Charlie Zelle, Tom Landwehr, Julie Goehring, John Linc Stine, Kristin Eide-Tollefson, Kevin McKinnon, Matt Massman, Brian Napstad, Tom Moibi, Adam Duininck

EQB Members Absent: Dr. Ed Ehlinger, Kate Knuth, Dave Frederickson, Shawntera Hardy

Staff Present: Will Seuffert, Courtney Ahlers-Nelson, Erik Dahl, Mark Riegel, Katie Pratt

I. Adoption of Consent Agenda and Minutes

II. Introductions

III. Chair's Report – Brian Napstad chaired the meeting in Commissioner Frederickson's absence.

IV. Executive Director's Report

Thank you to everyone who participated in the July CSEO event.

Anna Henderson, EQB staff, started a new position as the Governor's Water Policy Advisor. We will begin the process of filling her vacancy in the upcoming weeks.

On Monday, September 19th, EQB facilitated a workshop at the Minnesota Zoo with representatives from a variety of Minnesota agencies to define statewide goals and indicators to report on the health of our pollinator species in Minnesota.

We started the Environmental Review survey in July 2016. The goal of the survey is to assess the technical assistance provided by the EQB and collect feedback on the perceived effectiveness of environmental review. So far we have received responses from nearly 50% of RGUs invited to complete the survey and about 70% of citizens invited to complete the survey.

We are planning our Environmental Congress which will be held on February 3, 2017.

V. Designation of the Responsible Governmental Unit for Environmental Review

Presenter: Courtney Ahlers-Nelson, EQB

EQB staff received a letter from St. Louis County requesting that the EQB designate a different Regulated Governmental Unit (RGU) for the EAW for the proposed Spider Creek Mitigation Project. In its letter, St. Louis County suggested that the Minnesota Department of Natural Resources (DNR) is the more appropriate RGU due to the DNR's expertise in public waters, including ecological function of aquatic habitats and ecological effects to the flora and fauna.

A roll call vote was taken. The adoption of the resolution and approving the Findings, Conclusions, and Order assigning RGU duties to the DNR was approved.

VI. Interagency Pollinator Coordination Team Update

Presenters: Raj Mann and Whitney Place, Department of Agriculture; Crystal Boyd, Department of Natural Resources

The findings from the Special Registration Review was presented and there was discussion on MDA's response under Executive Order 16-07.

VII. Clean Power Plan in Minnesota: Public Engagement and Input

Presenter: Melissa Kuskie, MPCA staff

In February and March 2016, the Minnesota Pollution Control Agency conducted public listening sessions around the state to seek input on the development of a state Clean Power Plan. Meeting attendees shared a number of varied concerns ranging from climate and health protections to compliance costs. Ms. Kuskie shared with the Board the concerns and comments/input from these listening sessions.

The following people provided oral testimony:

- Mahyar Sorour - MPIRG
- Ann Ellis – North Star Electric Cooperative – Baudette, MN
- Timothy DenHerder Community Power/Cooperative Energy Futures
- George Crocker – North American Water Office/Community Power

Discussion followed.

VIII. Incorporating Climate Change into Environmental Review

Presenter: Mark Riegel, EQB staff and Samantha Radermacher, EQB intern

Samantha shared her policy research and compiled a summary document of the opportunities for incorporating climate change into environmental review. The final summary report will be used as a starting point for future discussions on the opportunities to address climate change through environmental review.

Discussion followed.

VIX. Update: Environmental Review of North Dakota Pipeline Company LLC's proposed Sandpiper Pipeline and Enbridge Energy, Limited Partnership's proposed Line 3 Replacement Pipeline

Presenters: Curtis Zaun, Department of Commerce; Barb Naramore, Department of Natural Resources; Michelle Beeman, Minnesota Pollution Control Agency

A status update was presented to the Board.

The following people provided oral testimony:

- Jerry Striegel – St. Paul
- Kathy Hollander – MN350
- Bill Adamski – Minneapolis
- John Munter – Warba, MN
- Willis Mattison – Osage, MN
- Andy Pearson - Minneapolis

Discussion followed.

The audio recording of the meeting is the official record and can be found at this link: ftp://files.pca.state.mn.us/pub/EQB_Board/

Webcast is also available on the EQB website: <https://www.eqb.state.mn.us/>

**RESOLUTION OF THE
MINNESOTA ENVIRONMENTAL QUALITY BOARD**

Designation of a Different Responsible Governmental Unit for the Environmental Review of
United States Steel Corporation's proposed Spider Creek Mitigation Project.

BE IT RESOLVED, that the Minnesota Environmental Quality Board approves and
adopts the Findings of Fact, Conclusions and Order; and

BE IT FURTHER RESOLVED, that Brian Napstad, Vice Chair of the Board, is
authorized to sign the adopted Findings of Fact, Conclusions and Order.

**STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD**

In the Matter of the Request to Designate a
Different Responsible Governmental Unit
for the Environmental Review of United
States Steel Corporation's proposed Spider
Creek Mitigation Project

**FINDINGS OF FACT,
CONCLUSIONS OF LAW,
AND ORDER**

FINDINGS OF FACT

1. United States Steel Corporation (U.S. Steel), Minnesota Ore Operations – Minntac (Minntac) received a United States Army Corps of Engineers (USACE) permit for the Minntac Mine Pit Extension project, which includes progression of the Minntac East Pit in Mountain Iron, Minnesota.
2. The Mine Pit Extension project will impact 3,697 linear feet of Parkville Creek.
3. Special Condition 11 of the USACE permit requires that U.S. Steel mitigate for the loss of Parkville Creek.
4. U.S. Steel proposes that mitigation occur entirely on Spider Creek, which is located in the northeast quarter of Section 24, Township 52 North, Range 19 West, St. Louis County, Minnesota.
5. The “Spider Creek Restoration Plan: Minntac Mine Extension Project” prepared in December 2015, states that the proposed Spider Creek Mitigation Project (project) is to restore the pattern, profile, and dimension of a minimum of 3,697 linear feet of Spider Creek.
6. The “Spider Creek Restoration Plan: Minntac Mine Extension Project” states that the proposed project will include additional benefits to ensure sustainable stream characteristics and to improve riparian and floodplain vegetation.
7. The “Spider Creek Restoration Plan: Minntac Mine Extension Project” also states that the proposed project requires a Public Waters Work Permit administered by the Minnesota Department of Natural Resources (DNR) and a National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit issued by the Minnesota Pollution Control Agency (PCA).
8. Minnesota Rule 4410.0200, subpart 33 reads:

Governmental action. "Governmental action" means activities including projects wholly or partially conducted, permitted, assisted, financed, regulated, or approved by governmental units, including the federal government.

Minn. R. 4410.0200, subpart 33.

9. Minnesota Rule 4410.0200, subpart 65 reads:

Project. "Project" means a governmental action, the results of which would cause physical manipulation of the environment, directly or indirectly. The determination of whether a project requires environmental documents shall be made by reference to the physical activity to be undertaken and not to the governmental process of approving the project.

Minn. R. 4410.0200, subpart 65.

10. The EQB finds that the proposed project requires a "governmental action" under Minnesota Rule 4410.0200, subpart 33.
11. The EQB finds that the proposed project is a "project" under Minnesota Rule 4410.0200, subpart. 65 and that the restoration will result in the physical manipulation of a minimum of 3,697 linear feet of Spider Creek.
12. Minnesota Rule 4410.4300 establishes mandatory categories for the preparation of an environmental assessment worksheet (EAW). Subpart 26 reads:

Stream diversion. For a diversion, realignment, or channelization of any designated trout stream, or affecting greater than 500 feet of natural watercourse with a total drainage area of ten or more square miles unless exempted by part 4410. 4600, subpart 14, item E, or 17, the local governmental unit shall be the RGU.

Minn. R. 4410.4300, subpart 26.

13. The EQB finds that Minnesota Rules 4410.4300, subpart 26 requires that for the mitigation of Spider Creek an EAW must be completed.
14. The EQB finds that Minnesota Rules 4410.4300, subpart 26 also designates the local governmental unit as the responsible governmental unit (RGU) for the EAW.
15. On August 1, 2016, EQB staff received a letter from St. Louis County requesting that the EQB designate a different RGU for the EAW for the proposed project.
16. The August 1, 2016 letter from St. Louis County was also sent to the DNR Environmental Review Program.
17. On August 17, 2016, the DNR sent a letter to the EQB indicating DNR staff had been in communication with St. Louis County and U.S. Steel representatives, and that the DNR would be willing to serve as RGU for the proposed mitigation project.

18. Minnesota Rule 4410.0500, subpart 6 reads:

Exception. Notwithstanding subparts 1 to 5, the EQB may designate, within five days of receipt of the completed data portions of the EAW, a different RGU for the project if the EQB determines the designee has greater expertise in analyzing the potential impacts of the project.

Minn. R. 4410.0500, subpart 6.

19. The EQB finds that in its history of applying Minnesota Rules 4410.0500, subpart 6, the designation of a different RGU has not been completed “within five day of receipt of the completed data portion of the EAW” and that rarely is a data submittal made prior to EQB’s decision.
20. The EQB finds that there are several examples of the EQB processing requests to designate a different RGU without a data submittal nor within five days of the data submittal. For example, the following projects did not have data submittals submitted prior to an EQB decision:
 - a. Living Word Bible Camp – proposed recreational development, 2013
 - b. Minnesota Sands, LLC – proposed silica sand projects, 2013
 - c. Lock and Dam Number 1 – proposed courting project, 2015
21. The EQB finds that making a decision within the five days of the EAW data submittal is not practical for the RGU or project proposers to plan for the environmental review.
22. The EQB believes that it was never the intent of the five day limitation to limit public planning or collaboration between the RGU and the project proposer before the EAW data submittal.
23. The EQB finds that to designate a different RGU other than St. Louis County under Minnesota Rules 4410.0500, subpart 6, that the EQB must determine that such a designee has greater expertise in analyzing the potential impacts of the proposed project.
24. The August 1, 2016 letter from St. Louis County also suggested that the DNR is the more appropriate RGU for the proposed project because of DNR’s expertise in public waters, including ecological function of aquatic habitats, ecological effects to the flora and fauna and expertise in preparing joint state-federal environmental review documents.
25. The August 17, 2016 letter from DNR states: “MNDNR’s expertise in work in public waters and ecosystems functions and effects of aquatic ecosystems would assist in assessment of the project.”
26. The EQB finds that the DNR has more experience in analyzing the potential impacts associated with stream mitigation.

27. The EQB finds that the DNR has more experience in analyzing the potential impacts associated with stream mitigation as they are responsible for permitting the work done in Spider Creek, a public water.
28. The EQB finds that the DNR has greater expertise than St. Louis County in analyzing the potential for environmental impacts of projects involving work in public waters and preparing EAWs and Environmental Impact Statements (EIS) for such projects.

Based on the foregoing Findings of Fact, the Minnesota Environmental Quality Board makes the following:

CONCLUSIONS OF LAW

1. Any of the foregoing Findings of Fact more properly designated as Conclusions of Law are hereby adopted as such.
2. The EQB concludes that pursuant to Minnesota Statutes chapter 116D and Minnesota Rules 4410, the EQB has jurisdiction over RGU designation.
3. The EQB concludes that the proposed Spider Creek Mitigation Project requires environmental review pursuant to Minnesota Rules 4410.
4. The EQB concludes the request for the EQB to decide the question whether to designate a different RGU for the proposed project was properly brought to the EQB Board.
5. The EQB concludes that the DNR has greater expertise in analyzing the potential for environmental impacts of the proposed Spider Creek Mitigation Project than St. Louis County, and is therefore better suited as RGU to conduct the environmental review for the project.

Based on the Findings of Fact, Conclusions and the entire record of this proceeding, the Minnesota Environmental Quality Board hereby makes the following:

ORDER

The Environmental Quality Board hereby orders and designates the Minnesota Department of Natural Resources as the responsible governmental unit for environmental review of the proposed Spider Creek Mitigation Project by the United States Steel Company.

Approved and adopted this 21st day of September, 2016.



Brian Napstad, Vice Chair of the Board,
on behalf of David J. Frederickson, Chair
Minnesota Environmental Quality Board

Minnesota Academy of Family Physicians
Petition for Rulemaking and Supporting Documents

1400.2500 PETITION FOR RULEMAKING.

**PETITION FOR RULEMAKING TO THE MINNESOTA DEPARTMENT OF
EQB**

Name: Dania Kamp, MD

Group Represented or Title: Minnesota Academy of Family Physicians

Address: Suite 1680, 600 Highway 169

St. Louis Park, MN 55426

I request that the agency named above (check one):

Adopt a new rule governing _____

Amend Minnesota Rules, part(s) 4410.1200, 4410.2300

Repeal Minnesota Rules, part(s) _____

1. Explain the need or reason for the rulemaking you request. The agency will consider your reasons in making its decision, so your explanation must be detailed. You can use additional pages.

2. For a new rule, state the proposed new language of the rule. For rule amendments, repeat the text of the rule, striking through deletions and underlining new language. If you cannot provide new rule language, then write a detailed description of the rule that you are requesting. You can use additional pages.

You must file this petition with the executive director or head of the agency in person or by United States mail. The agency must reply in writing to your petition within 60 days after receiving it.

DATE: May 25, 2016



Signature of Petitioner

Statutory Authority: *MS s 14.386; 14.388; 14.51*

History: *20 SR 2058*

Published Electronically: *August 6, 2013*



May 25, 2016

Minnesota Environmental Quality Board (EQB)
520 Lafayette Road
St Paul, MN 55155

RE: Petition for Rulemaking under Minn. R. 1400.2040 and 1400.2500

Dear Environmental Quality Board (EQB) members,

The Minnesota Academy of Family Physicians (MAFP) is the largest medical specialty organization in Minnesota, representing over 3,100 members. The MAFP House of Delegates (HOD) meets annually and considers resolutions brought forth by its members designed to improve patient and public health. The HOD passed the following resolution at its April 13, 2016 meeting in Minneapolis.

“BE IT RESOLVED, that the MAFP supports the preparation of a comprehensive, independently produced Health Impact Assessment (HIA) for all sulfide mining projects requiring the completion of an environmental assessment worksheet (EAW) or an environmental impact statement (EIS), and

BE IT FURTHER RESOLVED, that the MAFP also supports changing Minnesota Administrative Rules in Chapter 4410 to include the requirement that a comprehensive and independent HIA be prepared for all sulfide mining projects requiring an EAW or EIS.”

The impetus for the resolution came from discussions with MPCA Commissioner John Linc Stine and DNR Assistant Commissioner Barb Naramore at a September 25, 2015 meeting held at the DNR Offices in St. Paul. They recommended that we pursue changing Chapter 4410 to require an HIA. DNR Commissioner Tom Landwehr, MDH Commissioner Dr. Ed Ehlinger, and Joanna Dornfeld Assistant Chief of Staff from Governor Dayton’s office, were also present.

At this meeting Dr. M. Tariq Fareed, then MAFP President, and several Duluth doctors requested that a comprehensive, independently produced HIA be completed for the PolyMet NorthMet Project proposal. The Minnesota Medical Association (MMA), the Minnesota Nurses Association (MNA) and Minnesota Public Health Association (MPHA) had also requested that an HIA be completed for this project. Ultimately, the Minnesota DNR as the responsible governmental unit (RGU) under Chapter 4410, denied their requests.

The Minnesota Department of Health, the Minnesota Department of Natural Resources, and the Minnesota Pollution Control Agency officially espouse a “health in all policies” approach to governance. To make this a reality and resolve any potential conflicts, we need to put these words into action. We petition under Minnesota Statutes 14.09 and Minnesota Rule 1400.2040 that Chapter 4410 be amended to require that human health impacts be specifically analyzed in an independently produced HIA. This step would ensure that human health impacts are rigorously analyzed, along with environmental, economic, employment and sociological impacts.

A petition for rulemaking under Minnesota Rules 1400.2500 and supporting documents, including proposed language for the rule change, the July 2015 letter from MAFP requesting a health impact assessment for the PolyMet NorthMet proposed sulfide mine and the meeting bullet points reflecting the substance of issues raised by Duluth physicians at the above-described September 2015 meeting with State Commissioners are also attached.

Please let us know when the EQB plans to discuss and consider our request for rulemaking and whether there is additional information that would be helpful to you in this process.

Thank you for your consideration of our petition,

A handwritten signature in black ink that reads "Dania Kamp" followed by a long horizontal flourish.

Dania Kamp, MD, MAFP President

Enclosures

Petition for rulemaking using the form in Minn. R. 1400.2500

Specific proposed rule changes to Minn. R. 4410.1200 and 4410.2300

July 2015 MAFP letter requesting PolyMet HIA

September 2015 bullet points from physicians' meeting with commissioners

1400.2500 PETITION FOR RULEMAKING.

PETITION FOR RULEMAKING TO THE MINNESOTA DEPARTMENT OF
EQB

Name: Dania Kamp, MD

Group Represented or Title: Minnesota Academy of Family Physicians

Address: Suite 1680, 600 Highway 169

St. Louis Park, MN 55426

I request that the agency named above (check one):

Adopt a new rule governing _____

Amend Minnesota Rules, part(s) 4410.1200, 4410.2300

Repeal Minnesota Rules, part(s) _____

1. Explain the need or reason for the rulemaking you request. The agency will consider your reasons in making its decision, so your explanation must be detailed. You can use additional pages.

2. For a new rule, state the proposed new language of the rule. For rule amendments, repeat the text of the rule, striking through deletions and underlining new language. If you cannot provide new rule language, then write a detailed description of the rule that you are requesting. You can use additional pages.

You must file this petition with the executive director or head of the agency in person or by United States mail. The agency must reply in writing to your petition within 60 days after receiving it.

DATE: May 25, 2016



Signature of Petitioner

Statutory Authority: *MS s 14.386; 14.388; 14.51*

History: *20 SR 2058*

Published Electronically: *August 6, 2013*

1400.2500 PETITION FOR RULEMAKING
Submitted by Minnesota Academy of Family Physicians
May 20, 2016

The Minnesota Academy of Family Physicians (MAFP) requests amendment of Minnesota Rules 4410.1200 and 4410.2300 as follows:

4410.1200 EAW CONTENT

E. major issues sections identifying potential environmental impacts and issues that may require further investigation before the project is commenced, including identification of cumulative potential effects;

F. if the project involves a permit to mine, mining operation, storage pile, tailings facility, waste facility, hydrometallurgical process or beneficiation plant for nonferrous metallic minerals as defined in part 6132.0100, the EAW must also contain a major issues section identifying human health impacts that may require further investigation before the project is commenced, including identification of cumulative potential effects.

[change lettering for subsequent items]

4410.2300 CONTENT OF EIS

H. Environmental, economic, employment, and sociological impacts: for the proposed project and each major alternative there shall be a thorough but succinct discussion of potentially significant adverse or beneficial effects generated, be they direct, indirect, or cumulative. For any permit to mine, mining operation, storage pile, tailings facility, mine waste facility, hydrometallurgical process or beneficiation plant for nonferrous metallic minerals as defined in part 6132.0100, an EIS must contain a thorough health risk and health impact assessment of potentially significant adverse or beneficial effects generated, be they direct, indirect, or cumulative. Data and analyses shall be commensurate with the importance of the impact and the relevance of the information to a reasoned choice among alternatives and to the consideration of the need for mitigation measures. . .



July 22, 2015

Governor Mark Dayton
Office of the Governor and Lt. Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, MN 55155

RE: Request for Human Health Risk and Human Health Impact Assessments

Dear Governor Dayton, Commissioners:

We appreciate the opportunity to convey our concerns about the potential health effects of copper-nickel sulfide mining in Northeastern Minnesota.

The Minnesota Academy of Family Physicians (MAFP) is the largest medical specialty organization in Minnesota, representing over 3000 family physicians, family medicine residents, and medical students. The House of Delegates is the elected representative body of the MAFP and holds its annual meeting in the spring. Physician delegates, representing every corner of Minnesota, bring forth resolutions promoting patient and public health. These resolutions are discussed, debated and voted upon by the entire House.

On April 15, 2015, The House of Delegates unanimously approved the following resolution:

BE IT RESOLVED, that the MAFP request that a Human Health Risk Assessment be performed using the most current scientific modeling methods to evaluate the health effects of the by-products of proposed mining projects, and

BE IT FURTHER RESOLVED, that the MAFP supports the subsequent completion of a Human Health Impact Assessment for mining projects so that both health professionals and the public can make informed decisions.

With the adoption of this resolution, the MAFP joins its voice to those of the Minnesota Medical Association (MMA), Minnesota Nurses Association (MNA), Minnesota Public Health Association (MPHA) and Dr. Edward Ehlinger and the Minnesota Department of Health (MDH) in requesting that the health impacts of sulfide mining be analyzed and addressed.

Human Health Risk and Health Impact Assessments have not been completed for the PolyMet NorthMet Project. As physicians, our priorities are the health of our patients and the communities we serve. We must be proactive in asking, "How will PolyMet's NorthMet Project affect the long-term health of our patients and communities?" Health Risk and Health Impact Assessments are needed to answer these questions.

Dr. Ehlinger stated in the comments he submitted on behalf of the MDH, "Health starts where we live, learn, work and play. To create and maintain healthy Minnesota communities, we have to think in terms of health in all policies." We urge you to consider completing health risk and health impact assessments for the PolyMet NorthMet Project and those to follow.

Thank you for your consideration.

Sincerely,

A handwritten signature in cursive script that reads "M. Tariq Fareed".

M. Tariq Fareed
President, MAFP

CC: Commissioner Tom Landwehr, Minnesota Department of Natural Resources
Commissioner Dr. Edward Ehlinger, Minnesota Department of Health
Commissioner John Linc Stine, Minnesota Pollution Control Agency

Sept. 25th Meeting at DNR

Review of issues presented by physicians attending

To Commissioners Landwehr, Linc Stine, Ehlinger , Assistant Commissioner Naramore, and Assistant Chief of Staff Dornfeld

Introduction: Jennifer Pearson, M.D., Family Medicine, Duluth

- Review of important letters voicing health concerns of SDEIS: *(copy of each of these of these letters attached)*
 - MPHA (October 2014): representing over 400 public health professionals
 - MN Nurses Association (March, 2014) representing over 20,000 nurses
 - Health Providers Letter (March, 2014) 46 doctors and nurses expanded to:
 - Individual Health Professionals letter (Oct. 2014): 94 individuals plus Healthy Food Action and Food and Water Watch for a total of 153 health professionals (October 2014)
 - MMA (Sept. 25th, 2014) Dr. Don Jacobs, representing over 10,000 physician members
 - Lake Superior Chapter Minnesota Academy of Family Physicians (March 2015 letter), followed in April 2015 by unanimous resolution of statewide MAFP, representing more than 3000 family physicians and residents (largest specialty organization in MN).
- Collective ASK: Comprehensive Health Risk Assessment of the NorthMet Project and Health Impact Assessment. Critical that these analyses not be just a desktop exercise, but scrutiny of underlying assumptions and use of independent science to provide objective assessments of risks and impacts.
- Quotes from PFEIS: response to concerns regarding human health:
 - “Completing an HIA between the SDEIS and FEIS would require significant time and effort, and would represent a considerable delay to the FEIS”
 - “The SDEIS did include extensive public health information relative to air and water quality”
 - “The additional information from and HIA would not significantly inform regulatory permits required for the project”
- Physician’s opinion: We do not believe that the conclusions of the Co-Lead agencies to the many comments requesting health analysis are sufficiently rigorous or protective of human health.

Closer look at Bullet Point Quotes:

- Bullet Point number 1:

- Physicians' concerns are for the health and wellness of region
- At least 5 of 10 Toxins of major public health concern to the World Health Organization (mercury, lead, arsenic, asbestos, particulate air pollution) are released from copper-nickel mining as well as sulfates released that increase mercury methylation and accumulation in the food chain
- If this door is opened, may never be able to close it
- Must take whatever time is needed assess the affects to human health, regardless of time needed. Health of future generations in our hands.
- Bullet Point #2: Covered by others- concerns about the extent and quality of information pertinent to public health remaining with the PFEIS
- Bullet Point #3:
 - Risk/Benefit of potential health effects needed to be better understood to make informed decisions
 - FDA regulations for any medication we prescribe; allow us to understand Risk/Benefit Ratio and discuss with patients
 - More and more medical literature about environmental toxins and the deleterious affects to human health
 - State of Minnesota must set a precedent that independent analysis, Health Risk Assessment and public Health Impact Assessment ARE necessary information to include in an FEIS before new industry that can potentially affect human health (sulfide mining and processing) is allowed to seek regulatory permits
 - Hippocratic Oath- first do no harm. Our duty as physicians.

Water Modeling/Containment: Areas of Concern that Support the Need for Human Health Impact Assessment Emily Onello, M.D., Family Medicine, Duluth

- Models used in PFEIS assert that there will be no off-site discharge of drainage water during operations. Current expert opinions in the literature dispute the feasibility of this assertion. Given the toxicity of this aqueous drainage, alternative models that include various rates of off-site discharge should be provided. (For example, what if only 80% or 60% of water seepage is captured for treatment?) **What would be the human health effects, if any, using these lower capture rates?**
- The PFEIS also asserts that after the mine closes, a greensand filter, pre-filters and a reverse osmosis system would be required to treat water to meet water quality standards well into the foreseeable future. **The document does not model what could happen to human health if this post-closure treatment were to end (due to unanticipated scenarios of malfunction, natural disaster or inadequate funding). How many people could get sick? And how sick could they become?**

- Analysis of the two scenarios described above should include modeling for methylmercury contamination as a result of sulfate releases, as well as releases of toxins including mercury, lead, arsenic and manganese. Potential *indirect* health effects of loss of water quality should be considered in the health impact analyses.
- Table 6.2.7-5 in the PFEIS estimates that NorthMet's direct GHG emission constitutes just over 1/1000th of the total GHG release of the state of Minnesota. Though a small fraction at first glance, when adding in indirect emissions, **could these GHG emissions have health significance?** Health-directed analyses could investigate this possibility.
- Current PFEIS models greenhouse gas (GHG) release but is not required to address how additional fossil fuel combustion related to the PolyMet project could affect human health. This connection is critical because links between increased air pollution and adverse health outcomes (for example, heart attacks and strokes) are well established in the medical literature. **Could the added air pollution from power generation affect human health in our region? More asthma attacks? Acute coronary events? Strokes? Higher prevalence of heart failure?**
- Estimates of direct and indirect GHG emissions only extend for 30 years in the PFEIS, yet the energy-demanding processes of water treatment will continue well beyond that time. Figure 5.2.7-9 gives an emission lifetime total of 15,790,752 metric tons of carbon dioxide-equivalent (CO₂e). **What would GHG emission projections look like beyond 30 years, say the 200 to 500 years where pollution from tailings and mine site may require active water quality treatment? Could the long-term electricity demand for wastewater treatment have significant direct and/or indirect effects on human health? If effects are identified, how might they differ under different models of power generation?**

Water Modeling/Containment Continued: Sue Nordin, M.D., Family Medicine, Duluth

- We question the statement that the area under the tailings basin will be impermeable. Independent review by JD Lehr and Don Lee (available on line at <http://www.waterlegacy.org/PolyMet-SDEIS-Comments>) points out that this claim is not substantiated.
- No evidence has been provided that in real field experience situations 90-99% capture of wastewater has been achieved. We would like to see modeling of pollutant outputs for lower levels of capture, along with evaluation of health consequences of less perfect capture.

Health Impacts Associated with Catastrophic Failure: Debbie Allert, M.D., Family Medicine, Duluth and President of Minnesota Academy of Family Physicians, Lake Superior Chapter

- We respectfully request that an in-depth, independent, rigorous, and adequately funded Health Impact Assessment and Health Risk Analysis be done for the proposed NorthMet project. This presentation centers on the likelihood and impact of catastrophic events on human health. Catastrophic events may involve dam failure, waste rock storage, tailings storage, or the transportation and storage of contaminated process water, concentrates, and sludge.
- Why is a Health Impact Assessment needed?
 - The current PFEIS does not adequately address the issues of either a catastrophic dam failure or multiple small breaches of the PolyMet tailings dam or of containment of PolyMet's highly toxic hydrometallurgical residue at the Hydrometallurgical Residue Facility (HRF). These events could have significant impacts on human health.
- What are the primary health concerns?
 - In the event of dam failures or breaches, highly toxic substances will be released into nearby watersheds, these include:
 - Heavy metals, such as manganese and lead, mercury that are known human neurotoxins.
 - Arsenic, a known carcinogen.
 - Mercury and sulfates, which are especially concerning because bacteria in the relatively acidic environment of bogs and wetlands produce methylmercury. Methylmercury is highly toxic to humans. Even small amounts bio accumulate in the food chain to toxic levels.
- How likely is it that catastrophic failures will occur?
 - Catastrophic events resulting in the introduction of contaminated water into surrounding watersheds have occurred recently in similar operations
 - In 2014 the Mount Polley, British Columbia copper and gold mine tailings pond breach spilled over 6 billion gallons of mine waste and polluted water into the surrounding lakes and watershed causing a major environmental disaster.
 - A 2015 study of tailings storage facility failures centering on those categorized as "serious" or "very serious" determined that such failures have increased not decreased over the last 20 years. The study also concluded that small mining companies have the highest failure rates partially because of financial constraints that can restrict them from implementing the best available technology. (Reference: The Risk, Public Liability, & Economics of Tailings Storage Facility Failures, Bowker and Chambers, July 21, 2015)
- Catastrophic events may occur in NE Minnesota in the future.
 - In June, 2012 parts of Northeast Minnesota experienced a 10 inch rainfall in 24 hours.

- The current PFEIS does not address how the tailings dams or HRF will be able to withstand rainfall in excess of 5.69 inches in a 24 hour period and fails to analyze more extreme weather events that may occur over the 200+ year life expectancy of the tailings dam.
- Whose health is at risk?
 - There are 34 homes that could be immediately affected by a PolyMet dam failure. Contaminated seepage could reach the first home in an hour.
 - Contamination of the watershed could affect thousands of people downstream. Flowage from the PolyMet site empties into both the Partridge and the Embarrass rivers which empty into the St. Louis River which is the largest tributary of Lake Superior, which is the largest source of clean water in world and serves heavily populated areas.
- How do these concerns relate to PolyMet?
 - PolyMet has no history with copper sulfide mining.
 - PolyMet has few assets and may not be able to invest in the best available technology in regard to contaminated water containment.
 - PolyMet's environmental documents fail even to consider the best available technology known as filtered dry tailings stacking, a technique recommended to reduce tailings dam failures as well as to reduce contaminated seepage from tailings.
 - As stated above, PolyMet environmental documents do not include any assessment of health risks of catastrophic dam failure or multiple small breaches.
- Conclusion
 - As physicians, we believe there is overwhelming potential for significant, far-reaching harm to the health of our community. We believe that there does not exist at this time adequate information regarding the human health impacts of the proposed NorthMet project. We believe that citizens and their health providers need to know what will happen if the sulfides mine engineering (especially the long-term containment of contaminants) works perfectly . . . and what will happen to our health if it doesn't. The current information is grossly inadequate to predict the human health impact of this project.
 - It is imperative those who will ultimately make final decision understand the true cost both in loss of health and in healthcare dollars that will result as a consequence of the NorthMet proposed project. Therefore we are requesting an independent and adequately funded rigorously scientific Health Risk Assessment and Health Impact Assessment prior to the completion the FEIS.

Mercury- Steve Bauer M.D., Medical Director of Community Mental Health Center which serves the Arrowhead of MN

- Industrial exposure to high levels of mercury is known to lead to mercury poisoning. “Mad Hatters Disease” was a common name reflecting consequences of high levels of ingestion when hat-makers used mercury to treat fur to make felt hats.
- Mercury exposures resulting from ingestion of fish contaminated with methylmercury can result neuropsychiatric issues including problems with brain development and sensory issues that can include paranoia and hallucinations.
- Mercury ingestion can also cause other adverse medical outcomes, including neurological, heart, kidney, immune system and problems with reproduction.
- As medical director my role is to not only treat but to minimize possible problems when possible.
- The adage “an ounce of prevention is worth a pound of cure” is applicable only when there is a cure.
- Unfortunately with mercury poisoning there is no way to “fix” the damage that results from exposure. Treatment may only lessen the severity. Prevention cannot be traded for “cure”.
- The assumptions made within the most recent EIS about potential mercury and methylmercury risks are not good science.
- The current modeling uses a “best case scenario” guesstimate and doesn't allow for many possible problems that may arise.
- After reviewing other information from experts that study how mercury and other heavy metals are available in the environment and what factors lead to changes, there are several points that need better consideration.
- Specifically the proposed reverse osmosis treatment of the wastewater does not address either reduction of mercury or the potential for production of methylmercury downstream, which is the version that becomes incorporated in our food chain.
- The amounts calculated for mercury increases in downstream waters express a false precision and don't include an important factor of the production of additional methylmercury downstream as a consequence of the increased sulfates being added to the watershed combining with other mercury that has accumulated in the bogs and rivers from atmospheric deposition and other discharge sources.
- Most experts who have read the environmental review documents conclude that PolyMet and its consultants have underestimated the increase in mercury methylation.
- Other examples of poor science include the laboratory test of absorption of mercury onto tailings, which only tested mercury samples for short periods of time. This test showed an initial drop in mercury levels, but then showed increasing levels in a period of just hours. This test is clearly insufficient to tell us how the long-term mixing of the waste rock in the tailings pond will

change with respect to mercury concentrations over the years of mining, reclamation and beyond.

- Science on the issue of mercury contamination should be objective to provide a more complete analysis of the future consequences of sulfide mining.
- We ask you to address this clear hazard to public health with independent analysis of health risks and a more broad and considered assessment of impacts to the community. An independent academic expert like Dr. Brian Branfireun has the needed perspective. Thank you.

Methyl Mercury – Margaret Saracino M.D., Child and Adolescent Psychiatry, Duluth

- Represent the patients with no voice- infants and children.
- This project's negative impact could be profound and have devastating consequences for infants and children due to the potential to increase heavy metals into the environment, including methylmercury, lead, arsenic, manganese, all of which cause neurodevelopmental disorders in infants and children.
- Neurodevelopmental disorders include ADHD, dyslexia, other learning disorders, autistic spectrum disorders, cerebral palsy, and intellectual disabilities.
- Neurodevelopmental disorders are one of the new pediatric morbidities- chronic conditions with no cure.
- Neurodevelopmental disorders can set the stage for neurodegenerative diseases later in life.
- Neurodevelopmental disorders occur in 3-8% of the approximately 4 million infants born each year.
- The National Academy of Sciences (NAS) estimated in 2000 that 3% of neurobehavioral disorders in American children are caused directly by toxic environmental exposures.
- Methylmercury exposure occurs due to ingestion of pregnant women and young children of fish with high methylmercury content. The placenta is not protective and the blood brain barrier of the infant is not well formed until after 2 years, leaving the developing brain vulnerable to injury. Permanent brain damage can occur, with loss of IQ points. Exposures to levels of methylmercury below what is considered toxic for adults are dangerous to the developing brain.
- Sulfide mining is known to release other neurotoxins and their negative affects can be synergistic.
- Treatment is actually management, as there are no cures. Children may need multiple supportive services including:
 - Educational assistance in the form of an IEP (Individualized Education Program) or 504 (disability accommodation) plan
 - Individual and family therapy
 - Occupational therapy, physical therapy, speech and language services

- Partial hospitalization, inpatient psychiatric hospitalization, residential placement, group home
- Juvenile detention (potential for incarceration as adults)
- SSDI (Social Security Disability Insurance)
- Possible group homes or supportive living environments as adults.
- Economic costs:
 - Each decrement in IQ is associated with lower wages, diminished lifetime earning power.
 - The loss of intelligence from methylmercury exposure has exacted a significant economic cost to American society amounting to at least hundreds of millions of dollars per year.
 - Lost wages for parents, loss of work due to meetings with care providers
 - Loss of economic growth for the community
 - Evidence from worldwide sources cite that the average national IQ scores are associated with GDP (gross domestic product)
 - Estimated costs of neurobehavioral disorders of environmental origin, US, 1997 is \$9.2 billion
- Lack of resources for management:
 - CDC (Center for Disease Control) reported in 2013 that only 20% of emotionally disturbed children and adolescents receive some kind of mental health services and only a fraction of them receive an evaluation by a child/adolescent psychiatrist
 - Children and adolescents with developmental disabilities have 3-4 times higher rates of mental, emotional and behavioral disorders than the general population (National Institute of Health 2001)
- First do no harm-Hippocratic Oath. This should apply to government agencies before allowing new industry with risks to human health.
- Issue of data/research- needs to be NON-biased. We do not accept studies that are supported financially by the drug industry as the research study has inherent bias.
- Risk/benefit ratio- if the risks outweigh the benefits, then need to look at alternatives.
- Potential risks of this project are profound. It is imperative that, before going forward, that we have an independent study, with realistic models, and accurate numbers, in order to decipher the true human health risks. Too much is at stake- costs to human health, the environment and economic costs to the community and the State.

Polymet Mine Workers: Douglas Wendland, M.D., Occupational and Environmental Health, Duluth

- Mine workers at PolyMet will have exposure to respirable crystalline silica which causes the disease silicosis.
- Mine workers will also have exposure to diesel particulates, nickel and other potentially toxic substances.
- The current Mine Safety and Health Administration (MSHA) exposure guidelines (30 C.F.R. 56.5001) are mainly based on the 1973 American Conference of Governmental Industrial Hygienists (ACGIH) guidelines and are therefore outdated and inadequate for mine worker protection.
- The current MSHA allowance for respirable crystalline silica is 4 times that recommended in current ACGIH TLV-BEI guidelines: 25 micrograms/cubic meter. (2014 ACGIH-BEI Guidelines)
- The National Institute for Occupational Health & Safety (NIOSH) has recommended and both MSHA and OSHA have proposed rule changes to reduce the exposure allowance for respirable silica to 50 mcg/m³. (See 30 C.F.R. 58, 29 C.F.R. Parts 1910, 1915, 1926)
- MSHA and the current PolyMet proposal do not mandate the medical surveillance of mine workers in order to evaluate the effectiveness of measures to limit the exposures to crystalline silica and other workplace exposure hazards.
- OSHA has published models for medical surveillance of workers exposed to a variety of chemical hazards including respirable crystalline silica. (29 C.F.R. Appendix A to 1926.1053)
- **Recommendations:**
 - Require that exposure levels of miners to respirable crystalline silica not exceed the level required in the current MSHA and OSHA proposals for rule change.
 - Require that for other exposures the 2015 ACGIH TLV-BEI Guidelines be used to define the permitted exposure.
 - Require a medical surveillance program for miners exposed to dusts, minerals and chemicals identified as significant health hazards at mine site and processing facilities with use of OSHA recommended model to guide creation of such monitoring programs.
 - The Final Environmental Impact Statement (FEIS) should include an assessment of the health impact on the community and health care resources that may result from workplace exposure both at mining sites and at related offsite workplaces. This assessment should include both cancer and non-cancer health risks.

Particulate Pollution Health Concerns- John Ipsen M.D., Family Medicine, Duluth

- Discharges of fine particulates including amphibole elongated mineral particles - pose a health risk to the mine workers and to the surrounding communities.
- The rock to be mined contains amphibole fibers: crystals with similarities to asbestos found in ore formations in the Duluth Complex where the mine would be located. Mining the ore will produce EMPs (elongated mineral particles, including amphibole mineral fibers) and other harmful particulates.
- The MN Department of Health and the PFEIS state that amphibole mineral fibers pose “an uncertain risk to human health”, an undetermined toxicity and potency. This is not reassuring. Without a thorough evaluation of the potential for exposures and the risks involved, we will be relegating the miners and the people in the surrounding communities who breathe the air to participate in an experiment they did not agree to be part of.
- Mesothelioma is a rare cancer directly linked to amphibole mineral fibers. Other identified risks of exposure include coronary artery disease (which is of course far more common than mesothelioma), and cancers of the larynx, stomach, and bladder. The personal and financial burden of these illnesses would be significant.
- The PFEIS evaluates airborne discharges in relation to PM10 and PM2.5 standards. However particulates 4 microns and below are likely to become lodged in the alveoli and so the PFEIS most likely underestimates the risk of PolyMet’s particulate releases.
- In addition there is recent research by Liuhua Shi et al. (referenced below) that has brought into question the EPA thresholds for PM2.5, and indicates human health is adversely affected by significantly lower levels of fine dust than was previously thought.
- The discussion of particulate air pollution control in the PFEIS does not provide adequate assurance of human safety.
- HEPA filters will be used downstream from bag filters, but only in some applications and only for part of the year (apparently due to energy costs). Where the trapped fines from the filters will go is not addressed.
- The tailings basin beaches will be a source of dust and the claim that capillary action will keep the surface moist and prevent the wind from blowing particulates aloft has not been substantiated and may represent wishful thinking.
- Water will be used in some operations to reduce dust, but wherever the particulate-laden water goes, once it evaporates, the dust will be exposed.
- The contribution to air pollution from what’s termed “fugitive dust” has not been not been rigorously analyzed. The control measures identified at the plant site are only theorized to provide adequate suppression of dust.
- The rail transport of ore from the mine site to the plant site is claimed to have minimal contributions to airborne particulates but there is concern that 6 miles of railbed could accumulate and release a significant quantity of dust

- from the 32 thousand tons of ore transported daily and that the dust will be carried off by the wind.
- The particulates can travel far. We know that the airborne concentrations of amphibole fibers measured 12-15 miles away at sites near Ely are highest when the wind blows from the direction of the eastern Iron Range - due to activity at taconite operations that are about a mile from the proposed PolyMet site. Conversely the lowest amphibole particulate levels on record occurred during a taconite miners' strike. If these fibers are detectable in the air around Ely it is virtually certain higher levels are present at the mine site and surrounding area.
 - Another significant omission in the EIS documents is the pollution that will be produced by remote power generation supporting the energy needs of the project. Much of this is likely to be supplied by coal combustion. In addition to its contribution to greenhouse gases, fossil fuel combustion to meet power needs of the PolyMet project will have deleterious health effects due to release of SO_x, NO_x, Mercury, and Particulates.
 - In summation, the PFEIS incompletely addresses particulate air pollution. The analysis provided in the PFEIS is inadequate to reasonably address the health risks of the proposed mine – risks to the mine workers and to people living in the surrounding communities. A more comprehensive Health Risk Assessment as well as a Health Impact Assessment from a qualified independent evaluator is necessary to clarify the risks of this proposal.

HIA and the regulatory process – Dr. Kris Wegerson; Family Medicine, Duluth

- NEPA (1969) directs all agencies of the Federal government to take health impacts into account for all Federal actions “significantly affecting the quality of the human environment”. MEPA (1973) directs “all department and agencies of the state government to ...undertake, contract for or fund such research as is needed in order to determine and clarify effects by known or suspected pollutants which may be detrimental to human health or to the environment, as well as to evaluate the feasibility, safety and environmental effects of various methods of dealing with pollutants”.
- The National Research Council (NRC) has published a book which details health impact assessments, their roles and uses in: “Improving Health in the United States: The Role of Health Impact Assessments”. The NRC states that “the appropriate assessments of direct, indirect, and cumulative health effects under NEPA is a matter of law and not discretion”. (p. 12)
- The PFEIS doesn't adequately address cancer, brain damage or lung disease. It neither provides a baseline health status of the affected populations, nor analyzes in an objective way the potential adverse effects of the PolyMet Project.
- The PFEIS does not specifically address the potential health impacts to vulnerable populations, such as infants, children, the elderly, and persons

- who rely for subsistence on fish, wild rice or game species, where pollutants may bio-accumulate. Executive Order 13045 (1997) directs “each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children, and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks”. Executive Order 12898 directs “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States”.
- HIA is considered to be a “best practices” approach to responsible review of large-scale natural resource development projects in Alaska. Independent scientific analysis of issues such as seepage of contaminated water, capture and spills of contaminated seepage, and mercury methylation potential as well as independent HIA contracting are needed to objectively evaluate health risks and public health impacts of the PolyMet NorthMet project.
 - We do not believe that the health effects of the proposed NorthMet Project have been adequately addressed in the PFEIS. Comprehensive and independently produced health risk and health impact assessments must be completed for the NorthMet Project prior to completion of the FEIS.

Conclusion: Jennifer Pearson, M.D.

- PolyMet preliminary final EIS is insufficient in addressing our concerns for human health. What we are requesting is as follows:
 - That the statements about what will be released would be based on real experience, with realistic range for seepage, collection, as well as impacts of potential failures
 - Independent science rather than overly optimistic models by the mining company. Would our state want us as physicians to prescribe medications that had only been studied and regulated by the companies that made a profit on them?
 - That state agencies have analyzed the health risks of all chemicals released and have looked at human cancer, respiratory illness, brain damage, neurodevelopmental disorders.
 - That independent scientists have provided quantitative and qualitative analysis of what would happen to the vulnerable individuals in our population: infants, children, the elderly and people who have greater exposure or sensitivity as well as on-site workers
 - That the costs of illness, health care, and disability have all been evaluated and calculated. There is much less cost in preventing than in treating disease.

- We've been asking agencies for 18 months to provide an independent Health Risk Assessment and Health Impact Assessment. Hundreds of individual physicians and allied health professionals have been loudly voicing our concerns and our request for further science and analysis.
- We are disappointed in the response made by the agencies in PFEIS
- Mission of organizations
 - MN Dept of Health: "Protecting, maintaining, and improving the health of all Minnesotans"
 - MN Pollution Control Agency: "To protect and improve the environment and enhance human health"
 - MN Dept of Natural Resources: "To work with citizens to conserve and manage the state's natural resources, to provide outdoor recreational opportunities, and to provide for commercial uses of natural resources in a way that creates a SUSTAINABLE QUALITY of life"
- Hippocratic Oath: first, do no harm.
 - Our job to assure the health of our region.
 - We need to clearly understand the risk/benefits.... In an industry where there appears to be many risks
 - Comprehensive Health Risk Assessment of the NorthMet Project and Health Impact Assessment. Critical that these analyses not be just a desktop exercise, but scrutiny of underlying assumptions and use of independent science to provide objective assessments of risks and impacts.

Selected References:

Letters voicing concern about Health Risk (attached)

PolyMet NorthMet Preliminary Final EIS, Appendix A, Responses to Comments and selected PolyMet documents cited in the PFEIS.

The Risk, Public Liability, & Economics of Tailings Storage Facility Failures, Bowker and Chambers, July 21, 2015

Synopsis of Psychiatry by Kaplan and Sadock, 9th addition, page 367

Neurobehavioral effects of developmental toxicity, Philippe Grandjean, Philip Landrigan, *Lancet Neurol* 2014;13:330-38 (attached)

Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain, Leonardo Trasande, Philip Landrigan, Clyde Schechter, volume 113, May 2005

Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality and Costs for Lead Poisoning, Asthma, Cancer, and Developmental

Disabilities, Philip Landrigan, Clyde Schechter, Jeffrey Lipton, Marianne Fahs, Joel Schwartz, Volume 110, July 2002.

AACAP Workforce Fact Sheet

Expert Opinion of JD Lehr; Don Lee, PhD, PE; and Brian A. Branfireun, PhD, Concerning the NorthMet Mining Project and Land Exchange Supplemental Draft Environmental Impact Statement available on line at <waterlegacy.org/PolyMet-SDEIS>

Low-Concentration PM_{2.5} and Mortality: Estimating Acute and Chronic Effects in a Population-Based Study, Liuhua Shi, Antonella Zanobetti, Itai Kloog, Brent A.

Improving Health in the United States: The Role of Health Impact Assessments, The National Academies Press, Washington, D.C., 2001



MINNESOTA ACADEMY OF
FAMILY PHYSICIANS

600 S. Highway 169
Suite 1680
St. Louis Park, MN 55426
www.mafp.org

(952) 542-0130 **Phone**
(800) 999-8198 **Toll-Free**
(952) 542-0135 **Fax**
office@mafpp.org **Email**

October 5, 2016

Minnesota Environmental Quality Board
520 Lafayette Rd.
St. Paul, MN 55155

RE: MAFP Petition for Rulemaking to Require Health Impact Assessment for
Sulfide Mining Environmental Review

Dear Members of the Environmental Quality Board:

In anticipation of our October 19th, 2016 presentation to the Environmental Quality Board, the Minnesota Academy of Family Physicians (MAFP) offers the attached materials. These materials reflect concerns from a wide variety of health professionals on the need for health impact analysis as part of the sulfide mining environmental review process in Minnesota. The documents chronicle sustained efforts since March 2014 to communicate the urgent concern of healthcare professionals.

We are looking forward to the upcoming EQB meeting. Thank you for the opportunity to discuss the MAFP's petition for a rule change.

Respectfully,

Dania Kamp, MD
President

Health Impact Assessment Sulfide Mining Master Document List

2012-09 Minnesota Department of Health (MDH), *Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet*.

2014-03-10 Minnesota Nurses Association (MNA) PolyMet SDEIS Comment Letter to Minnesota DNR requesting PolyMet Health Impact Assessment.

2014-03-11 Doctors and Nurses PolyMet SDEIS Comment Letter to Minnesota DNR, U.S. Army Corps of Engineers, U.S. Forest Service, U.S. EPA requesting Health Impact Assessment.

2014-03-13 Minnesota Department of Health, Commissioner Ed Ehlinger, MD, supporting PolyMet Health Impact Assessment.

2014-09-25 Minnesota Medical Association (MMA) Letter to Governor Dayton and Commissioners requesting PolyMet Health Risks and Health Impacts Assessment.

2014-10-17 Healthy Food Action, Dr. David Wallinga et al. Letter to Governor Dayton and Commissioners requesting PolyMet Health Assessment.

2014-10-19 Minnesota Public Health Association (MPHA) Letter requesting PolyMet Health Impact and Health Risk Assessment.

2014-10-20 Health Professionals Letter to Governor Dayton and Commissioners requesting PolyMet Health Risk and Health Impact Assessment.

2014-11-07 Duluth News Tribune Commentary, Drs. Susan Nordin, Emily Onello, Jennifer Pearson, Margaret Saracino, "Doctors' view: On PolyMet, the priority is health."

2015-03-09 MAFP Lake Superior Chapter Letter to Governor Dayton, Commissioners requesting PolyMet Health Impacts Assessment and meeting.

2015-04 MAFP House of Delegates Report adopting request for Health Risk Assessment and Health Impact Assessment for sulfide mining in Northeast Minnesota.

2015-04-22 Commissioner Landwehr Letter to MAFP Drs. Emily Onello and Kris Wegerson (response to March 9, 2015 letter)

2015-07-22 MAFP President Tariq Fareed, MD Letter to Governor Dayton and Commissioners Requesting HIA for PolyMet, sulfide mining.

2015-09-10 Commissioners' Letter to MAFP President, Dr. Tariq Fareed, in response to letter of July 22, 2015.

2015-09-25 Physicians' Written Statements from September 25, 2015 meeting with

Commissioners and Governor's staff requesting PolyMet Health Risks and Health Impacts Assessment (sent October 20, 2015).

2015-11-11 *Duluth News Tribune* Commentary, Dr. Deb Allert, "Medical professionals' view: Minnesota medical professionals call for PolyMet health-impact assessment."

2015-12-07 Commissioners' Memo to Governor Dayton, reasons given for denying PolyMet Health Impact Assessment.

2015-12-07 Dr. Margaret Saracino PolyMet FEIS Opinion on PolyMet mercury and neurodevelopment adverse impacts (submitted December 14, 2015).

2015-12-10 Dr. John Ipsen PolyMet FEIS Opinion on PolyMet particulate emissions and adverse health impacts. (submitted December 14, 2015).

2015-12-14 Commissioners' Letter to MAFP, Dr. Pearson, denying PolyMet HIA with attached December 7, 2015 Memo.

2016-04-13 MAFP Lake Superior Chapter Resolution to House of Delegates to require HIA for sulfide mining environmental review.

2016-04-13 MAFP Resolution adopted unanimously by House of Delegates to require HIA for sulfide mining proposals.

2016-05-05 *Duluth News Tribune* Commentary, Aggie Cook, RN, "Nurse's View: PolyMet sulfide mine threatens downstream health."

2016-05-25 MAFP Letter to Minnesota Environmental Quality Board, Petition for Rule amendment to require Health Impact Assessment for sulfide mining environmental review, with supporting documents.

2016-06-17 MPHA Letter supporting MAFP Rule Petition to require Health Impact Assessment for sulfide mining

2016-07-19 Agenda for Meeting of MAFP, MPHA and Minnesota EQB on Petition to require a Health Impact Assessment for sulfide mining environmental review.

2016-07-19 Physicians' and MPHA Written Statements from July 19, 2016 meeting with Minnesota EQB requesting rule requiring a Health Impact Assessment for sulfide mining environmental review (sent August 5, 2016).

2016-07-29 Minnesota EQB Letter to MAFP following up meeting of July 19, 2016 and setting date of October 19, 2016 to present Petition for Rule to require Health Impact Assessment in sulfide mining environmental review in EQB Board meeting.



MINNESOTA ACADEMY OF
FAMILY PHYSICIANS

600 S. Highway 169
Suite 1680
St. Louis Park, MN 55426
www.mafp.org

(952) 542-0130 **Phone**
(800) 999-8198 **Toll-Free**
(952) 542-0135 **Fax**
office@mafpp.org **Email**

August 5, 2016

Commissioner David Frederickson (dave.Frederickson@state.mn.us)
Executive Director Will Seuffert (will.seuffert@state.mn.us)
Planning Director Courtney Ahlers-Nelson (courtney.ahlers@state.mn.us)
Minnesota Environmental Quality Board
520 Lafayette Rd.
St. Paul, MN 55155

RE: MAFP Petition for Rulemaking to Require Health Impact Assessment for
Sulfide Mining Environmental Review

Dear Commissioner Frederickson, Mr. Seuffert, Ms. Ahlers-Nelson:

Thank you once again for meeting with us on July 19, 2016 in Duluth to hear our petition requesting a change in Minnesota Administrative Rules Chapter 4410 to require that a comprehensive and independently produced Health Impact Assessment (HIA) be prepared for all sulfide mining projects requiring an EAW or EIS. We are enclosing written summaries of our statements at the meeting collected as one document dated July 19, 2016. We are also enclosing the several years of our accumulated materials that support our petition.

Thank you for your letter of July 29, 2016 confirming that you will hold a hearing on our petition at the October 19, 2016 EQB board meeting at the MPCA offices in St. Paul. We also support the public comment process that will follow the hearing.

Please do not hesitate to contact us through Maria Huntley at the MAFP office if you have any further questions or requests for information. Please also feel free to contact Paula Maccabee at 651-646-8890 if you have questions or suggestions regarding the details of rule language amendments. We look forward to meeting with you again in October in St. Paul.

Sincerely,

Dania Kamp, MD, MAFP President
Deb Allert, MD, MAFP Lake Superior Chapter President
John Ipsen, MD, MAFP
Emily Onello, MD, MAFP
Kris Wegerson, MD, MAFP
Aggie Cook, RN, MPHA Immediate Past President – Minnesota Public Health Association

Enclosures

Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet

**Minnesota Climate and Health Program
Minnesota Department of Health
Environmental Impacts Analysis Unit**

September 2012



Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet

Minnesota Climate & Health Program
Minnesota Department of Health
Environmental Impacts Analysis Unit
625 Robert Street North
PO Box 64975
St. Paul, MN 55164-0975
651-201-4893

health.climatechange@state.mn.us
<http://www.health.state.mn.us/divs/climatechange/>

September 2012

Table of Contents

I. Background	5
II. Minnesota environmental review process	6
III. Health and climate change in federal and state environmental review.....	8
IV. Incorporating health impact assessments (HIA) with environmental review	11
Purpose of HIA	11
History.....	12
Benefits of incorporating HIA with environmental review.....	13
Barriers to incorporating HIA with environmental review	14
Overcoming barriers and general recommendations.....	15
V. Overview of Divine Mercy Development desktop HIA	17
VI. Review of Minnesota’s EAW for health and climate change impacts	18
Public health	19
Climate change.....	19
VII. Discussion	20
VIII. Recommendations to the EQB.....	21
Changes to the EAW	21
Changes to the EAW Guidelines	22
Changes to EAW process	24
IX. Conclusion.....	24
Appendix A: EAW Projects 2008-2010.....	26
Appendix B: Health and climate change in state environmental review.....	28
California.....	28
Public health	28
Climate change.....	30
Massachusetts	30
Public health	30
Climate change.....	31
New York.....	31
Public health	31
Climate change.....	32
Washington.....	33

Public health 33

Climate change..... 34

Hawaii 35

Public health 35

Climate change..... 36

Appendix C 38

References 39

I. Background

In 2010, the Minnesota Department of Health (MDH) received funds from the Centers for Disease Control and Prevention (CDC) to review the state Environmental Assessment Worksheet (EAW), part of the environmental review process in Minnesota. The purpose of the review was to discern whether climate change and health effects were being considered in the EAW. The scope of the project included an examination of the best practices of federal and state environmental review processes regarding the inclusion of human health and climate change, a literature review on incorporating health impact assessments (HIAs) into the environmental review process, a review of legislation requiring HIAs, a desktop HIA on a mixed-use project that completed an EAW in Minnesota, and a review of Minnesota's EAW for present assessment of health and climate change impacts.

As the culmination of this effort, MDH developed recommendations on incorporating health and climate change considerations into the EAW itself and the EAW Guidelines which are used to help guide preparation of the worksheet. The recommendations will be presented to the Environmental Quality Board (EQB), which oversees the state environmental review process, for its review and approval. Incorporating consideration of human health and climate change impacts within the EAW could have significant positive effects on human health and climate change adaptation and mitigation in Minnesota.

The built environment impacts the health of the public and can also influence factors that drive climate change. For example, developing a subdivision on the outskirts of an urban area may remove existing vegetation and trees and increase vehicle-miles traveled (VMT). Increases in VMT may increase greenhouse gas (GHG) emissions that contribute to climate change and can also result in negative health effects, including reduced air quality, increased motor vehicle-related injuries, and promotion of more sedentary life-styles. The EAW is used to assess a wide range of projects that can alter the natural and/or built environment, including mining operations, hog farms, and mixed-use developments. Addressing the potential negative health and climate change effects of increased vehicle traffic induced by new projects, or the positive effects of increasing density and walkability, can provide critical information to the public and decision makers for promoting a healthy built environment.

This report includes an evaluation of the environmental review process, an examination of potential methods for addressing public health and climate change through environmental review, and provision of specific recommendations to the EQB for how to address health and climate change in the Minnesota EAW.

II. Minnesota environmental review process

The Minnesota Environmental Policy Act of 1973 (MEPA) established a formal environmental review process to provide information about the environmental impacts of projects before necessary permits or approvals are issued. MEPA established the EQB to develop policies, create long-range plans and review proposed projects that would significantly influence Minnesota's environment. The EQB brings together the Governor's Office (as chair), five citizens and the heads of several state agencies (i.e., the Department of Agriculture, the Minnesota Pollution Control Agency (MPCA), the Department of Employment and Economic Development, the Department of Health, the Department of Natural Resources (DNR), the Minnesota Department of Transportation (MnDOT), the Department of Commerce, and the Board of Water and Soil Resources) that play a role in Minnesota's environmental quality and economic development.

The EQB writes rules for conducting environmental reviews, which are carried out by state and local governments.¹ At the state level, agencies responsible for carrying out environmental reviews include the MPCA, MnDOT, and the DNR. At the local level, watershed districts, counties, townships, and cities conduct environmental reviews under MEPA.²

An environmental review as outlined in Chapter 116D of Minnesota Statutes examines how a proposed project could potentially affect the environment and ways to avoid or minimize impacts before the project is permitted and built. Not all development projects require environmental review. The need for review is determined by the nature, size and location of a project. An environmental review must be conducted for any project or action that directly or indirectly alters the physical environment; involves governmental approval, assistance, or action; and has not yet been permitted or constructed (i.e., no retroactive reviews). Additionally, citizens can request an environmental review by petition. If an environmental review is required, the governmental body with jurisdiction over the project (i.e., the Responsible Government Unit, or "RGU") works with the developer to complete one or both of the following documents:

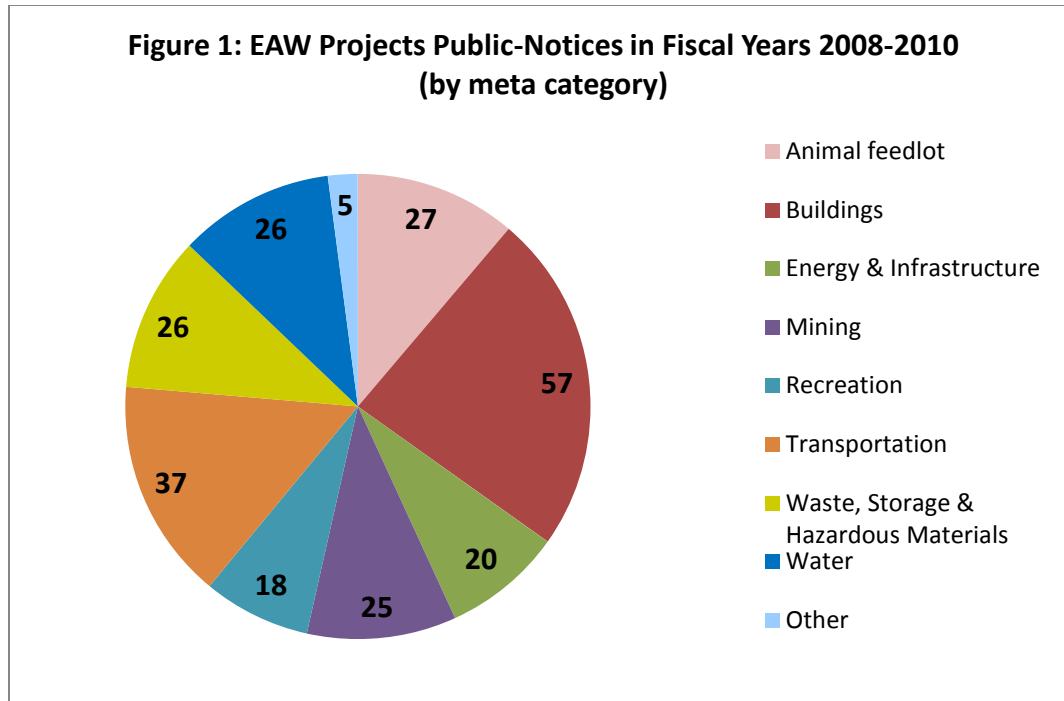
- Environmental Assessment Worksheet (EAW): A screening tool to determine whether a full environmental impact statement is needed. The worksheet is a six-page questionnaire about the project's environmental setting, the potential for environmental harm and plans to reduce the harm. Approximately 150 worksheets are completed each year.
- Environmental Impact Statement (EIS): An in-depth analysis used for major development projects that will significantly change the environment. The EIS covers social and economic influences, as well as environmental impact, and looks at alternate ways to proceed with the project. Seven EISs for private sector proposals were started between 2007 and 2010.³

According to EQB guidance documents, the EAW process typically requires 3 to 4 months to complete and has a total of six steps. First, the RGU determines if an EAW is needed. Second, the RGU obtains data

needed for the completion of the EAW from the project's proposer. Third, the RGU completes the EAW and distributes it to agencies for review. The member agencies of the EQB receive and review EAWs, as well as other local, state, and federal agencies, depending on the project type and location. Fourth, notice of the EAW is published in the EQB Monitor^a and a press release is given to a local newspaper. Fifth, any interested person can review the EAW and submit written comments to the RGU within 30 days following the Monitor notice. Comments may address the accuracy and completeness of information, additional environmental effects or corrective actions that should be considered and the potential for significant environmental effects due to the project. Finally, the RGU considers the EAW information and the comments received, and officially decides if the project has the potential for significant environmental impacts. If it is determined that there are no significant impacts or that impacts will be mitigated, the environmental review process is over. Any appeal of this decision must be made in district court within 30 days.⁴ If the project is determined to have the potential for significant impacts, an EIS is required.

MDH chose to review the EAW because more projects in the state complete an EAW than an EIS. Therefore, if public health and climate change analysis were included in the EAW, it would affect more projects overall. Figure 1 below demonstrates the nature and quantity of projects that undergo an EAW. Figure 1 includes all EAW projects that were published in the EQB Monitor during fiscal years 2008, 2009, and 2010. Projects published in fiscal years 2008 and 2009 were categorized by the MPCA and EQB staff for the Environmental Review Streamlining report published in December 2009.⁵ MDH staff categorized projects from fiscal year 2010 using EQB files and archived issues of the EQB Monitor. MDH aggregated EAW categories into nine meta-categories for Figure 1. A full list of projects by EAW category is provided in Appendix A. The categories used are consistent with the mandatory EAW categories defined by Minnesota Administrative Rule 4410.4300.

^a EQB Monitor is a biweekly publication of the Environmental Quality Board that lists descriptions and deadlines for Environmental Assessment Worksheets, Environmental Impact Statements and other notices. Available online at <http://www.eqb.state.mn.us/monitor.html>



The EQB has reviewed the EAW process in recent years to find areas to simplify the process for the RGU. In 2009, the MPCA was charged by the legislature to study options to streamline the environmental review process in Minnesota. The final report, *Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input*, noted that past efforts to explore broad streamlining of environmental review have often resulted in polarized views among stakeholders and these efforts have largely been unable to find a path toward consensus.⁶ The report demonstrated that there is still a divide among stakeholders on whether environmental review should be streamlined. In 2011, a working group of state agency staff and consultants that regularly complete EAWs developed a streamlined version of the worksheet. The majority of the content of the EAW remained the same, but was reorganized to flow better and reworded to provide clarity. Within this report, the EAW that was streamlined in 2011 will be referred to as the “streamlined EAW;” the EAW in operation at the time of this writing will be referred to as the “EAW;” and the documents that guide practitioners through completing EAWs will be referred to as the “EAW Guidelines.”

III. Health and climate change in federal and state environmental review

Many countries, including the United States, have enacted legislation or given executive orders to address the environmental impacts of policies and projects that affect the health of their citizens. In 1970, the United States passed the National Environmental Policy Act of 1969 (NEPA) [42 U.S.C. 4321 et seq.] to establish national environmental policy and goals for the protection, maintenance, and enhancement of the environment. The legislation provides a process for implementing these goals within the federal agencies.

The Act also established the federal Council on Environmental Quality (CEQ).⁷ The purposes of this Act are to “encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man. . .”⁸ In its original context, the federal environmental review process was intended to ascertain the effects of federal projects and actions on public health. Since implementation, the focus has been on the environment and biosphere with little review of human health except in cases where project-related pollution exposure may lead to cancer.⁹

More recently, the potential impacts of climate change have led the U.S. government to look at GHG emission reductions. In February 2010, the CEQ released Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. The purpose of the draft guidance is to encourage agencies to use the NEPA process “to reduce vulnerability to climate change impacts, adapt to changes in our environment, and mitigate the impacts of Federal agency actions that are exacerbated by climate change.” As rationale for this guidance, the CEQ cites Federal statutes, Executive Orders and agency policies committing the government to the goals of energy conservation, reducing energy use, eliminating or reducing GHG emissions, and promoting the deployment of renewable energy.

Around the same time of the passage of NEPA, many states enacted state environmental policy acts to address the

environmental impacts of actions and projects by states and other local governments not covered by NEPA. In addition to Minnesota, 15 states and the District of Columbia have enacted state environmental policy acts, often called “mini-NEPAs”. Minnesota’s response to NEPA was enacting MEPA, as described in Section II. Table 2 provides a list of states with state

State	Act/Regulation	Climate Change?	Public Health?
California*	CEQA	YES	YES
Connecticut	CEPA	NO	YES
District of Columbia	EPA	NO	YES
Georgia	GEPA	NO	NO
Hawaii*	OEQC	NO	YES
Indiana	IDEM	NO	YES
Massachusetts*	MEPA	YES	YES
Maryland	MEPA	NO	NO
Minnesota	MEPA	YES	YES
Montana	MEPA	NO	YES
New Jersey	Executive Order #215	NO	YES
New York*	SEQR	YES	YES
North Carolina	SEPA	NO	NO
South Dakota	Statute 34A	NO	NO
Virginia	Virginia Code 3.2	NO	NO
Washington*	SEPA	YES	YES
Wisconsin	WEPA	YES	YES

*States reviewed in more detail for climate change and public health measures.

environmental policy acts. These Acts established environmental review processes that range from a sentence or two of regulation requiring that a project must state its environmental impact, to full checklists and guidelines for completing the review.

MDH reviewed the 17 mini-NEPAs and found that the health issues of air quality (including odor and air pollution emissions), noise, hazardous activities or waste, aesthetics and scenic vistas, active transit and recreational resources, economic and cultural welfare, and climate change issues related to GHGs have been incorporated into the environmental review process of some states. Six states directly or indirectly address public health, another six states directly or indirectly address both public health and climate change or GHG emissions. The mini-NEPAs that address public health use language such as, does a project “expose people to potential substantial adverse effects/a significant risk” or “create hazards to human health and safety.” The mini-NEPAs that address climate change refer to the generation and mitigation of GHG emissions and require the RGU to comply with existing climate change or GHG emission policies.

MDH reviewed five of these states in detail because their environmental review process are comprehensive and include a worksheet similar to the Minnesota EAW. The five states were California, Massachusetts, New York, Washington, and Hawaii. Full review details are included in Appendix B. One of the strengths of California’s environmental review checklist is that it addresses the displacement of existing housing and people due to the development of a new project. Recent studies and health impact assessments have shown the health impact, especially mental health impact, experienced by displaced persons.¹⁰ A notable inclusion in Massachusetts’s environmental notification form is within the Traffic Impacts and Permits section. Subsection D asks, “How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?” Massachusetts is one of the only states to reference physical activity and accessibility as key public health issues. New York State included a section in their environmental assessment form specifically called “Impact on Public Health,” which asks “will proposed action affect public health and safety?” New York State and Washington State both provide detailed guidance on calculating projected GHG emissions from proposed projects. Hawaii does not currently require the calculation of GHG emissions, but undertook a report in 2010 that discussed whether the environmental assessment or impact statement is the appropriate tool for addressing climate change and GHGs. The report noted a few reasons for why the environmental review may not be the appropriate tool for addressing climate change. See Table 3 for a brief summary of this discussion.

Table 3: Why the EIS may not be the appropriate tool for addressing climate change

- It will just be another barrier to prevent development.
- It would just add cost to the project.
- Do not add another layer. If there are no consequences for not doing it, why require it?
- The EIS process is too late. It should be addressed in master planning.
- Is it fair or practical to ask developers to evaluate these issues?
- This should be addressed through strategic environmental assessment (SEA).

Source: <http://tinyurl.com/HawaiiERSReport>

While the use of mini-NEPAs for promoting public health and climate change is in its infancy, it is encouraging to note that several states, as described above, have been able to use the authority given by their environmental protection legislation to begin addressing public health and climate change issues. Minnesota may want to consider some of these notable examples for the EAW. Other public health issues that could potentially be addressed by environmental review, such as affordable housing, food security, and social determinants of health, have yet to be addressed through environmental review.

IV. Incorporating health impact assessments (HIA) with environmental review

Purpose of HIA

A key question of this project was whether Health Impact Assessment (HIA) would be an effective tool for incorporating public health and climate change evaluation into the EAW. HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population.¹¹ HIA provides recommendations on monitoring and managing those effects.

HIA has developed into a framework that contains six major steps, including: screening, scoping, assessment, recommendations, reporting, and evaluation and monitoring. The screening step primarily determines whether a project or policy could benefit from an HIA and whether the HIA could affect a decision that would mitigate negative health impacts and/or improve beneficial health impacts. The scoping step determines the health issues that will be assessed. The assessment step determines the health impact (direction, magnitude and severity) of a project. The recommendations step develops recommendations for promoting positive health impacts and/or mitigating the negative health impacts of a project. The reporting step reports the findings and recommendations to the decision makers. The last step, evaluation and monitoring, evaluates the HIA process and monitors the effect the HIA had on the decision being made and ultimately the health of the population being affected.

History

HIAs originated in the 1980s and have been primarily conducted in Australia, Europe (especially the UK), and the US. HIAs are frequently initiated by local public health authorities or local communities concerned about the health impacts of a policy or project within their community. HIAs began with a narrow definition of health favoring quantitative risk assessment and precision. Since then, public health has helped broaden the definition of health to include the social determinants of health^b and health equity^c.¹² This has resulted in an increased acceptance of less quantitative risk assessment and inclusion of qualitative evidence and best practices.

To date, the majority of HIAs are conducted voluntarily. In the US, six states have attempted to pass legislation promoting HIA use. Five states were unable to pass legislation including, California, Maryland, Alaska, Illinois, and Minnesota. California and Maryland introduced legislation in 2008 to integrate HIAs into the public health decision making process. Alaska explored the idea of requiring an HIA to provide analysis and insight on human health prior to any government action in 2010.¹³ Illinois attempted to require HIAs through an Environmental Policy Act update in 2011. Minnesota introduced language in the 2011 Healthy Communities Act to provide funding for HIAs on projects, programs, or policies identified by the community.¹⁴ Massachusetts is the only state to successfully pass legislation to require HIA. The 2009 legislation reorganized the Massachusetts transportation department and established a 'healthy transportation compact' which includes 11 actions steps, including Action (v) "establish methods to implement the use of health impact assessments to determine the effect of the transportation projects on public health and vulnerable populations" and Action (x) "institute a health impacts assessment for use by planners, transportation administrators, public health administrators and developers."¹⁵

HIAs can be combined with environmental impact assessments. There is a growing collection of literature looking at the effectiveness of incorporating the two processes. Proponents of integrating HIA with environmental review cite the similar processes used in both assessments; the similar purpose of both assessments to provide decisions makers information on mitigating risks and maximizing benefits; the existing multidisciplinary input of environmental assessment that provides a place for health to be addressed; and the established public involvement process that is key to both assessment processes.¹⁶ However, incorporating health into the environmental review process faces many challenges, such as the unknown and disputed cause-and-effect relationships of hazards and health outcomes; the complex nature of environmental health impacts; the general reluctance to use a broader, social definition of health; lack

^b The social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. (WHO, source: http://www.who.int/social_determinants/en/)

^c Health equity is the "attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities." (Healthy People 2020, Accessed online: <http://www.healthypeople.gov/2020/about/DisparitiesAbout.aspx>)

of involvement from health professions in environmental review; and a shortage of resources to implement HIAs, which means that health is not seen as a priority.¹⁷ The next sections address the benefits of incorporating HIA with environmental review, the barriers, and possible strategies for overcoming barriers.

Benefits of incorporating HIA with environmental review

Integrating HIA with environmental review provides the opportunity to examine the health impacts of industry and government actions, which is one of the original purposes of NEPA in addition to many state Environmental Policy Acts.¹⁸

The similar procedural steps of environmental reviews and HIAs assist in the integration of the two processes. First, there is no need to develop a new framework, which could be confusing and potentially duplicate work already in the Environmental Assessment Worksheet (EAW).¹⁹ For example the EAW has a section on the environmental impact of air pollutant emissions. Instead of a separate HIA checklist including air pollution, the EAW could consider both the environmental and public health impacts in one framework to prevent duplication of work. Second, there is no need to learn a new process, which enables practitioners in the health, environmental, and planning fields to be more familiar with the tool and saves on staff training or requiring potentially expensive external expertise.

The existing multidisciplinary input of environmental assessment provides a place for health to be addressed more thoroughly. For example, a housing development in San Francisco underwent an environmental review process for the demolition of an affordable, rent-controlled housing project and the development of a new residential development in its place. The environmental review found no adverse impacts on human populations and housing because the project would contribute a net gain in dwelling units. However, San Francisco Department of Public Health conducted a rapid HIA and found health impacts related to “psychological stress, fear, and insecurity due to eviction; crowding or substandard living conditions due to limited affordable replacement housing; food insecurity or hunger due to increased rent burdens; and the loss of supportive social networks due to displacement.”²⁰ These are major health concerns that would have impacted already marginalized populations had they not been addressed through an HIA during the environmental review process.

In the example of San Francisco, the health issues that were analyzed were concerns primarily brought up by the residents themselves. Public involvement is a required component of the environmental review process and public input will often bring up issues such as housing affordability and displacement.²¹ This is a benefit of HIA because federal and state agencies are more likely to accept input of health professionals when information is not only scientifically grounded, but presented in participation with an affected stakeholder community.²² Coordinating the public involvement for the environmental review with HIA can allow for more meaningful conversations and address citizens’ concerns of real or perceived risk.

Finally, one of the most important benefits is that HIA improves decision making. When processes are combined the authority making the ultimate decision must consider all information together at once – which provides for more comprehensive, holistic conclusions.²³ The HIA considers not only the negative impacts, but also the positive ones, which is not required for federal and some state environmental reviews.²⁴ It allows decision makers to see a more complete picture of the impact of a proposed project.

Barriers to incorporating HIA with environmental review

There are a number of barriers that have limited the use of HIAs. Researchers generally agree that the number one barrier to implementing HIAs is the general uncertainty of health risks, including the probability, magnitude, and severity of potential health effects.^{25,26,27} The uncertainty of health risks is compounded by the lack of available health data.^{28,29} HIAs are often more qualitative than quantitative, which can be seen as a weakness, but stories and anecdotes can be informative and persuasive regarding previously unforeseen health issues. This realization may be causing a trend change. Risk assessments, which are generally viewed as highly quantitative, acknowledge that the relative importance of an impact is influenced by the experiences and biases of those involved in the process because not every risk or impact has been established through a quantitative, scientific study.

Tied to the uncertainty of health risks, is the initial problem of identifying potential risks to human health or climate change from a proposed project. Agencies and organizations that conduct environmental reviews frequently do not have expertise in the health field. Additionally, there is a general lack of coordination with public health professionals.^{30,31,32,33} Health impacts related to water and air pollution are generally the most accepted and comprehensive impacts because more quantitative information exists. Environmental reviewers often lack the experience, expertise, and capacity to identify more complex health issues around socio-economic status, mental health, and perceived risks that can vary considerably by geography, project size and population composition.^{34,35,36}

If health was a higher priority in the review process, authorities and political leaders might provide more resources, incentives and linkages to health professionals, who have experience and expertise, for determining health impacts within the environmental review process.^{37,38,39} The relatively low importance of health in the mission of some authorities or organizations can be tied to the lack of involvement in the environmental review process by health professionals. Bringing health professionals to the table will highlight the public health impacts of projects undergoing environmental review. Authorities may not be aware that public health is high priority issue because the problems have not been brought to their attention.

An issue related to the relative importance of public health is the resulting informality of the current attempts to integrate HIAs with environmental review processes. Without the support of an explicit formal requirement and clear administrative procedures, the quality and content of informal attempts are inconsistent and potentially ineffective.⁴⁰ Legislative and administrative support, and especially funding and resources, would promote integrating and streamlining HIAs with environmental review.

Finally, some of the remaining barriers to incorporating HIAs in the environmental review process include lack of uniformity in both content and administrative structure between the two processes^{41,42,43}; the reactionary nature of the environmental review – the assessment occurs too late in the decision making process^{44,45,46}; and the underdeveloped or missing risk assessment and risk mitigation⁴⁷. However, these barriers are not insurmountable. For example, uniformity could be addressed with proper resources and support from authorities. The reactionary nature of the HIA in the environmental review process could be addressed by considering health at the beginning of a project before the environmental review is initiated. Additionally, mitigation strategies to prevent harm to public health will likely develop with advances in risk assessment.

Below is a chart that summarizes some of the main benefits and barriers to incorporating HIA into the environmental review process. (See Table 4.)

<i>Benefits</i>	<i>Barriers</i>
Address health as intended in national and state Environmental Policy Acts. (NPHP, 2005)	Limited quantitative health data and limited literature (quantitative and qualitative issues). (Kemm JR, 2004)
No need to develop new framework, reduce confusion and duplication of work (NPHP, 2005)	May require more time and resources in the current environment of tight budgets and limited resources
Combining processes requires consideration of all information together for combined, holistic conclusions. (Bond et al, 2001)	Difficulty in interpreting which impacts are more important; risks emphasizing one issue over the other (e.g., environment versus health). (Kemm JR, 2000)

Overcoming barriers and general recommendations

Most of the issues with conducting HIAs or integrating HIAs with environmental review can be remedied through standardization of process, guidelines, trainings, experience, and coordination with health officials.⁴⁸ However, a single standardized method of integrated health assessment is not recommended because context also is important: project size, historical/cultural context, stage in the planning process that the health assessment is taking place, etc.^{49,50}

The definition of health is important and needs to be agreed upon within the environmental review process. Health definitions vary from narrow and quantitative (e.g., the presence of illness, such as cancer) to holistic definitions of health, such as from the World Health Organization (WHO) that states that health is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”⁵¹ Among the reviewed studies, there is general consensus that the definition of health should be broad and include socioeconomic status, mental health, and other health determinants.^{52,53,54,55}

HIAs should incorporate qualitative information into health risk assessment; accept the inability to document direct cause-effect relationships; and listen to human ‘canaries’ – those who may see symptoms first and call out the signs of potential trouble.⁵⁶ Anecdotal information, case studies, and doctors’ observations (i.e., “soft data”) can complement other sources of environmental health data.⁵⁷ To improve and increase knowledge on health impacts from specific hazards, health outcomes of current decisions should be monitored to improve future decisions.⁵⁸

As previously mentioned, health professionals at all levels must be involved in guiding health incorporation. Additionally, health professionals have a role in convincing other agencies and authorities of the importance of including health.^{59,60,61}

Also, it is critical to involve the public early and throughout the process. Issues identified by the public, including perceived risks, will be different than those identified by public health professionals but no less influential.⁶² Empowering individuals through effective public participation can provide support for the HIA and any mitigation measures that result.^{63,64}

For governments and agencies that choose to embed HIAs in environmental review processes, there are some general recommendations found in literature. At the screening stage, determine first if an environmental review is necessary and then if an HIA is necessary. All screening procedures should consider the need to assess a project’s potential effects on health.⁶⁵ In the scoping process, work with health professionals to select the health indicators to include based on the impacts that are more likely to occur as a result of the specific project or policy. Impact mitigation should start with risk reduction measures, where decisions are made on a combination of impacts and risks.^{66,67} Overall, identify the potentially affected groups/populations; current health status of said population; and likely effects of the project on said population based on literature review, case studies, site visits, and other information.⁶⁸

Some literature questioned the suitability of the environmental review as the place for the HIA to be conducted. The HIA may be more effective if it considered health impacts, mitigation and alternatives at an earlier stage – in the development of the plans and policies, not at the environmental review stage.^{69,70}

However, environmental review in collaboration with HIA can result in better outcomes and further public consideration of underlying health issues.^{71,72}

V. Overview of Divine Mercy Development desktop HIA

MDH undertook a desktop HIA on a mixed-use development EAW to inform the development of MDH recommendations on incorporating health and climate change indicators into the EAW process. The HIA was intended to be a pilot for how HIA or health indicators might be incorporated or combined with the EAW. Therefore, the actual public health impacts of the project were not considered as important as the findings that could be generalized to mixed-use projects overall and incorporated into the EAW. Determining the health impacts that are currently missing from the EAW was the primary objective.

The desktop HIA included five of the six standard steps in HIAs: Screening, Scoping, Assessment, Recommendations, and Reporting. To select the project, MDH screened all of the mixed-use development projects that completed an EAW between fiscal years 2008-2010. The Divine Mercy Development EAW was selected because it screened positive for an HIA and contained more information for analysis than other EAWs. A group of internal MDH staff with knowledge of HIAs and experience completing environmental reviews selected the health indicators that would be used for the assessment. Health indicators were selected from research-based measures of the built environment and land use that relate to public health and climate change mitigation and adaptation. MDH chose indicators using the following criteria: 1) whether the indicator was directly related to public health, 2) whether the indicator addressed climate change or public health impacts from climate change, and 3) whether the EQB would have the authority to include the measure in the EAW (e.g., not a municipal ordinance or regional system). Generally an indicator had to meet at least two of the three criteria to be included.

Health indicators that directly related to public health included the following:

- minimizing exposure to harmful noise, hazardous sites and sources of air pollution emissions;
- providing access to parks, community gardens, and trails for physical activity;
- providing affordable and diverse housing options to improve community stability and foster social networks and community; and
- providing access to healthy food retailers and emergency services.

Health indicators that addressed climate change or public health impacts from climate change included the following:

- protection from flooding and impaired water quality;

- proximity and provision of public transit, bicycle lanes, and trails;
- provision of mixed-use buildings; and
- permitted clustered or high-density development.

A complete list of the health indicators included in the final HIA report is provided in Appendix C. The full HIA report is available online at <http://www.health.state.mn.us/divs/hia/reports.html>.

MDH analyzed the Divine Mercy Development EAW based on the selected health indicators. Analyses that are missing from the EAW that were identified via the HIA include:

- Food availability (farm land impacts and accessibility to stores/farmers markets/etc.)
- Housing
- Urban heat island effect
- Connectivity of recreation facilities and multi-modal trails related to activity and obesity levels
- Pedestrian/vehicular safety and response times for emergency services
- Secondary effects (e.g., the need for new public facilities, such as schools, fire, and police)

MDH acknowledges that examining only one type of project does not provide sufficient information to discover all of the climate change and public health impacts of the different types of EAW projects. The pilot project provides an example of how projects in one category (i.e., mixed use) could benefit from implementing an HIA. It also demonstrates the health impacts associated with one specific mixed-use project that completed an EAW.

VI. Review of Minnesota's EAW for health and climate change impacts

To some degree all of the projects that undergo environmental review will impact public health – either positively or negatively – and many of them will also affect climate change or be affected by climate change. In 2011, a working group of state agency staff and consultants that regularly complete EAWs developed a streamlined version of the worksheet. MDH reviewed the streamlined EAW to determine if direct or indirect health and climate change language was already included.

Overall, the EAW does include some components related to public health and climate change. The analysis of air quality impacts is the most comprehensive in terms of health effects and GHG emissions. Other components include impacts from hazardous waste (exposure or groundwater/soil contamination that could lead to exposure), water quality, and noise.

Public health

Similar to the national and other state environmental review worksheets, the streamlined EAW most often refers to health indirectly. The streamlined EAW contains 20 categories of questions, called “items.” The specific streamlined EAW items that address health impacts include the following:

- *Item 11b (water and wetlands, wastewater):* “3) If the wastewater discharge is to surface water – Identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.”
- *Item 12 (contamination/hazardous materials/wastes):*
 - “Pre-project site conditions – Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or groundwater contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines.”
 - “Project related generation/storage of solid wastes – Discuss potential environmental effects from solid waste handling, storage and disposal.”
 - “Project related use/storage of hazardous materials – Discuss potential environmental effects from accidental spill or release of hazardous materials.”
 - “Project related generation/storage of hazardous wastes – Discuss potential environmental effects from hazardous waste handling, storage, and disposal.”
- *Item 16 (air):*
 - Stationary source emissions - “Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria.”
 - Vehicle emissions – “Discuss the project’s vehicle-related emissions effect on air quality.”
 - Dust and odors - “Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life.”
- *Item 17 (noise):* “Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life.”
- *Item 18a (transportation):* “Describe traffic-related aspects of project construction and operation. Include . . . and 5) availability of transit and/or other alternative transportation modes.”

Climate change

The only item in the streamlined EAW that address climate change (either adaptation or mitigation) is *item 16 (air)*. The two subparts to this item that address emissions include the following:

- Stationary source emissions – “Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous pollutants, criteria pollutants, and any greenhouse gases.”
- Vehicle emissions – “Describe the effects of the project’s traffic generation on air emissions.”

MDH met with the EAW workgroup to discuss adding greenhouse gases to the Vehicle emissions subpart. The workgroup informed MDH that vehicle emissions (including greenhouse gases) are thoroughly addressed by the MPCA for those projects that generate additional vehicle trips and traffic. Additionally, “projects currently subject to the Minnesota Environmental Policy Act, under the jurisdiction of MPCA, and requiring a federal or state air emissions permit due to emission of criteria pollutants regulated under the Clean Air Act must calculate a ‘carbon footprint’.”⁷³

VII. Discussion

While the EAW addresses some health and climate change issues, the streamlined EAW could be improved to more thoroughly address public health and climate change impacts. There are several strategies that could be used to improve public health and climate change mitigation/adaptation including the following: requiring a full HIA, integrating HIA with the EAW, including more public health professionals in the EAW process, using the EAW to screen for HIA, and more.

As part of the process of developing the report’s final recommendations, MDH shared draft strategies for including health and climate change with the EAW working group. One of the major hurdles identified in the discussion was the narrow definition of ‘environment’ that the EQB uses in rule. EQB rules define “environment” to include: “land, air, water, minerals, flora, fauna, ambient noise, energy resources, and man-made objects or natural features of historic, geologic or aesthetic significance (part 4410.0200, subpart 23).” The EAW working group members, while not against the consideration of public health and climate change, questioned the ability to discuss human health in a forum where environment is defined so narrowly that the EAW can only analyze direct impacts to the environment that would result in a health impact and not health impacts that are indirectly related to changes in the environment. For example, the workgroup considered contaminated ground water from construction a direct impact, but vehicle-related injuries because of additional car and truck traffic as an indirect impact. Safety was one of the issues of human health that the EAW working group questioned specifically as not appropriate in the EAW. However, the EAW Guidelines already includes language about safety. Under “Guidance for certain types of projects,” on page 15 under *Item 21 Nonmetallic mineral mining*, the guidelines read, “Although safety-related traffic concerns are not “environmental” in nature, nearby residents will likely want to know about the numbers and routing of truck traffic to and from the mine.”

MDH has found that there are many questions in the EAW that suggest the process was developed for the benefit of human health. Additionally, the declaration of state environmental policy in statute indicates a responsibility to "...assure for all people of the state safe, healthful, productive, and aesthetically and culturally pleasing surroundings..." (116D.02, Sudv.2). It could be argued that including consideration of human health is much more in line with the purpose of the original Act than including items such as minerals, man-made objects and energy resources, which are in place for economic, not ecologic, reasons.

It would be ideal to agree upon the Minnesota environmental review's purpose and reconstruct the EAW process with the consideration of health and climate change. Coincidentally, a Governor's Order was issued on November 16, 2011 to review the entire environmental review process in Minnesota. MDH staff was invited to participate on two of the working groups. While this could be a great opportunity for promoting health, it is not the only way or even the most likely way to incorporate health and climate change into the process. In that regard, MDH has considered a suite of potential recommendations to the EQB, which are described in the next section.

VIII. Recommendations to the EQB

Using results from the literature review, measures from other states, the Divine Mercy Development HIA, and conversations with the EQB and the EAW working group, MDH has the following recommendations for the EQB for incorporating climate change and public health measures into the EAW process. The recommendations are threefold: minor changes to the language in the streamlined EAW form, inclusion of additional guidance language in the EAW Guidelines (which have not been revised to match the streamlined EAW), and the addition of a MDH staff person to review EAWs as a screening tool for recommending HIAs.

Changes to the EAW

MDH is recommending four changes to the streamlined EAW; they include the following:

- *Item 11c: Stormwater*, MDH recommends changing the first sentence from "'Describe the quantity and quality of stormwater runoff at the site prior to construction,'" to "Describe the quantity and quality of stormwater runoff at the site prior to and post construction."
- *Item 11: Water and Wetlands*, MDH proposes adding the following question: "11f: Floodplains – If the project is located in a designated 100-year floodplain, describe any anticipated impacts to the floodplain as a result of construction, including reduced floodplain function, and identify measures to mitigate any anticipated impacts."
- *Item 16a: Stationary source emissions*, MDH recommends including the list of GHGs. The first sentence should read, "Describe the type, sources, quantities and compositions of any emissions

from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases (such as, carbon dioxide, methane, and nitrous oxide).”

- *Item 19: Cumulative potential effects*, MDH recommends reinserting “impacts to infrastructure and public services” which were removed from the streamlined EAW (originally *Item 28: Infrastructure and public services*). The piece of *Item 28: Infrastructure and public services*, “streets,” was included in the streamlined EAW under *Item 18: Transportation*. MDH recommends that *Item 19: Cumulative potential effects* in the streamlined EAW include both “connected actions” identified in previous versions of the EAW and “consequential actions,” such as the addition of police protection, fire protection and schools to serve both the existing area and the new project which may not fall under “connected actions.”

Changes to the EAW Guidelines

Based on the literature review, it is beneficial from a public health perspective to include health indicators in the EAW because the reviewer/decision maker and even the public will have information on all benefits and risks to inform the final decision. However, MDH recognizes the need to keep the EAW concise; therefore, the majority of the recommendations are to add specific guidance and examples of health impacts or mitigation strategies in the EAW Guidelines within Chapter 3: Item-by-item-guidance. RGUs looking for guidance will see the examples for health and climate change related environmental issues and may choose to incorporate them. Specific recommendations to the EAW Guidelines^d include the following:

- *Item 9: Land Use* should be re-written to read as follows: “The purpose of this question is to identify existing land uses, the community’s plans for future land use as directed by plans and zoning, any incompatibility between the existing land use, plans or zoning, and proposed project, and mitigation measures for any incompatibilities. Proposed projects that are incompatible with nearby land uses may cause public nuisance^e issues that have health impacts. A typical example would be a gravel operation proposed next to a residential area: dust and noise could cause significant conflicts with the residential land use. Many communities use land use plans, zoning, and special overlay districts to prevent the proximate siting of incompatible uses. Proposed projects that do not comply with local land use controls must provide reasoning for not complying and mitigation measures.”
- *Item 14: Water-related land use management districts*, specifically the guidance for floodplains, should be retained and incorporated into *Item 11f: Floodplains* of the streamlined EAW. *Item 14* was cut from the EAW during the 2010/2011 streamlining process. The specific language MDH recommends retaining is, “The local planning and zoning office should be contacted regarding

^d Note: The EQB has not yet revised the EAW Guidelines to correspond to the streamlined EAW.

^e The term *public nuisance* covers a wide variety of minor crimes that threaten the health, morals, safety, comfort, convenience, or welfare of a community.

local shoreland and flood plain ordinances that may apply. . . [F]lood plain . . . land use districts are protected by special zoning ordinances designed to protect the resources of such lands. The EAW should discuss whether the project fully complies with all these special zoning requirements.” Additional language that MDH recommends the EQB to add to this item is as follows, “Future climate conditions are anticipated to result in increased frequency and intensity of floods. Construction within designated floodplains can reduce the effectiveness of these areas in containing flood water. Additionally, construction in these areas is more susceptible to impacts from flood events. Not only will the protected resources in this area be impacted, but people living in flood-plain areas will be at increased risk for flood-related human health impacts, such as injuries, drowning, and other health issues.” If the EQB chooses not to add *Item 11f*, MDH recommends incorporating the specified language from *Item 14* stated above into *Item 9a – iii*.

- *Item 17: Water quality: surface water runoff*, MDH recommends that the correction made to this item in the 2010 Errata & Updates for EAW Guidelines be retained. The specific language MDH recommends retaining is, “The descriptions of stormwater management system elements in item 17a should not be limited to detention/retention basins; newer types of Best Management Practices, such as infiltration areas, should also be described and shown on site plans.” MDH recommends including examples of additional Best Management Practices, such as ensuring stormwater pipes are designed for larger storm events, or that projects that impact municipal storm and sewer pipes should be aware of whether their storm and sewer pipes are connected for potential overflow and contamination concerns.
- *Item 17b*, MDH recommends specifically including groundwater as receiving waters, in addition to surface waters. The item uses lakes as an example, and should consider using an additional example of an aquifer or drinking water well.
- *Item 21: Traffic*, MDH recommends incorporating the original guidance language from *Item 21: Traffic* into *Item 18: Transportation* of the streamlined EAW, and recommends adding the following guidance language to *Item 18c*, “Discuss intersections or streets where pedestrian (or bicycle or vehicular) injury/collisions have occurred. Or identify where potential conflicts may occur after construction. Provide any measures the project is planning to mitigate these conflicts.” The streamlined EAW combined “transportation” from *Item 28: Infrastructure and public services* and “traffic” from *Item 21: Traffic* into *Item 18: Transportation*. Additionally, MDH supports the addition of *Item 18a #5*) “availability of transit and/or other alternative transportation modes.”
- *Item 29: Cumulative impacts*, (*Item 19* in the streamlined EAW) MDH recommends that the guidance make a more direct connection to climate change. MDH recognizes that several items in the EAW indirectly address potential impacts of climate change, such as, stormwater management, GHG emissions, and the availability of public transit or alternative modes of transportation. While individual projects themselves cannot calculate their direct impact on climate change, scientific

consensus holds that GHG emissions are the leading cause of anthropogenic climate change, and the project should describe any efforts it is taking to mitigate emissions or adapt to the potential impacts of climate change. For example, if the project is an infill development and proposes to increase the tree canopy – this would be a mitigation effort to reduce GHG as well as an adaptation measure to increase infiltration to manage stormwater and reduce the urban heat island effect, especially during extreme heat events. MDH can provide resources to include in the guidance document for project proposers.

- *Guidance for certain types of projects – Residential development, subpart 19*, MDH recommends adding guidance for affordable housing best practices. Specifically, if the project proposes the demolition, removal or remodeling of housing and especially affordable housing, it should discuss how it plans to support the replacement of the housing.
- *Guidance for certain types of projects – Mixed residential and commercial-industrial projects, subpart 32*, MDH recommends adding the clustering of development as a best practice. Clustered development addresses accessibility, physical activity, reduced mobile emissions from vehicles, and preserves existing uses of land which is especially important if the project is being developed on farmland, forest, or other prime environmental resources.

Changes to EAW process

MDH provided initial recommendations to the EQB working group that streamlined the EAW. There were concerns about adding additional questions to the EAW to address health and climate change. A recommendation from the working group was that MDH use the EAW as a screening tool for an HIA, like the EQB uses the EAW as a screening tool for a potential EIS. Therefore, MDH recommends that an MDH staff person review all EAWs using an HIA screening tool, such as the Design for Health Screening tool used for the Divine Mercy Development HIA, to screen projects for an HIA, as resources permit. If a project triggers an HIA, the MDH staff person would then recommend to the RGU that they conduct a voluntary HIA on the project, focusing on the specific health issues that are most likely to be impacted by the project.

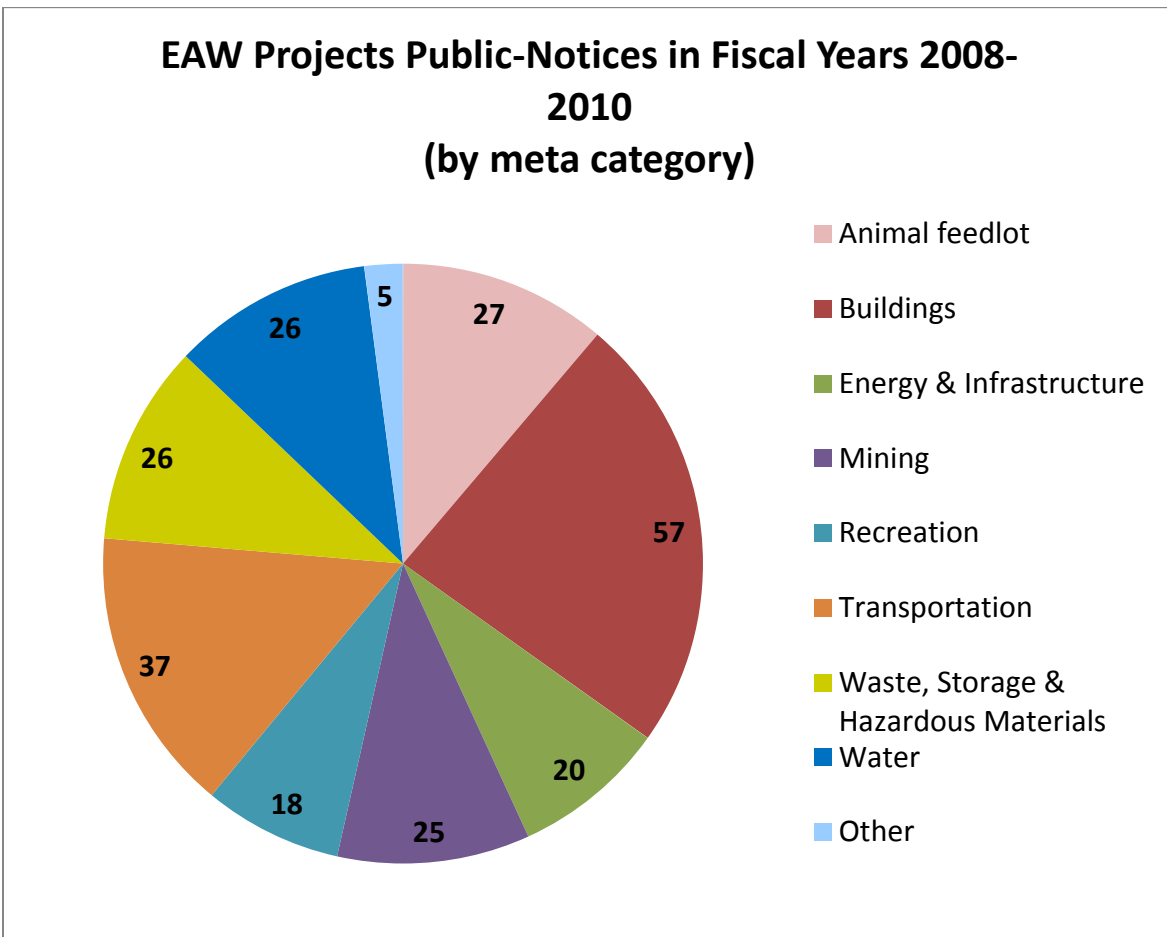
IX. Conclusion

The built environment impacts the health of the public and can also influence factors that affect climate change. NEPA and state environmental policy acts have been developed to determine whether proposed projects would significantly influence the environment. Additionally, MDH's review found that these statutes support the inclusion of public health and climate change considerations. Many states incorporate health and climate change considerations within their environmental review process. However, not all states have incorporated health and climate change, and none of the states have included the myriad of health considerations that may result from a proposed project, such as housing displacement, food security, and social determinants of health. This report concludes that HIA is one tool that can be used to more

comprehensively assess the health and climate change impacts of projects that go through the environmental review process.

Minnesota's EAW already addresses some health and climate change issues; however, several public health issues remain unaddressed or insufficiently addressed by the EAW. This report provides simple recommendations for modifying the streamlined EAW and EAW Guidelines and for incorporating HIA into the environmental review process to address some of the gaps and to enhance the promotion of public health and climate change adaptation and mitigation. These simple changes could have a broad impact on the health of Minnesota citizens.

Appendix A: EAW Projects 2008-2010



Category	FY08/09	FY10	Total
Air pollution	1	-	1
Airport	5	-	5
Animal feedlot	25	2	27
Campground	7	3	10
Commercial	18	7	25
Communication tower	-	2	2
Fuel conversion	6	-	6
Highway	27	1	28
Historical places	1	3	4
Land use conversion	1	-	1
Landfill	5	2	7
Marina	3	1	4
Metallic mining	1	1	2

Mixed use	8	-	8
Natural areas	1	-	1
Nonmetallic mining	18	5	23
Other	2	-	2
Public waters	16	2	18
Recreational trail	5	2	7
Residential	18	2	20
Solid waste	1	1	2
Sports facility	1	-	1
Storage facilities	2	1	3
Streams & ditches	4	3	7
Transmission lines	8	3	11
Water appropriation	1	-	1
Wind farm	1	-	1
Wastewater treatment facilities	12	2	14
Total	198	43	241

Appendix B: Health and climate change in state environmental review

MDH reviewed the 17 mini-NEPAs and found that the health issues of air quality (including odor and air pollution emissions), noise, hazardous activities or waste, aesthetics and scenic vistas, active transit and recreational resources, economic and cultural welfare, and climate change issues related to GHGs have been incorporated into the environmental review process of some states. MDH reviewed five states in more detail because their environmental review process are comprehensive and include a worksheet similar to the Minnesota EAW. The five states are California, Massachusetts, New York, Washington, and Hawaii. Full review details are included below.

California

California projects that require permit approval must complete a preliminary checklist of potential environmental impacts. The checklist reviews projects for potential impacts of significance. If a project is determined to have significant impacts on the environment, a full environmental impact report (EIR) is required.

Public health

In California's preliminary environmental checklist, public health including a range of issues such as exposure to pollutants, noise and safety hazards, and the mental health effects of scenic vistas. The preliminary environmental checklist includes questions on the following health-related issues: air quality; aesthetics; geology and soils; hazards and hazardous materials; hydrology and water quality; noise; and transportation and traffic. Two of the indicators for air quality include the following: Would the project expose sensitive receptors to substantial pollutant concentrations? And, would the project create objectionable odors affecting a substantial number of people? Under noise pollution, California's preliminary checklist has six questions related to the negative exposure of people to excessive noise and ground-borne vibrations. One indirect public health impact that California's checklist addresses is the displacement of existing housing and people due to the development of a new project. Recent studies and health impact assessments have shown the health impact, especially mental health, experienced by displaced persons.⁷⁴ Overall, California's preliminary environmental review addresses many issues related to public health.

Public Health related language

Section I. Aesthetics. Would the project:

- a) Have a substantial adverse effect on a scenic vista?

Section III. Air Quality. Would the project:

- d) Expose *sensitive receptors* to substantial pollutant concentrations?
- e) Create objectionable odors affecting a substantial number of people?

Section VI. Geology and Soils. Would the project:

- a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving . . .

Section VIII. Hazards and Hazardous Materials. Would the project:

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
- b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?
- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?
- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?
- f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?
- h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Section IX. Hydrology and Water Quality. Would the project:

- i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Section XII. Noise. Would the project result in:

- a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

Section XVI. Transportation/Traffic. Would the project:

- f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Section XVIII. Mandatory Findings of Significance.

- c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Climate change

In the preliminary checklist, California addresses climate change through GHG emissions. The section on GHG emissions asks the following: “Would the project: a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?”, and/or “b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?” Possible responses to the question are ‘potentially significant impact’, ‘less than significant with mitigation incorporated’, ‘less than significant impact’, or ‘no impact’. “If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.”⁷⁵

Climate change related language

Section II. Agriculture and Forestry Resources. Would the project:

d) Result in the loss of forest land or conversion of forest land to non-forest use?

Section VII. Greenhouse Gas Emissions. Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Massachusetts

The Massachusetts Environmental Policy Act requires that any project that exceeds a specific threshold^f for which state agency action is required^g must complete an environmental notification form (ENF) and may be required to complete an EIR.

Public health

The Massachusetts ENF addresses public health issues related to air quality, noise impacts, asbestos exposure, and other solid and hazardous waste impacts. A notable inclusion in the state’s ENF is within the Traffic Impacts and Permits section. Subsection D asks, “How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?”⁷⁶ Massachusetts is one of the only states to reference physical activity and accessibility as key public health issues.

^f “Examples of threshold activities include the following: alteration of 25 or more acres of land; alteration of designated significant habitat, and/or taking of endangered or threatened species or species of special concern; alteration of coastal dunes, barrier beaches, or coastal banks; alteration of 500 ft. of fish run or inland bank; alteration of 1,000 s.f. of salt marsh or outstanding resource waters; alteration of 5,000 s.f. of bordering or isolated vegetated wetlands; new or expanded fill or structure in a velocity zone or regulatory floodway; alteration of one-half acre of other wetlands; and projects proposed within an Area of Critical Environmental Concern (ACEC).” Source: MEPA, available online: <http://www.mass.gov/czm/permitguide/regs/policyact.htm>.

^g “State agency action includes activities that are undertaken, permitted, and/or funded by agencies of the Commonwealth, and the transfer of lands owned or controlled by the Commonwealth.” Source: MEPA, available online: <http://www.mass.gov/czm/permitguide/regs/policyact.htm>.

<p><i>Public Health related language</i></p> <p>Traffic Impacts and Permits Section</p> <p>D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?</p> <p>Air Quality Section</p> <p>B. Describe the project's other impacts on air resources and air quality, including noise impacts</p> <p>Solid and Hazardous Waste Section</p> <p>D. If the project involves demolition, do any buildings to be demolished contain asbestos?</p> <p>E. Describe the project's other solid and hazardous waste impacts (including indirect impacts)</p>

Climate change

ENF sections on Solid & Hazardous Waste and Air Quality ask that project proposers describe anti-idling and other measures to limit emissions, but the major connection made to climate change is through the state's GHG policy. Specifically, the language states that "proponents for projects that are subject to the requirement to prepare a mandatory EIR should attempt to qualitatively identify sources and types of GHG emissions in the Environmental Notification Form (ENF) filing."⁷⁷

<p><i>Climate change related language</i></p> <p>Solid and Hazardous Waste Section</p> <p>Describe anti-idling and other measures to limit emissions from construction equipment</p> <p>Air Quality Section</p> <p>B. Describe the project's other impacts on air resources and air quality, including noise impacts</p> <p>All projects requiring ENF/EIR must also comply with GHG policy</p> <p>(http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf)</p> <p>Proponents for projects that are subject to the requirement to prepare a mandatory EIR should attempt to qualitatively identify sources and types of GHG emissions in the Environmental Notification Form (ENF) filing.</p>

New York

New York State (NYS) requires that an environmental assessment form (EAF) be completed for qualifying projects under the State Environmental Quality Review (SEQR). Qualifying projects include most projects or activities proposed by a state agency or unit of local government, and all discretionary approvals (permits) from a NYS agency or unit of local government. On completing an EAF, the lead agency determines the significance of an action's environmental impacts. The agency then decides whether to require (or prepare) an EIS and whether to hold a public hearing on the proposed action.

Public health

NYS is unique in that it has a section within the EAF specifically called "Impact on Public Health". It asks, "Will proposed action affect public health and safety?" Topics of public health and safety include risk of explosion, emissions, burial of hazardous waste, storage of flammable liquids, and

excavation near hazardous waste. Other sections within the EAF also relate to public health such as affecting aesthetic resources, open space and recreation, noise and odor.

<p><i>Public Health related language</i></p> <p>Impact on Aesthetic Resources</p> <p>11. Will Proposed Action affect aesthetic resources?</p> <p>Examples that would apply:</p> <ul style="list-style-type: none"> - Proposed land uses, or project components visible to users of aesthetic resources which will eliminate or significantly reduce their enjoyment of the aesthetic qualities of that resource. <p>Impact on Open Space and Recreation</p> <p>13. Will proposed Action affect the quantity or quality of existing or future open spaces or recreational opportunities?</p> <p>Examples that would apply:</p> <ul style="list-style-type: none"> - The permanent foreclosure of a future recreational opportunity. - A major reduction of an open space important to the community. <p>Noise and Odor Impact</p> <p>17. Will there be objectionable odors, noise, or vibration as a result of the Proposed Action?</p> <p>Examples that would apply:</p> <ul style="list-style-type: none"> - Blasting within 1,500 feet of a hospital, school or other sensitive facility. - Odors will occur routinely (more than one hour per day). - Proposed Action will produce operating noise exceeding the local ambient noise levels for noise outside of structures. - Proposed Action will remove natural barriers that would act as a noise screen. <p>Impact on Public Health</p> <p>18. Will Proposed Action affect public health and safety?</p> <ul style="list-style-type: none"> - Proposed Action may cause a risk of explosion or release of hazardous substances (i.e. oil, pesticides, chemicals, radiation, etc.) in the event of accident or upset conditions, or there may be a chronic low level discharge or emission. - Proposed Action may result in the burial of "hazardous wastes" in any form (i.e. toxic, poisonous, highly reactive, radioactive, irritating, infectious, etc.) - Storage facilities for one million or more gallons of liquefied natural gas or other flammable liquids. - Proposed Action may result in the excavation or other disturbance within 2,000 feet of a site used for the disposal of solid or hazardous waste.

Climate change

NYS produced the "Guide for Assessing Energy Use and Greenhouse Gas Emissions" for staff reviewing EIS. Conducting the review of energy use and GHG emissions is viewed as being within the guidance of the original SEQRA Act. State and local governments should "conduct their affairs with an awareness that they are stewards of the air, water, land, and living resources, and that they have an obligation to protect the environment for the use and enjoyment of this and all future generations."⁷⁸ The Guide states that projects are responsible for the climate change impacts enhanced by energy use and GHG emissions (i.e., mitigation) but that planning for climate change impacts on the project (i.e., adaptation) is not part of the requirement. The document includes

guidance on a number of specific requirements including the following: the exact emissions that require counting; the mathematical units (e.g., lbs of CO₂) in which to present the data; that both direct and indirect sources of emissions must be included (e.g., the direct source of a smokestack on a plant side versus the indirect emissions generated when equipment used in the plant were manufactured and shipped); and emissions mitigation measures such as carbon sinks.

Climate change related language

Impact on Air

7. Will Proposed Action affect air quality?

Examples that would apply:

- Proposed Action will induce 1,000 or more vehicle trips in any given hour.
- Emission rate of total contaminants will exceed 5 lbs. per hour or a heat source producing more than 10 million BTU's per hour.

Impact on Energy

16. Will Proposed Action affect the community's sources of fuel or energy supply?

Examples that would apply:

- Proposed Action would cause a greater than 5% increase in the use of any form of energy in the municipality.

Guide for Assessing Energy Use and Greenhouse Gas Emissions in an Environmental Impact Statement, provides instructions to DEC staff for reviewing an environmental impact statement (EIS) pursuant to the State Environmental Quality Review Act (SEQR) when the EIS includes a discussion of energy use or greenhouse gas (GHG) emissions. http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf

Washington

Washington's State Environmental Policy Act (SEPA) requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. To determine the environmental impacts of a project, the state provides an environmental checklist to evaluate the significance of a project and decide whether a full EIS must be completed.

Public health

Public health is most specifically addressed in the Washington environmental checklist within the section Environmental Health, but also has implications in Air Emissions and Recreation sections. The Environmental Health section asks what environmental health hazards exist and potential exposure to "toxic chemicals, risk of fire and explosion, spill, or hazardous waste." The Air Emissions section includes emissions during and post construction from automobile and stationary sources. The Recreation section concerns the loss of recreational uses.

Public Health related language

Subsection a. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

c. Proposed measures to reduce or control emissions or other impacts to air, if any?

Section 7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Section 12. Recreation

b. Would the proposed project displace any existing recreational uses? If so, describe.

Climate change

In Washington the analysis of GHG emissions is currently voluntary. The Washington State Department of Ecology, which oversees state agency compliance of SEPA, wrote a working paper called *Greenhouse Gas Emissions and SEPA* and developed guidance for agencies completing EAWs on how to account for GHG emissions from project actions. Measures mentioned in the paper are addressed within the Air Emissions section of the environmental review. The guidance is similar to that provided by NYS; however, Washington requests the consideration of both GHG emissions and how the environment might be impacted by anticipated climate change resulting from GHG emissions.⁷⁹

The Washington Department of Transportation (WSDOT) environmental review process requires that all state and federal transportation projects overseen by WSDOT calculate GHG emissions in three ways: Operational, Construction, and Embodied/Lifecycle.⁸⁰ Locally, King County drafted GHG Emissions Worksheet to assist in calculating the emissions generated by each project – including emissions associated with building energy use. At the local level only King County and the City of Seattle require addressing GHG emissions in SEPA documents.

Climate change related language

Subsection a. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

c. Proposed measures to reduce or control emissions or other impacts to air, if any?

Section 6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

Section 14. Transportation

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

c. How many parking spaces would the completed project have? How many would the project eliminate?

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

g. Proposed measures to reduce or control transportation impacts, if any.

Uses 'air emissions' section to analyze greenhouse gases which the lead agency uses to determine impact. SEPA Climate Change working paper:

http://www.ecy.wa.gov/climatechange/docs/sepa/20110603_SEPA_GHGinternalguidance.pdf

Hawaii

Hawaii's environmental review law was modeled after NEPA. For any proposed project or activity, if one or more of nine conditions (called "triggers")^h is present, then an environmental assessment (EA) or an EIS must be prepared and circulated to the public for review.

Public health

Hawaii does not have any specific questions on the impact of a project on public health. Instead the state uses "significant criteria" within its EA to evaluate health impacts. Hawaii considers a proposed action to have a significant effect on the environment if it causes loss or destruction of a natural or cultural resource; "substantially affects the economic welfare, social welfare, and cultural practices of the community or State"; "substantially affects public health"; or negatively affects air quality, water quality, noise levels, scenic vistas and viewplanes.⁸¹

^h A list of the nine triggers can be found online here: http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0343/HRS_0343-0005.HTM

Public Health related language

Significance Criteria

B. In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
4. Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;
5. Substantially affects public health;
10. Detrimentally affects air or water quality or ambient noise levels;
12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies

Climate change

In 2010 Hawaii released the “Final Report on Hawaii Environmental Review System 2010,” which acknowledged that Hawaii’s environmental review laws do not explicitly address climate change, and it reviewed how climate change might be included in the environmental review process. The Report suggested adding a question about a project emitting substantial quantities of GHG to the significance criteria, or adding a question that addresses climate change hazards that increase the “scope or intensity of hazards to the public, such as increased coastal inundation, flooding, or erosion that may occur as a result of climate change anticipated during the life-time of the project.” Finally, the Report includes a checklist for reviewing the effectiveness of the current EA for addressing climate change. One of the questions is whether the EA/EIS is an appropriate tool for addressing climate change in the first place. Hawaii’s full discussion on climate change from the report is included following the box on climate change related language.

Climate change related language

Significance Criteria

B. In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it:

13. Requires substantial energy consumption.

**From the Final Report on Hawaii Environmental Review System 2010
CLIMATE CHANGE**

Are climate changes issues adequately addressed in the current EIS system?**Uncertainty and lack of methodology prevent addressing climate change.**

- No agreement exists on what the impacts will be.
- Research exists, but decision-makers do not use it.

- Standard indicators, baselines, and metrics are necessary to measure impacts.
- The precautionary principle should guide our actions when knowledge is insufficient.
- The State and Counties should establish a database of likely climate change impacts and make this available to EA/EIS preparers.

Climate change is addressed in the current system.

- The coastal zone management (CZM) process is effective.
- Experienced consultants understand the issue and address it appropriately.

The EIS is not the appropriate tool for addressing climate change.

- It will just be another barrier to prevent development.
- It would just add cost to the project.
- Do not add another layer. If there are no consequences for not doing it, why require it?
- The EIS process is too late. It should be addressed in master planning.
- Is it fair or practical to ask developers to evaluate these issues?
- This should be addressed through strategic environmental assessment (SEA).

How best can climate change impacts to Hawaii be incorporated into the EIS process?

The best way to address climate change is still undetermined.

- The science exists, but it is not widely accepted by the public.
- Change the rules to be more specific about what should be addressed.
- Approach the EIS through the lens of sustainability.
- The 2050 plan should be a template for addressing climate change.
- Address how a project will affect climate change; and how climate change will affect a project.
- California is currently addressing this. Hawaii should look there for guidance.

Climate change is a cumulative impact issue, which must be resolved first.

Climate change in Hawaii is best addressed another way, not through EIS.

- Assess climate change through established agency policies and guidelines.
- The State and local levels are too small scale. Leave this to NEPA to address.
- It should be addressed at the long-range planning level.

Comments and Concerns

- Should secondary and tertiary impacts be considered?
- Agencies, developers, and the public do not want to acknowledge it.
- Global warming will be a boilerplate statement stuck into the EA/EIS.

Appendix C

Divine Mercy Development HIA

Currently available online at: <http://www.health.state.mn.us/divs/hia/reports.html>

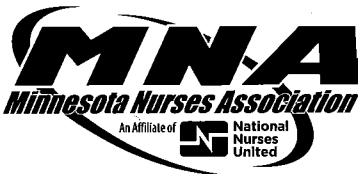
References

- ¹ Minnesota Environmental Protection Agency (MEPA). Environmental Review Website. Accessed online: <http://www.pca.state.mn.us/index.php/topics/environmental-review/environmental-review.html>. September 6, 2011.
- ² Minnesota Pollution Control Agency. 2009. Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input. Accessed online: <http://www.pca.state.mn.us/index.php/view-document.html?gid=11253>.
- ³ Office of the Legislative Auditor (OLA). 2011. Evaluation Report: Environmental Review and Permitting. Accessed online: <http://www.auditor.leg.state.mn.us/ped/2011/envir.htm>
- ⁴ Environmental Quality Board (EQB). 1998. Guide to Minnesota Environmental Rules.
- ⁵ Minnesota Pollution Control Agency. 2009. Environmental Review Streamlining: A summary of past efforts, current ideas, and stakeholder input. Accessed online: <http://www.pca.state.mn.us/index.php/view-document.html?gid=11253>.
- ⁶ *Ibid.*
- ⁷ Environmental Protection Agency (EPA). National Environmental Policy Act (NEPA). Accessed online: <http://www.epa.gov/compliance/basics/nepa.html>. September 6, 2011.
- ⁸ National Environmental Policy Act of 1969 (NEPA). Sec. 2 [42 USC § 4321] Accessed online: September 6, 2011 at <http://ceq.hss.doe.gov/nepa/regs/nepa/nepaeqia.htm>.
- ⁹ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ¹⁰ Cohen, R. 2011. The Impacts of Affordable Housing on Health: A Research Summary. Center for Housing Policy. *Insights from Housing Policy Research*, Issue May 2011: 1-8.
- ¹¹ National Research Council, *Improving Health in the United States: The Role of Health Impact Assessment*, 2011.
- ¹² Harris P et al. 2009. Human health and wellbeing in environmental impact assessment in New South Wales, Australia: Auditing health impacts within environmental assessment of major projects. *Environmental Impact Assessments Review*, 29:310-318
- ¹³ Farquhar, Doug. 2011. Personal communication. August 29, 2011.
- ¹⁴ Minnesota House of Representatives. 2011. Minnesota Healthy Communities Act. Accessed online: <https://www.revisor.mn.gov/bin/bldbill.php?bill=H2646.0.html&session=1s87>
- ¹⁵ Massachusetts Department of Transportation. 2012. Healthy Transportation Compact. Accessed online: <http://www.massdot.state.ma.us/GreenDOT/HealthyTransportationCompact.aspx>
- ¹⁶ Bhatia R, Wernham A. 2008. Integrating Human Health into Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health and Justice. *Environ Health Perspect* 116:991-1000. <http://dx.doi.org/10.1289/ehp.11132>
- ¹⁷ McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. *Environmental Impact Assessment Review*, 25: 737-746
- ¹⁸ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ¹⁹ *Ibid.*
- ²⁰ Bhatia R, Wernham A. 2008. Integrating Human Health into Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health and Justice. *Environ Health Perspect* 116:991-1000. <http://dx.doi.org/10.1289/ehp.11132>
- ²¹ *Ibid.*
- ²² *Ibid.*
- ²³ Bond R et al. 2001. Integrated impact assessment for sustainable development: A case study approach. *World Development*, Vol. 29, No. 6: 1011-1024
- ²⁴ Bhatia R. 2007. Protecting Health Using an Environmental Impact Assessment: A Case Study of San Francisco Land Use Decisionmaking. *Protecting the Public From Environmental Hazards*. *American Journal of Public Health*, Vol 97, No 3.
- ²⁵ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ²⁶ Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. *Environmental Impact Assessment Review*, 26: 410-424
- ²⁷ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ²⁸ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf

- ²⁹ Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. *Environmental Impact Assessment Review*, 22: 633-653
- ³⁰ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ³¹ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ³² Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. *Environmental Impact Assessment Review*, 26: 410-424
- ³³ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ³⁴ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ³⁵ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ³⁶ Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. *Environmental Impact Assessment Review*, 26: 410-424
- ³⁷ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ³⁸ McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. *Environmental Impact Assessment Review*, 25: 737-746
- ³⁹ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ⁴⁰ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ⁴¹ *Ibid.*
- ⁴² Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. *Environmental Impact Assessment Review*, 26: 410-424
- ⁴³ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ⁴⁴ National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ⁴⁵ Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. *Environmental Impact Assessment Review*, doi:10.1016/j.eiar.2010.01.005
- ⁴⁶ McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. *Environmental Impact Assessment Review*, 25: 737-746
- ⁴⁷ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ⁴⁸ *Ibid.*
- ⁴⁹ Bond R et al. 2001. Integrated impact assessment for sustainable development: A case study approach. *World Development*, Vol. 29, No. 6: 1011-1024
- ⁵⁰ Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online: http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
- ⁵¹ World Health Organization (WHO). 1948. WHO definition of Health. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.
- ⁵² National Public Health Partnership (NPHP). 2005. Health Impact Assessment: Legislative and Administrative Frameworks. Accessed online: http://www.hiaconnect.edu.au/files/NPHP_Frameworks.pdf
- ⁵³ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ⁵⁴ Noble B, Bronson J. 2006. Practitioner survey of the state of health integration in environmental assessment: The case of northern Canada. *Environmental Impact Assessment Review*, 26: 410-424
- ⁵⁵ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ⁵⁶ *Ibid.*

- ⁵⁷ Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. *Environmental Impact Assessment Review*, 14: 311-319
- ⁵⁸ Dannenberg AL et al. 2008. Use of Health Impact Assessment in the U.S.: 27 Case Studies, 1999-2007. *American Journal of Preventative Medicine*, 34 (3): 241-256
- ⁵⁹ McCaig K. 2005. Canadian insights: The challenges of an integrated environmental assessment framework. *Environmental Impact Assessment Review*, 25: 737-746
- ⁶⁰ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ⁶¹ Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. *Environmental Impact Assessment Review*, 14: 311-319
- ⁶² Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. *Environmental Impact Assessment Review*, 22: 633-653
- ⁶³ Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online: http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
- ⁶⁴ Franssen EAM, Staatsen B, and Lebret E. 2002. Assessing health consequences in an environmental impact assessment: The case of Amsterdam Airport Schiphol. *Environmental Impact Assessment Review*, 22: 633-653
- ⁶⁵ Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online: http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
- ⁶⁶ Demidova O, Cherp A. 2005. Risk assessment for improved treatment of health considerations. *Environmental Impact Assessment Review*, 25: 411-429
- ⁶⁷ Davies K, Sadler B. 1997. Environmental assessment and human health: perspectives, approaches and future directions. A background report for the international study of the effectiveness of environmental assessment. Ottawa, Health Canada. Accessed online: http://www.hc-sc.gc.ca/hecs-sesc/ehas/pdf/human_health_perspective.pdf
- ⁶⁸ *Ibid.*
- ⁶⁹ Steinmann A. 2000. Rethinking human health impact assessment. *Environmental Impact Assessment Review*, 20; 627-645
- ⁷⁰ Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. *Environmental Impact Assessment Review*, doi:10.1016/j.eiar.2010.01.005
- ⁷¹ Dannenberg AL et al. 2008. Use of Health Impact Assessment in the U.S.: 27 Case Studies, 1999-2007. *American Journal of Preventative Medicine*, 34 (3): 241-256
- ⁷² Laws DW, Sagar AD. 1994. Perspectives on human health impact assessment. *Environmental Impact Assessment Review*, 14: 311-319
- ⁷³ Schively Slotterback C et al. 2010. Testing three health impact assessment tools in planning: A process evaluation. *Environmental Impact Assessment Review*, doi:10.1016/j.eiar.2010.01.005
- ⁷⁴ Cohen, R. 2011. The Impacts of Affordable Housing on Health: A Research Summary. Center for Housing Policy. Insights from Housing Policy Research, Issue May 2011: 1-8.
- ⁷⁵ 2011 California Environmental Quality Act (CEQA) Handbook. 2011. Section 15064.4 Determining the Significance of Impacts from Greenhouse Gas Emissions. p. 107 Accessed online: <http://www.califaep.org/docs/CEQA/CEQAHandbook2011.pdf>
- ⁷⁶ Massachusetts Environmental Policy Act (MEPA) Office. 2011. Environmental Notification Form (ENF). Accessed online: <http://www.env.state.ma.us/mepa/downloads.aspx>
- ⁷⁷ Massachusetts Executive Office of Energy and Environmental Affairs. 2010. Revised MEPA Greenhouse Gas Emissions Policy and Protocol. Accessed online: <http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf>
- ⁷⁸ New York State Department of Environmental Conservation. 2009. Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements. Accessed online: http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf
- ⁷⁹ Washington Department of Ecology. 2011. Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews. Accessed online: <http://www.ecy.wa.gov/climatechange/sepa.htm>
- ⁸⁰ Washington State Department of Transportation. 2012. Guidance for Project-Level Greenhouse Gas and Climate Change Evaluations. Accessed online: <http://www.wsdot.wa.gov/NR/rdonlyres/73ADB679-BDA6-4947-93CA-87C157862DD7/0/WSDOTprojectLevelGHG.pdf>

⁸¹ Hawaii Administrative Rules. 1996. Chapter 200 – Environmental Impacts Statement Rules. Accessed online: http://gen.doh.hawaii.gov/sites/har/AdmRules1/11-200.htm#sec_17



March 10, 2014

Professional Distinction

Personal Dignity

Patient Advocacy

Ms. Lisa Fay, EIS Project Manager
 Minnesota DNR Division of Ecological and Water Resources
 Environmental Review Unit
 500 Lafayette Road
 St. Paul, MN 55155-4025

Dear Ms. Fay:

At its Board of Directors meeting on January 22, the Minnesota Nurses Association heard the pros and cons of the proposed PolyMet mine from several speakers familiar with the project. After further discussion, the Board felt it necessary to draft this letter.

The PolyMet NorthMet Supplemental Draft Environmental Impact Statement (SDEIS) contains inadequate analysis of the impacts on public health from the proposal. The co-lead agencies should conduct and include a health impact assessment (HIA) in the Environmental Impact Statement to fully analyze the public health implications of PolyMet's proposed mine.

HIAs are a tool used in the environmental review process. Environmental Impact Statements, such as the PolyMet SDEIS being considered by the co-lead agencies, are required by the National Environmental Policy Act to contain analysis of impacts on human health. However, human health is subordinated to environmental impacts, is addressed in a piecemeal fashion, and there is no examination of the social determinants of health in the SDEIS. A HIA would integrate human health into the environmental review for the PolyMet NorthMet proposal, allow consideration of mitigation measures, and involve the community in planning for the project.

The State of Alaska has adopted HIAs as a best practice for environmental review of mining and natural resource extraction proposals and has established procedures and a toolkit for conducting a HIA in that context. The U.S. Centers for Disease Control and Prevention also has a number of resources for integrating HIAs into the environmental review process. In Minnesota, HIAs have also been conducted as part of projects such as the Central Corridor Light Rail Transit in the Twin Cities.

The Minnesota Nurses Association is requesting that you please take the following action as you revise the NorthMet Supplemental Draft Environmental Impact Statement:

345 Randolph Avenue
 Suite 200
 St. Paul, MN 55102
 Tel: 651.414.2800
 800.536.4662
 Fax: 651.695.7000
 Email: mnnurses@mnnurses.org
 Web: www.mnnurses.org

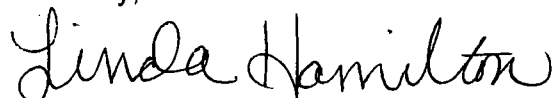
AFL-CIO



Ms. Lisa Fay
Page 2
March 10, 2014

Conduct a health impact assessment for the PolyMet project and include the results of the assessment in the EIS. The HIA should include examination of all aspects of public health affected by the proposal, including analysis of the social determinants of health.

Sincerely,

A handwritten signature in cursive script that reads "Linda Hamilton".

Linda Hamilton, RN
President, Minnesota Nurses Association

Resources:

Rajiv Bhatia and Aaron Wernham (2008). "Integrating Human Health into Environmental Impact Assessment." *Environmental Health Perspectives* 116(8). 991-1000. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2516559/>.

State of Alaska Department of Health and Social Services. "Alaska Health Impact Assessment (HIA) Program." <http://www.epi.alaska.gov/hia/default.htm>.

United States Centers for Disease Control and Prevention. "Health Impact Assessment." <http://www.cdc.gov/healthyplaces/hia.htm>.

United States Environmental Protection Agency (2013). "A Review of Health Impact Assessments in the U.S.: Current State-of-Science, Best Practices, and Areas for Improvement." <http://www.epa.gov/research/healthscience/docs/review-hia.pdf>



Doctors and Nurses Expressing Concern About the Health Impacts of PolyMet's Mine Plan

Lisa Fay, EIS Project Manager
MDNR Division of Ecological and Water Resources
Environmental Review Unit
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025
NorthMetSDEIS.dnr@state.mn.us

Douglas Bruner
US Army Corps of Engineers
St. Paul District, Regulatory Branch
180 5th Street E, Suite 700
Saint Paul, MN 55101
Douglas.W.Bruner@usace.army.mil

Michael Jimenez
U.S. Forest Service – Superior National Forest
8901 Grand Avenue Place
Duluth, MN 55808
mjimenez@fs.fed.us

Ken Westlake, Section Chief
US Environmental Protection Agency Region 5
NEPA Implementation Section, Mail Code E-19J
77 W. Jackson Blvd.
Chicago, IL 60604
westlake.kenneth@epa.gov

RE: PolyMet NorthMet Sulfide Mining SDEIS

Dear Ms. Fay, Mr. Westlake:

This comment letter is submitted on behalf of the 46 undersigned doctors and nurses. We are concerned that the proposed PolyMet NorthMet copper-nickel mine project could have significant adverse impacts on human health as a result of pollutants released to air, surface water and drinking water. We also believe that the PolyMet NorthMet Supplemental Draft Environmental Impact Statement (“PolyMet SDEIS”) fails to adequately assess important risks to human health from the pollutants that would be released from this project. The absence of any professionals from the Minnesota Department of Health from the List of Preparers of the PolyMet SDEIS is particularly troubling.

Minnesota Health Professionals Comment – PolyMet
March 11, 2014
Page 2

We respectfully request that the PolyMet SDEIS be deemed inadequate due to unresolved concerns and insufficient assessment of health risks of the proposal. We would further request that, in revising the PolyMet SDEIS, a comprehensive Health Risk Assessment be prepared under the guidance of the Minnesota Department of Health. In this letter, we summarize some issues and concerns leading to these requests.

Mercury contamination of fish and impacts on neurotoxicity in the developing fetus as well as in infants, children and adults is a significant public health concern in Minnesota. The Minnesota Health Department found 1 out of 10 infants in Minnesota's Lake Superior Region are born with unsafe levels of mercury in their blood. The percentage of infants thus at risk for neurologic impairment was higher than in the Lake Superior Region of Wisconsin or Michigan. We are aware that many of the bodies of water downstream of the proposed PolyMet mine and plant are legally impaired due to mercury in fish tissue. Other mine facilities that release mercury and/ or sulfates increase the cumulative risk of methylmercury bioaccumulation. The lower reaches of the St. Louis River, including the St. Louis River estuary, are known to contain particularly high levels of mercury.

After reviewing the PolyMet SDEIS, we believe that the information on mercury releases and the potential for mercury bioaccumulation is insufficient. The SDEIS does not disclose releases of mercury from seepage and does not analyze the effects of local deposition of mercury and other air pollutants or of hydrologic changes on mercury bioaccumulation. The SDEIS does not provide evidence to justify its claims about collection and containment of mercury and sulfates.

The PolyMet SDEIS also provides an insufficient analysis of the human health risks of other pollutants, such as neurologic morbidity resulting from manganese and lead release; and carcinogenic effects of air emissions of diesel, asbestos-like fibers, nickel and other particulates, and of arsenic releases to water. The PolyMet SDEIS fails to analyze health risks to workers who would work on-site at the PolyMet mine or plant and fails to assess impacts of tailings groundwater seepage on nearby residential populations. The PolyMet SDEIS does not discuss impacts of exposures to vulnerable populations, such as infants, children, the elderly and persons who rely for subsistence on fish, wild rice or game species, where pollutants may bioaccumulate.

For these reasons, we first request that the PolyMet SDEIS be revised to provide more complete information on mercury and sulfate air pollution emission and deposition, water pollution seepage from various sources, and the potential conversion to and bioaccumulation of methylmercury resulting from releases to the environment and hydrological changes from the proposed PolyMet project.

Minnesota Health Professionals Comment – PolyMet
March 11, 2014
Page 3

We further request that the PolyMet SDEIS be determined inadequate pending supplementation to include a Health Impacts Assessment, under the direction of the Minnesota Health Department. This Health Impacts Assessment should include at least the following:

1. Description of the known human health impacts of all pollutants in PolyMet's air emissions and water discharges based on reliable toxicity and epidemiology data.
2. Assessment of health risks resulting from fossil fuel combustion, including impacts of burning coal to meet mine energy demands.
3. Assessment of potential health impacts on residential wells from tailings seepage and cumulative health risks from contaminants to other drinking water sources.
4. Health risk assessment for on-site workers at both the PolyMet mine and plant, reflecting both cancer and non-cancer risks.
5. Assessment of cumulative mercury risks, including hazard levels in bodies of water that are already impaired for mercury in fish and risks posed by mercury concentration downstream in the St. Louis River.
6. Assessment of cumulative cancer and non-cancer risks from existing and additional sources of toxic chemicals, such as manganese, arsenic, lead and nickel, applying the most protective health risk analysis and an appropriate "lifetime" exposure.
7. Assessment of cumulative risks of multiple chemicals and exposure routes on vulnerable populations, including infants, children, the elderly and populations who have higher rates of consumption of affected foods, such as fish and wild rice.

Thank you for considering the concerns of Minnesota's doctors and nurses as you evaluate the PolyMet mine project and SDEIS. We are committed to using careful assessment and rigorous science to protect the health of the next generation and generations to come throughout Minnesota.

Sincerely yours,

Susan Nordin, MD Family Medicine Duluth, MN

Jennifer Pearson, MD Family Medicine Duluth, MN

Emily Onello, MD Family Medicine Duluth, MN

Kris Wegerson, MD Family Medicine Duluth, MN

John Ipsen, MD Family Medicine Duluth, MN

Minnesota Health Professionals Comment – PolyMet
March 11, 2014
Page 4

Kevin Brellie, RN Duluth, MN

Robert Stubenvoll, MD Otolaryngology Duluth, MN

Bethel Anderson, RN Cloquet, MN

Steve Long, MD Family Medicine Duluth, MN

David Hutchinson, MD Family Medicine Duluth, MN

Mark Goellner, MD Internal Medicine Duluth, MN

Judith Johnson, MD OB/ GYN Duluth, MN

Rodney Middlebrook, OD Optometry Austin, MN

Margaret Saracino, MD Child and Adolescent Psychiatry Duluth, MN

Steve Sutherland, MD Child and Adolescent Psychiatry Duluth, MN

Douglas Hoffman, MD Orthopedic Surgery Duluth, MN

Kirsten Bich, MD Family Medicine Duluth, MN

Christine Swenson, MD Family Medicine Duluth, MN

Craig Peterson, MD Anesthesiology Duluth, MN

Bruce Derauf, MD Radiology Duluth, MN

Judy Derauf, RN Duluth, MN

Steve Bauer, MD Child and Adolescent Psychiatry Duluth, MN

Irene Carr, MD OB/ GYN Duluth, MN

Anne Rogotzke, MD OB/ GYN Duluth, MN

Jeff Adams, MD Emergency Medicine Duluth, MN

Elizabeth Raduege, MD Family Medicine Duluth, MN

Jeanette Johnson, RN Floodwood, MN

Jacob Prunuske, MD Family Medicine Duluth, MN

Christine Larsen, NP OB/ GYN Duluth, MN

Rhett Bonner, MD Family Medicine Duluth, MN

Minnesota Health Professionals Comment – PolyMet
March 11, 2014
Page 5

Vincent Kershaw, MD Duluth, MN

Eric Ringsred, MD Duluth, MN

Sarah Nelson, MD Duluth, MN

Victoria Puumala Heren, MD Cloquet, MN

Thomas E. Kottke, MD St. Paul, MN

Lydia Caros, DO Minneapolis, MN

Nancy Newman, MD St Paul, MN

Linda Feltes, MMB St. Paul, MN

Sally Keating, Family Nurse Practitioner (Ret.) Rochester, MN

David W. Moen, MD St. Paul, MN

David Wallinga, MD Minneapolis, MN

John Eckfeldt, MD, PhD Minneapolis, MN

Diane M Pittman, MD Family/ Emergency Medicine, Bemidji, MN

Nancy B Beecher, MD Minneapolis, MN

Patricia Peters, RN Duluth, MN

Diane Dickey, RN Brimson, MN



Protecting, maintaining and improving the health of all Minnesotans

March 13, 2014

Lisa Fay
EIS Project Manager
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
Saint Paul, MN 55155-4025

Dear Ms. Fay,

Thank you for providing the Minnesota Department of Health (MDH) with the opportunity to comment on the Supplemental Draft Environmental Impact Statement (SDEIS) for the NorthMet Mining Project and Land Exchange.

Due to the scope and nature of the SDEIS, MDH staff were not able to complete exhaustive review of the entire document. However, the following provide some comments, both specific and general in nature related to the SDEIS and the project.

Hydrogeology

The SDEIS assigns very low hydraulic conductivity values to the Duluth Complex and minimizes the potential for groundwater transport via large-scale fractures and faults. This assumption is based on the work of Foose and Cooper (1979, 1980) which indicates that such features were formed early and at depth during emplacement of the Duluth Complex and that these features are largely filled with gouge, limiting their ability to act as groundwater conduits. However, Davidson reported a regional fracture pattern in the Duluth Complex in Lake and Cook counties which were "...interpreted as having resulted from regional stresses, possibly related to glacial unloading and uplift together with some tectonic readjustments resulting from erosion, basin formation, and isostatic rebalancing" (The Duluth Complex in the Perent Lake and Kawishiwi Lake Quadrangles, Lake and Cook Counties, Minnesota – A Discussion to Accompany Miscellaneous Map Series Maps M-7 & M-8, D.M. Davidson, Jr., Minnesota Geological Survey, 1969). The forces that created the fracture pattern in Lake and Cook counties would have also affected the Duluth Complex in St. Louis County, suggesting that local- to regional-scale fractures could be present and may act as possible conduits for higher rates of groundwater flow in the Precambrian bedrock. These fractures were not taken into account in the SDEIS. It would therefore be more conservative to assume higher flow rates when modeling groundwater and contaminant transport for this project.

Available static water level elevations for residential water supply wells near the Embarrass River indicate that water levels are generally higher in the surficial aquifer wells than in the Precambrian bedrock wells, suggesting a downward vertical gradient may exist throughout this area. While the SDEIS, citing PolyMet (2013) and Siegel and Ericson (1980), notes that the

Ms. Fay
NorthMet
Page 2
March 13, 2014

surficial and bedrock aquifers are hydraulically connected and recharge to the bedrock occurs, in part, from leakage from the overlying surficial aquifer (pages 4-24, 4-26, 4-54 of the SDEIS), the SDEIS later cites the same work by Siegel and Ericson to conclude "...the interaction between the surficial deposits and the bedrocks aquifers is assumed to be insignificant..." (page 4-149 in the SDEIS).

This conclusion appears to underpin later assumptions regarding the effectiveness of the various seepage containment systems to prevent contaminant migration in the bedrock aquifer, particularly at the Tailings Basin on the Plant Site. However, some seepage is predicted to escape the Tailings Basin and containment systems. Additionally, discharge via the Emergency Overflow Channel would circumvent the containment system entirely. Moreover, if there is downward migration of groundwater from the surficial aquifer to the bedrock as noted on pages 4-24, 4-26, 4-54 of the SDEIS, this may permit seepage to migrate beneath the slurry cut-off walls. The proposed groundwater monitoring network for the Embarrass River Watershed (SDEIS Table 5.2.2-54) includes only the existing monitoring wells installed around the Tailings Basin, which apparently are the wells shown in SDEIS Figure 4.2.2-13. Construction details for these wells are not included in the SDEIS and only two have records in the Minnesota County Well Index (CWI) (GW006, UN 625042; GW008, UN 625044). These are completed in the surficial aquifer at depths of 14 and 12 feet, respectively. MDH recommends that additional monitoring wells be installed within the bedrock aquifer to evaluate potential impacts to this aquifer.

On page 5-6, the SDEIS estimates that over 90% of seepage from the Category 1 Stockpile will be captured by the groundwater containment system with the remaining 10% following the groundwater flow to the West Pit where the water will be cycled through the Waste Water Treatment Facility (WWTF). However, the west end of the stockpile is located on a groundwater "high" (Fig. 4.2.2-5 in the SDEIS) from which some of the flow may be to the north and northeast and could discharge to Yelp Creek and then the Partridge River. This needs to be accounted for in the evaluation of potential migration of contaminants to groundwater and surface water and planning of the Mine Site groundwater monitoring network.

Groundwater Evaluation Criteria

On page 5-10 the SDEIS notes that the national primary drinking water standards for copper and lead are treatment-based, "at-the-tap" values for public water supplies and not "in situ" groundwater values. Therefore, the SDEIS proposes that the secondary Maximum Contaminant Level (sMCL) of 1,000 µg/L for copper be used as the groundwater evaluation criterion. This value is protective only for acute health effects resulting from short-term, high level exposures and is not considered protective for infants, children, or other sensitive individuals. MDH is currently evaluating its advice for copper in drinking water. In the interim, MDH recommends that 300 µg/L be used as the groundwater evaluation criterion for the NorthMet project, as this appears to be protective for infants, children, and other sensitive individuals (Public Health Goals for Chemicals in Drinking Water: Copper, California Office of Environmental Health Hazard Assessment, February 2008).

Ms. Fay
NorthMet
Page 3
March 13, 2014

Regarding lead, MDH recommends well owners take action to remove all lead from their drinking water if detected. Given the presence of domestic water supply wells near the site, MDH recommends the national primary drinking water standard of 15 µg/L be used as a groundwater evaluation criterion in monitoring near the site.

On pages 5-11 and 5-12, Table 5.2.2-2 of the SDEIS lists the applicable groundwater evaluation criteria for the project. In most cases, either the federal MCL or the Minnesota Health Risk Limit (HRL) is selected, but higher SDEIS evaluation criteria were chosen for beryllium, manganese and thallium "...based on background water quality". Although manganese exceeded the federal MCL of 50 µg/L in most samples, Table 4.2.2-6 in the SDEIS indicates most of the groundwater samples collected near the proposed Mine Site were near or below the state Risk Assessment Advice (RAA) levels of 100 µg/L for infants and 300 µg/L for children and adults. MDH recommends the RAA values be used as the groundwater evaluation criterion for manganese. Table 4.2.2-24 of the SDEIS indicates higher manganese concentrations downgradient of the existing LTV Steel Mining Company Tailings Basin, but this simply suggests contamination of the surficial and bedrock aquifers from previous activities at this site that need to be considered in evaluating impacts to groundwater, not background concentrations for the aquifers. This is important as the maximum 90th percentile probability (P90) concentrations predicted in the 500-year model simulation suggests manganese concentrations in the groundwater in all of the flow paths from the Plant Site will exceed the MDH RAAs, including areas where domestic wells are present (Table 5.2.2-38 in the SDEIS).

Similarly, the detections of beryllium near the proposed Mine Site indicate background concentrations in the aquifers are generally below the federal MCL of 0.4 µg/L and only slightly above the MDH HRL of 0.08 µg/L. MDH recommends the HRL be used as the groundwater evaluation criterion, as beryllium concentrations in the Plant Site flow paths are also predicted to exceed the HRL in areas where domestic wells are present.

In contrast, naturally occurring levels of thallium do appear to exceed the state and federal drinking water criteria, so using a slightly higher value for evaluation purposes makes sense. Moreover, the SDEIS modeling indicates that thallium levels are unlikely to exceed the state and federal criteria.

Water Quality

Groundwater discharge from the Mine Site to the Partridge River could impact the Hoyt Lake drinking water supply (via Colby Lake) and alter geochemical conditions that affect mercury availability to fish, creating another potential human exposure pathway. Therefore, conservative modeling of potential impacts to the river that incorporate all possible contaminant sources is critical.

Seepage from the Category 2/3 and 4 waste rock stockpiles and Ore Surge Piles primarily will be captured by leachate collection systems and treated, but some will reach the groundwater along with seepage from the mine pits, WWTF equalization basins and Overburden Storage and Laydown Area and eventually discharge to the Partridge River (Table 5.2.2-26 of the SDEIS). Table 5.2.2-22 of the SDEIS suggests that this will result in little, if any, change in groundwater

Ms. Fay
NorthMet
Page 4
March 13, 2014

quality compared to the continued existing conditions and that none of the groundwater evaluation criteria will be exceeded, based on modeling predictions regarding constituent release under oxidizing conditions and considering likely attenuation factors for arsenic, antimony, copper and nickel. This seems inconsistent with field leaching test results on locally sourced Duluth Complex Gabbro (1978 DNR/AMAX Field Leaching and Reclamation Program – Progress Report on the Leaching Study, DNR, Jan. 29, 1979; and Environmental Leaching of Duluth Gabbro Under Laboratory and Field Conditions: Oxidative Dissolution of Metal Sulfide and Silicate Minerals, DNR, 1980). That rock had copper, nickel, and sulfate percentages lower than those projected for the Category 4 waste rock and similar to those projected for the Category 2/3 waste rock, yet generated runoff containing 620 – 2,400 µg/L sulfate and 120 – 70,000 µg/L nickel (copper was generally <50 µg/L in these tests, except one pile that leached approximately 10,000 µg/L).

Several untreated wastewater streams from the Plant Site appear to be directed to the Mine Site during the early phases of reclamation. These include untreated seepage from the Tailings Basin, blended with seepage that has passed through the Waste Water Treatment Plant (WWTP), which is to be discharged to the West Pit to accelerate its flooding (p. 3-135, “Water Management”) and WWTP reject concentrate will be transported to the West Equalization Basin of the WWTF at the Mine Site (p. 5-81, Plant Site). No information is provided regarding likely contaminant concentrations in these wastewater streams, so it is not clear how their possible contribution to groundwater contamination was evaluated.

It is also unclear how constituent leaching was accounted for during the period while the pits are being flooded during the reclamation phase. Table 5.2.2-19 of the SDEIS seems to suggest the oxidation will occur before flooding, but according to Younger (The longevity of minewater pollution: a basis for decision-making. Sci. Tot. Env., vol. 194/195, pp. 457-466, 1997), fluctuating water levels result in conditions more conducive to acid mine drainage and metal leaching than full exposure to oxygen. The flooding of each pit will take approximately 20 years during which time it is likely water levels will fluctuate within the pits. Also, it is not clear whether the waste rock from the stockpiles will simply be deposited in the East Pit in year 11 and remain partly exposed for 20 years while the water rises around it, or if the placement of the waste rock will occur in stages to ensure the rock is either still on the stockpile liner (and leachate is collected and treated) or entirely submerged within the pit to minimize acid production and metal leaching.

On p. 5-104, the SDEIS indicates that once flooded, groundwater inflow to the pits will limit the exposure of the wall rock to oxygen. However, no dissolved oxygen data was presented in Section 4 of the report. Has it been measured?

Local Well Inventory and Chemical Monitoring

The SDEIS does not adequately address possible impacts of groundwater contamination on local domestic wells. A thorough inventory and baseline water quality assessment of existing wells should be conducted prior to the initiation of any mining activities so that any future degradation of drinking water quality related to mining activities can be identified and remediated.

Ms. Fay
NorthMet
Page 5
March 13, 2014

Figures 5.2.2-4 and 5.5.2-6 in the SDEIS outline the groundwater flowpaths along which contamination from the NorthMet mine and plant sites is projected to flow toward the Partridge and Embarrass Rivers. MDH staff conducted a preliminary comparison of these two areas with a search of well locations from the CWI database to assess the impacts that this proposed mining action could have on local domestic wells that are either within the delineated flowpath zones or are between the flowpath zones and the Partridge or Embarrass River. The area between the flowpath zones and the rivers was incorporated into the analysis to address uncertainty in discharge points along tributary streams between the plant and the Embarrass River.

Two sets of well data were assessed: located wells (wells that either have locations verified and recorded using GPS or that have been field-verified to six quarter-sections) and unlocated wells (wells whose locations are estimated based on information provided by well contractors at the time of well construction). Our assessment shows that there were no well records in CWI between the mine site and the Partridge River. However, Figure 1 (attached) shows that 19 located and eight unlocated wells with records currently within CWI met our search criteria for the area between the Plant Site and the Embarrass River, and by inference could be impacted by this mining activity. It should be noted that these numbers likely represent minimum values, as there may be unlocated wells in the area that pre-date the Minnesota state Well Code in either of the modeled zones. These wells that pre-date the code would need to be inventoried, located and input into CWI. Any unused and unsealed wells found during the inventory could be conduits through which a contaminant plume could more quickly propagate, and therefore would need to be sealed as per current Well Code by the parcel owner, possibly with PolyMet Mining, Inc.'s assistance. Also, PolyMet Mining, Inc. should take every opportunity to collect baseline samples for any new wells that might be drilled in the area.

Sample analytes and frequency of resampling are two aspects for which MDH would like to be consulted if permitting for the project moves forward. MDH is also interested in accessing the baseline data results archive and would ask to be included in those discussions as well.

Water Supply Contingency Planning

The city of Hoyt Lakes relies upon Colby Lake as its drinking water source, and modeling results presented within the SDEIS indicate that the lake water will remain safe for consumption. However, the uncertainty associated with all modeling studies points to the need for a monitoring and contingency strategy that will ensure a safe water supply for Hoyt Lakes in the event of unanticipated water quality degradation of Colby Lake related to the proposed mining activities.

In order to ensure a continued safe drinking water source for Hoyt Lakes, PolyMet Mining, Inc., as the owner and operator of the NorthMet mine, should assist with water supply contingency planning for the city. This contingency plan should address ongoing water quality and quantity monitoring and set up protocols for gradually changing conditions and emergencies, should they occur. There are existing contingency plans in place in other areas of the Iron Range, and those plans could be used as a template for any Hoyt Lakes plan.

Ms. Fay
NorthMet
Page 6
March 13, 2014

Air Quality

Air quality modeling for crystalline silica in the SDEIS is based on predicted PM₁₀ and PM_{2.5} emissions. However, when discussing the toxicity of crystalline silica, the real concern is with respirable crystalline silica particles with a diameter of 4 micrometers (4 µm or 4 microns) or smaller, also referred to as PM₄. Particles of crystalline silica in this size range are of greatest concern. PM₁₀ (particulate matter 10 microns or smaller) is inhalable, but the fraction of PM₁₀ that is larger than 4 microns only reaches upper levels of the respiratory system. Particles 4 microns or smaller can travel much deeper in the lungs and reach the lower respiratory surfaces (alveoli) where the changes that produce silicosis take place. Disease risk is related to both the levels and duration of silica exposure and the onset of disease may occur long after the exposure has ceased. PM_{2.5} measurements may underestimate health risks from crystalline silica exposures. MDH has established a chronic Health Based Value (HBV) of 3 µg/m³ for respirable PM₄ crystalline silica and recommends using this as a screening value for assessing potential health risks associated with respirable crystalline silica.

Climate Change

Table 5.2.7-8 in the SDEIS indicates that the NorthMet project will result in 196,341 metric tons per year (mtpy) direct and 511,000 mtpy indirect greenhouse gas (GHG) emissions, or a total increase in GHG emissions of 707,342 mtpy. This would make the NorthMet project a significant contributor to the total annual state GHG emissions. MDH recommends that all projects in Minnesota evaluate options for reducing GHG emissions, through energy conservation and use of renewable energy sources, to limit contributions to climate change and help achieve Minnesota's GHG emissions reduction targets of 15% by 2015 and 30% by 2025.

Health Impact Assessment

A Health Impact Assessment (HIA) is a research and community engagement process that can be used to help ensure that people's health and concerns are being considered when decisions on infrastructure and land use projects are being made. The National Research Council defines HIA as "a structured process that uses scientific data, professional expertise, and stakeholder input to identify and evaluate public-health consequences of proposals and suggests actions that could be taken to minimize adverse health impacts and optimize beneficial ones." HIAs have been used to provide important health information to decision makers on a wide range of projects outside the typical health arena, including comprehensive plans, brownfield redevelopment, transportation projects, energy policies, and housing projects. Over 100 HIAs have been performed in the US to help improve public health. Ten HIAs have been completed in Minnesota, mostly on comprehensive plans and transportation projects.

The International Council on Metals and Mining (ICMM) prepared the [Good Practice Guidance on Health Impact Assessment](#) to ensure their member's operations contribute positively to community health and wellbeing. ICMM notes that mining projects can impact infectious and chronic disease rates and mental health and wellbeing. ICMM recommends conducting HIAs to proactively maximize community health and wellbeing and reduce potential health impacts.

Ms. Fay
NorthMet
Page 7
March 13, 2014

HIAs have been used to inform decision makers about health effects in projects such as oil and gas leasing, coal mine proposals, and copper, zinc and gold mining. These HIAs may review health issues that are typically included in an EIS, such as water and air quality, but they also review additional health effects that are related to the specific site and community. Some health effects considered in these HIAs include reviewing the health effects of newly built infrastructure and traffic to support mining, the influx of migrant workers, and the disturbance of food sources relied upon by subsistence cultures.

An HIA on the project could provide additional health information for policy makers in determining how to balance health and citizens' concerns with economic benefits of the project. An HIA could be scaled according to available resources and still answer some of the health questions posed by the community. An HIA could provide recommendations to policy makers to support possible positive health outcomes and to mitigate or prevent possible negative health outcomes to improve the public's health and to inform zoning, permitting, monitoring, and reclamation policies.

Summary

- Assume higher flow rates for groundwater and contaminant transport modeling to account for local- to regional-scale fractures within the Duluth Complex.
- Install additional monitoring wells within the bedrock aquifer to evaluate potential impacts to this aquifer.
- Account for the groundwater "high" in the evaluation of potential migration of contaminants to groundwater and surface water and in planning of the Mine Site groundwater monitoring network.
- Use 300 µg/L as the groundwater evaluation criterion for copper.
- Use 15 µg/L as the groundwater evaluation criterion for lead. Well owners should take action to remove all lead from their drinking water if detected.
- Use 100 µg/L for infants and 300 µg/L for children and adults as the groundwater evaluation criterion for manganese.
- Use 0.08 µg/L as the groundwater evaluation criterion for beryllium.
- Conservatively model all potential impacts to the river, incorporating all possible contaminant sources.
- Clarify inconsistencies between field leaching test results and modeling predictions that indicate no change in groundwater quality compared to existing conditions with no exceedances of groundwater evaluation criteria.
- Provide contaminant concentrations from untreated wastewater streams and clarify how their contribution to groundwater contamination was assessed.
- Clarify how constituent leaching was accounted for during reclamation flooding.
- Provide dissolved oxygen data if available or complete measurement.
- Conduct a thorough inventory and baseline water quality assessment of existing wells prior to the initiation of any mining activities so that any future degradation of drinking water quality related to mining activities can be identified and remediated. This inventory and assessment should include located and unlocated wells.
- Properly seal any unused and unsealed wells found during the inventory.

Ms. Fay
NorthMet
Page 8
March 13, 2014

- Collect baseline water samples when new wells are drilled in the area.
- Consult with MDH staff regarding sample analytes and frequency of resampling.
- Consult with MDH staff regarding the baseline data results archive.
- Prepare a water supply contingency plan for the city of Hoyt Lakes that addresses ongoing water quality and quantity monitoring and sets up protocols for gradually changing conditions as well as emergencies, should they occur.
- Use $3 \mu\text{g}/\text{m}^3$ as a screening value for assessing potential health risks from respirable PM_{10} crystalline silica.
- Evaluate options for reducing GHG emissions, through energy conservation and use of renewable energy sources.
- Consider preparation of a Health Impact Assessment.

Health starts where we live, learn, work, and play. To create and maintain healthy Minnesota communities, we have to think in terms of health in all policies. Thank you again for the opportunity to provide comments on this SDEIS for the NorthMet project. Please feel free to contact Michele Ross at (651) 201-4927 or michele.ross@state.mn.us if you have any questions regarding this letter.

Sincerely,



Edward P. Ehlinger, M.D., M.S.P.H.
Commissioner
P.O. Box 64975
St. Paul, MN 55164-0975

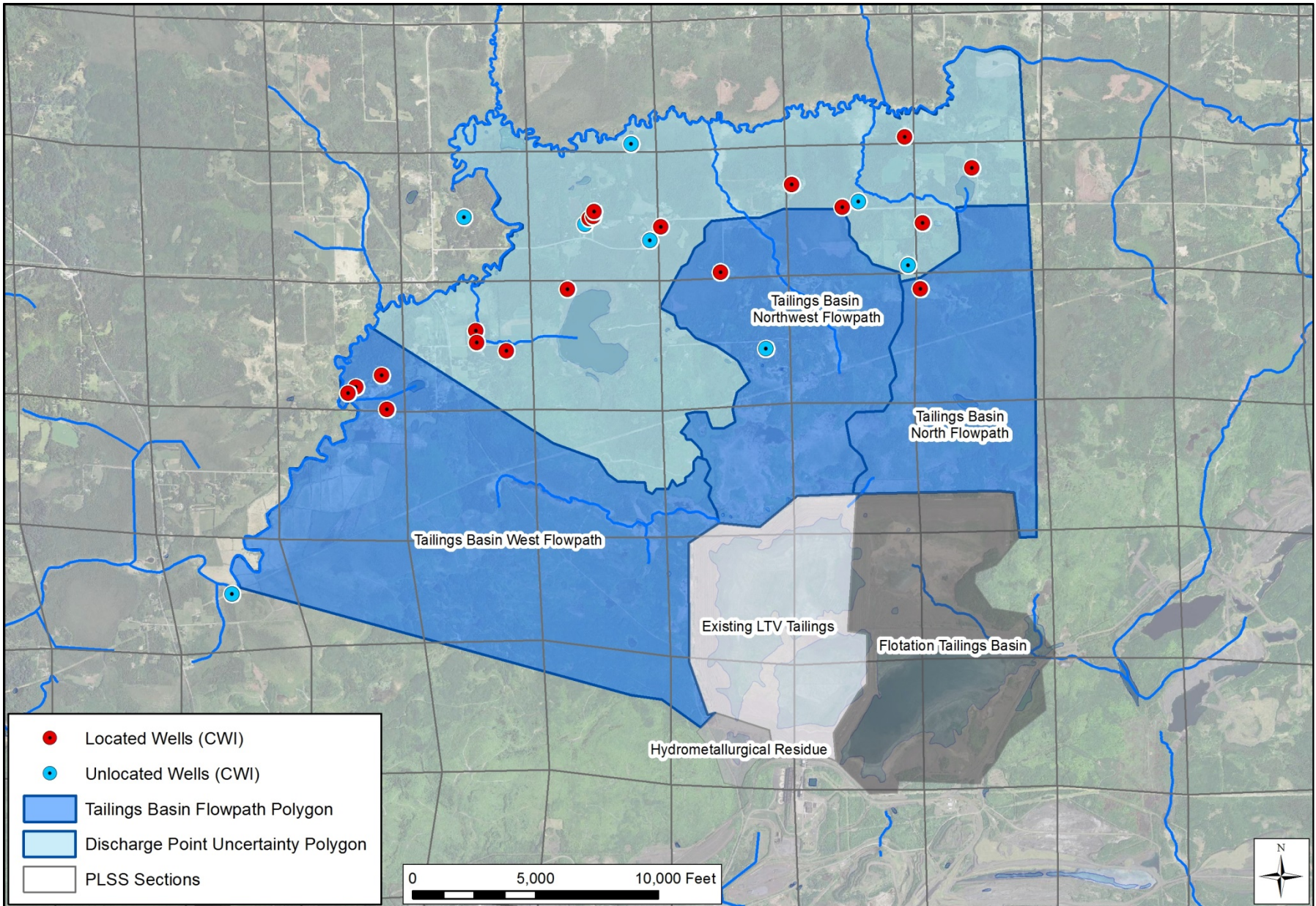


Figure 1
Known and Estimated Well Locations in Relation to
NorthMet Plant Site Surface and Groundwater Flowpaths



September 25, 2014

Governor Mark Dayton

Commissioner Edward Ehlinger, M.D., Minnesota Department of Health

Commissioner Tom Landwehr, Minnesota Department of Natural Resources

Commissioner John Linc Stine, Minnesota Pollution Control Agency

Dear Governor Dayton, Commissioner Ehlinger, Commissioner Landwehr, and Commissioner Stine:

RE: Comprehensive Analysis of the Health Risks and Public Health Impacts of the PolyMet NorthMet Sulfide Mine Project

On behalf of the Minnesota Medical Association, I am writing to offer support for the request that a comprehensive analysis of the health risks and public health impacts of the PolyMet NorthMet Sulfide Mine Project be conducted. This assessment will assist the state of Minnesota in making an informed decision as to the proposed project, taking into account any potential adverse effects this type of mining may have on the health of Minnesotans.

According to the Minnesota Department of Natural Resources (DNR), "PolyMet Mining, Inc. (PolyMet) is proposing to develop a mine and associated processing facilities for the extraction of copper, nickel, and platinum group elements from the NorthMet Deposit in northeastern Minnesota." Furthermore, DNR notes that this mine "would be the first of its kind in the state." For a project on a scale as large as that of the PolyMet Mine Project, understanding the potential health effects, both positive and negative, is an important component in deciding whether to allow this type of mining in Minnesota. As pollutants and other contaminants associated with the mine could possibly affect the health of Minnesotans, the need to gather additional information through a comprehensive assessment is critical.

A health risk assessment and health impact assessment of sulfide mining is a reasonable step to take to protect the future health of Minnesotans. The MMA urges your support.

Sincerely,

Donald M. Jacobs, M.D., F.A.C.S.

President



October 17, 2014

Governor Mark Dayton
Office of the Governor & Lt Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, MN 55155

Commissioner Tom Landwehr, Minnesota Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155-4040

Commissioner Dr. Edward Ehlinger, Minnesota Department of Health
625 N. Robert St.
St. Paul, MN 55155-253

Commissioner John Linc Stine, Minnesota Pollution Control Agency
520 Lafayette Road N
St. Paul, MN 55155-4194

RE: PolyMet NorthMet Sulfide Mining - Assessment of Health Effects, Impacts on Healthy Foods and Drinking Water

Dear Governor Dayton, Commissioners:

This letter is submitted on behalf of the undersigned members of Healthy Food Action, a national network of health professionals interested in food systems that support good nutrition and environmental health.

We write to request a comprehensive analysis be done of the threat posed by the PolyMet sulfide mine to healthy foods, drinking water and public health before any further decisions are made about this project.

Americans already eat an unhealthy diet, on the whole, characterized by eating too many processed foods, high in added sugars and fats, eating not enough whole, unprocessed foods like fruits and vegetables and fresh fish, and by drinking too many sugary drinks instead of plain old water.

We are concerned the proposed PolyMet project could add to the epidemics of chronic disease in Minnesota and the rest of the country -- like diabetes, heart disease and cancer -- by adding to the load of toxic pollutants in our air, surface and drinking waters, thereby increasing the oxidative stress those pollutants exert on human tissue. Oxidative stress is a fundamental mechanism shared by all of the chronic diseases mentioned above.

We believe that analysis performed thus far is insufficient to assess important risks to human and public health, especially including the direct and indirect impacts of the pollutants that this project will release once they are ingested by human beings.

For example, Healthy Food Action is particularly concerned about mercury contamination of fish. The Minnesota Health Department found 1 out of 10 infants in Minnesota's Lake Superior Region are born with unsafe levels of mercury in their blood. As you know, no level of mercury exposure is thought to be safe for the developing brain of a fetus or young child. Mercury is an incredibly potent neurotoxin, in other words. The percentage of infants at risk for neurologic impairment in Minnesota's Lake Superior Region is higher than that of Wisconsin or Michigan.

The U.S. Environmental Protection Agency, as well as other experts in mercury toxicity, have concluded that PolyMet mercury modeling to date has been insufficient and recommended additional scientific analysis of mercury releases and mercury bioaccumulation impacts.

Besides fish, sulfide mining pollution can erode the supply and quality of other healthy foods that are integral to the culture and diets of many Minnesotans, including our Native peoples, such as wild rice and the wild game that feed in lakes where pollutants are known to bioaccumulate. Again, of course, it is the infants, children, elderly and persons who rely for subsistence on these foods who will be at greatest risk.

Healthy Food Action urges that a decision by Minnesota to permit its first copper-nickel mine, how to control its pollution and how to financially assure its risks, must include an assessment of the project's effect on food systems and public health.

We request, Governor Dayton, that you direct your Commissioners to take the following important actions to ensure protection of human health:

1. Improve Data and Modeling of pollutant releases from the PolyMet sulfide mine project to address gaps in environmental review and to allow accurate modeling of both mercury releases and mercury bioaccumulation.
2. Prepare a Health Risk Assessment under the guidance of the Department of Health, with lead agencies requiring that the PolyMet project proposer bear any costs as part of environmental review. Complete at least the following tasks:
 - Assess cumulative mercury risks, including hazard levels in bodies of water that are already impaired for mercury in fish and risks posed by mercury concentration downstream in the St. Louis River.
 - Assess potential health impacts due to drinking water contaminants in residential wells and Hoyt Lakes municipal drinking water.
 - Assess cumulative risks of multiple chemicals and exposure routes on vulnerable populations, including infants, children, the elderly and populations who have higher rates of consumption of affected foods, such as fish and wild rice.
3. Engage the community in a Health Impact Assessment process initiated by the Department of Health in partnership with local scientists and health professionals to ensure that impacts of the PolyMet project on food systems and public health are analyzed and considered prior to any public decisions.

Thank you for considering our request for improved data, a health risk assessment and a health impact assessment process before decisions are made on the PolyMet mine project. We hope that you share the Healthy Food Action commitment to protecting Minnesota food systems and the health of generations to come.

Sincerely yours,

David Wallinga, M.D., MPA
St. Paul, MN 55105

Lisa Daniels, MHA
Saint Paul, MN 55112

Rachel Grewell, RN
Minneapolis, MN 55418

Elizabeth Hayes, PsyD
St. Paul, MN 55105

Kathleen McClintock
Minneapolis, MN 55408

Ann Mongreau, RN
Spring Lake Park, MN 5543

Debbie Ross, RD
Prior Lake, MN 55372

Lisa Smith, BSN
Pipestone, MN 56164

Hazel Tanner, RN, MPH
Minneapolis, MN 55417

Susan Wehrenberg, RD
Apple Valley, MN 55124



MINNESOTA PUBLIC
HEALTH ASSOCIATION
www.mpha.net

P.O. Box 14709 • Minneapolis, MN 55414

Governor Mark Dayton
Office of the Governor & Lt Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, MN 55155

Commissioner Tom Landwehr, Minnesota Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155-4040

Commissioner Dr. Edward Ehlinger, Minnesota Department of Health
625 N. Robert Street
St. Paul, MN 55155-253

Commissioner John Linc Stine, Minnesota Pollution Control Agency
520 Lafayette Road N
St. Paul, MN 55155-4194

RE: PolyMet NorthMet Sulfide Mining - Assessment of Health Effects

Dear Governor Dayton, Commissioners:

This letter is submitted on behalf of the Minnesota Public Health Association. The Minnesota Public Health Association is an all-volunteer professional organization for public health professionals throughout the state of Minnesota. Our mission is to create a healthier Minnesota through effective public health practice and engaged citizens.

We write to request a comprehensive analysis of the health risks and public health impacts of the PolyMet sulfide mine project before any decisions are made about this controversial project.

We are concerned that the proposed PolyMet copper-nickel mine project could have significant adverse impacts on human health as a result of pollutants released to air, surface water and drinking water. We believe that analysis performed thus far is insufficient to assess important risks to human health and public health impacts of the pollutants that would be released from the PolyMet project.

Mercury contamination of fish and impacts on neurotoxicity in the developing fetus as well as in infants, children and adults is a significant public health concern in

Minnesota. The Minnesota Health Department found 1 out of 10 infants in Minnesota's Lake Superior Region are born with unsafe levels of mercury in their blood. The percentage of infants thus at risk for neurologic impairment was higher than in the Lake Superior Region of Wisconsin or Michigan. We are aware that many of the bodies of water downstream of the proposed PolyMet mine and plant are legally classified as impaired due to mercury in fish tissue. The lower reaches of the St. Louis River, including the St. Louis River estuary, are known to contain particularly high levels of mercury.

An international mercury expert, Dr. Brian Branfireun, concluded that the PolyMet SDEIS analysis of mercury and mercury bioaccumulation was not adequate and that the PolyMet project had the potential to increase methylmercury downstream of the project, including in the St. Louis River, as a result of changes in hydrology as well as pollution releases. The U.S. Environmental Protection Agency also concluded that the PolyMet SDEIS mercury modeling was insufficient and recommended additional scientific analysis of mercury bioaccumulation impacts.

In addition, we believe that the PolyMet SDEIS provided an insufficient analysis of the individual and synergistic human health risks of other pollutants, such as neurologic morbidity resulting from manganese and lead release; and carcinogenic effects of air emissions of crystalline and asbestos-like fibers, nickel and other particulates, and of arsenic and other metals and contaminants released to water. Health risks to workers who would work on-site at the PolyMet mine or plant must be assessed, along with impacts of polluted wastewater and groundwater seepage on nearby residential populations.

The adverse effects of air pollution from coal combustion on cardiovascular health, asthma and other pulmonary disease are well recognized. Health effects of additional air emissions resulting from fossil fuel electricity generation to serve the needs of the PolyMet mine and processing facility must also be assessed. Finally, assessment should be done of the exposures to vulnerable populations, such as infants, children, the elderly and persons who rely for subsistence on fish, wild rice or game species, where pollutants are known to bioaccumulate.

The Minnesota Public Health Association believes that decisions as significant as whether to permit Minnesota's first copper-nickel mine, how to control its pollution and how to financially assure its risks, must also include an assessment of the public health impacts of the proposed project.

We request, Governor Dayton, that you direct that your Commissioners to take the following important actions to ensure protection of human health:

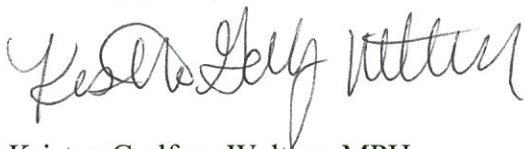
1. Conduct a rigorous and scientific analysis of pollutant releases and emissions from the PolyMet sulfide mine project to address gaps in environmental review, to provide a thorough analysis of polluted seepage at the mine and tailings sites, and to provide sufficient reliable data to enable modeling of both mercury releases and mercury bioaccumulation.
2. Prepare a Health Risk Assessment under the guidance of the Department of Health, with lead agencies requiring that the PolyMet project proposer bear any costs as part of environmental review. Complete at least the following tasks:

- Assess cumulative mercury risks, including hazard levels in bodies of water that are already impaired for mercury in fish and risks posed by mercury concentration downstream in the St. Louis River.
 - Assess potential health impacts due to drinking water contaminants in residential wells and Hoyt Lakes municipal drinking water.
 - Assess cancer and non-cancer risks to on-site workers at both the PolyMet mine and plant, due to metals dust, particulates and other emissions.
 - Assess health risks resulting from fossil fuel combustion, including impacts of burning coal to meet mine energy demands.
 - Assess cumulative risks of multiple chemicals and exposure routes on vulnerable populations, including infants, children, the elderly and populations who have higher rates of consumption of affected foods, such as fish and wild rice.
3. Engage the community in a Health Impact Assessment process initiated by the Department of Health in partnership with local scientists and health professionals to ensure that impacts of the PolyMet project on public health are analyzed and considered prior to any public decisions.

Across the country, the track record of hardrock mining in sulfide-bearing rock has been very poor. Minnesota has no experience with this type of mining. We believe that potential health impacts must be assessed before Minnesota's first proposed sulfide mine, the PolyMet project, reaches the permitting stage in order to put the long-term health and well-being of Minnesota residents at the forefront.

Thank you for considering the concerns of the Minnesota Public Health Association (MPHA) as you continue to evaluate the PolyMet mine project. We hope that you share our commitment to using careful assessment and rigorous science to understand potential health risks and to protect the health of the next generation and generations to come throughout Minnesota.

Sincerely yours,



Kristen Godfrey Walters, MPH
President
Minnesota Public Health Association



Health Professionals & Scientists Concerned About Health Impacts of PolyMet's Mine Plan

October 20, 2014

Governor Mark Dayton
Office of the Governor and Lt Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, MN 55155

Commissioner Tom Landwehr
Minnesota Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155-4040

Commissioner Dr. Edward Ehlinger
Minnesota Department of Health
625 N. Robert St.
St. Paul, MN 55155-253

Commissioner John Linc Stine
Minnesota Pollution Control Agency
520 Lafayette Road N
St. Paul, MN 55155-4194

RE: PolyMet NorthMet Sulfide Mining - Assessment of Health Effects

Dear Governor Dayton, Commissioners:

This letter is submitted on behalf of the undersigned Minnesota health professionals, scientists and groups. We write in support of the request of nearly four dozen doctors and nurses, many of whom practice in Northern Minnesota, who commented on the PolyMet NorthMet Supplemental Draft Environmental Impact Statement ("PolyMet SDEIS") in March of this year and requested a comprehensive analysis of the health risks and public health impacts of the PolyMet sulfide mine project.

We are concerned that the proposed PolyMet copper-nickel mine project could have significant adverse impacts on human health as a result of pollutants released to air, surface water and drinking water. We believe that analysis performed thus far is insufficient to assess important risks to human health and public health impacts of the pollutants that would be released from the PolyMet project.

Mercury contamination of fish and impacts on neurotoxicity in the developing fetus as well as in infants, children and adults is a significant public health concern in Minnesota. The Minnesota Health Department found 1 out of 10 infants in Minnesota's Lake Superior Region are born with unsafe levels of mercury in their blood. The percentage of infants thus at risk for neurologic impairment was higher than in the Lake

Superior Region of Wisconsin or Michigan. We are aware that many of the bodies of water downstream of the proposed PolyMet mine and plant are legally classified as impaired due to mercury in fish tissue. The lower reaches of the St. Louis River, including the St. Louis River estuary, are known to contain particularly high levels of mercury.

An international mercury expert, Dr. Brian Branfireun, concluded that the PolyMet SDEIS analysis of mercury and mercury bioaccumulation was not adequate and that the PolyMet project had the potential to increase methylmercury downstream of the project, including in the St. Louis River, as a result of changes in hydrology as well as pollution releases. The U.S. Environmental Protection Agency also concluded that the PolyMet SDEIS mercury modeling was insufficient and recommended additional consideration of mercury bioaccumulation impacts.

In addition, we believe that the PolyMet SDEIS provided an insufficient analysis of the individual and synergistic human health risks of other pollutants, such as neurologic morbidity resulting from manganese and lead release; and carcinogenic effects of air emissions of crystalline and asbestos-like fibers, nickel and other particulates, and of arsenic and other metals and contaminants released to water. Health risks to workers who would work on-site at the PolyMet mine or plant must be assessed, along with impacts of polluted wastewater and groundwater seepage on nearby residential populations.

The adverse effects of air pollution from coal combustion on cardiovascular health, asthma and other pulmonary disease are well recognized. Health effects of additional air emissions resulting from fossil fuel electricity generation to serve the needs of the PolyMet mine and processing facility must also be assessed. Finally, assessment should be done of the exposures to vulnerable populations, such as infants, children, the elderly and persons who rely for subsistence on fish, wild rice or game species, where pollutants are known to bioaccumulate.

As health professionals and scientists, we believe that decisions as significant as whether to permit Minnesota's first copper-nickel mine, how to control its pollution and how to financially assure its risks, must also include an assessment of the public health impacts of the proposed project. Both the Minnesota Nurses' Association and Commissioner Ehlinger have suggested that a Health Impacts Assessment be conducted to analyze the public health implications and costs of the PolyMet sulfide mine project.

We request, Governor Dayton, that you direct your Commissioners to take the following important actions to ensure protection of human health:

1. Conduct a rigorous and scientific analysis of pollutant releases and emissions from the PolyMet sulfide mine project to address gaps in environmental review, to provide a thorough analysis of polluted seepage at the mine and tailings sites, and to provide sufficient reliable data to enable modeling of both mercury releases and mercury bioaccumulation.

Minnesota Health Professionals and Scientists Request for PolyMet Health Assessment
 October 20, 2014
 Page 3

2. Prepare a Health Risk Assessment under the guidance of the Department of Health, with lead agencies requiring that the PolyMet project proposer bear any costs as part of environmental review. Complete at least the following tasks:
 - Assess cumulative mercury risks, including hazard levels in bodies of water that are already impaired for mercury in fish and risks posed by mercury concentration downstream in the St. Louis River.
 - Assess potential health impacts due to drinking water contaminants in residential wells and Hoyt Lakes municipal drinking water.
 - Assess cancer and non-cancer risks to on-site workers at both the PolyMet mine and plant, due to metals dust, particulates and other emissions.
 - Assess health risks resulting from fossil fuel combustion, including impacts of burning coal to meet mine energy demands.
 - Assess cumulative risks of multiple chemicals and exposure routes on vulnerable populations, including infants, children, the elderly and populations who have higher rates of consumption of affected foods, such as fish and wild rice.

3. Engage the community in a Health Impact Assessment process initiated by the Department of Health in partnership with local scientists and health professionals to ensure that impacts of the PolyMet project on public health are analyzed and considered prior to any public decisions.

Across the country, the track record of hardrock mining in sulfide-bearing rock has been very poor. Minnesota has no experience with this type of mining. We believe that potential health impacts must be assessed before Minnesota's first proposed sulfide mine, the PolyMet project, reaches the permitting stage in order to put the long-term health and well-being of Minnesota residents at the forefront.

Thank you for considering the concerns of Minnesota health professionals and scientists as you continue to evaluate the PolyMet mine project. We hope that you share our commitment to using careful assessment and rigorous science to understand potential health risks and to protect the health of the next generation and generations to come throughout Minnesota.

Sincerely yours,

Minnesota Citizens Federation Northeast - Health Care and Economic Justice; Duluth, MN

Food & Water Watch, Midwest Region - Safe and Sustainable Food, Water and Fish

David A. Ahlquist, MD, Gastroenterology and Hepatology, Professor of Medicine - Mayo Clinic; Rochester, MN

Debra Allert, MN, Family Medicine; Two Harbors, MN

Bethel Anderson, RN, retired; Cloquet, MN

Minnesota Health Professionals and Scientists Request for PolyMet Health Assessment
October 20, 2014
Page 4

Vicki Andrews, FNP, Family Nurse Practitioner; Duluth, MN

Ann Bajari, RN, PHN, MPH; Annandale, MN

Steve Bauer, MD, Child and Adolescent Psychologist; Duluth, MN

Kirsten Bich, MD, Family Practice; Duluth, MN

Rhett Bonner, MD, Family Medicine; Duluth, MN

Arnold Brier, MD, Gastroenterology; St. Paul, MN

Mary Jo D. Briggs, RN, MPA, Healthcare Business Consultant; Rochester, MN

Amy Burt DO, FAAP, Pediatrician; Plymouth, MN

Irene Carr, MD, Obstetrics and Gynecology; Duluth, MN

Ray Christenson, MD, Family Practice; Duluth, MN

Jill R. Clark, RN, PHN; Minneapolis, MN

Karen Clark, State Representative, PHN; Minneapolis, MN

Joan Cleary, MM, Health Consultant; St. Paul, MN

Debra Cudnowski, MD, Family Medicine; Duluth, MN

Louise Curnow, Certified Physician's Assistant; Duluth, MN

Bruce Derauf, MD, Radiology; Duluth, MN

Chris Derauf, MD, Pediatrics; Rochester, MN

Judy Derauf, RN; Duluth, MN

Candace Dow, MHA; Minneapolis, MN

John H. Eckfeldt, MD, PhD, FCAP, Ellis Benson Professor of Laboratory Medicine and Pathology, University of Minnesota Medical School; Isabella, MN

Abigail Gewirtz, PhD, LP, Associate Professor, Dept. of Family Social Science & Institute of Child Development, University of Minnesota; St. Paul, MN

Malka Goodman, MD, Child and Adolescent Psychiatry, retired; St. Paul, MN

Aziel Goodman, MD, Psychiatry; St. Paul, MN

Sheila Goodman Rosenthal, MD, Obstetrics and Gynecology; Minneapolis, MN

Phyllis Gorin, MD, Pediatrics, Family Health Manager; St. Paul, MN

Michael Grouws, MD, Internal Medicine; Minneapolis, MN

James Hart, MD, Internal Medicine/Public Health; Minneapolis, MN

Gail Harty, Neurosurgical Research Technician; Lanesboro, MN

Minnesota Health Professionals and Scientists Request for PolyMet Health Assessment
October 20, 2014
Page 5

Jamie Harvey, Executive Director, Institute for a Sustainable Future; Duluth, MN

Douglas Hoffman, MD, Orthopedics; Duluth, MN

Laura Houghtaling, MPH, Epidemiology and Global Health; St Paul, MN

Thomas Huntley, PhD, Biochemistry; Duluth, MN

John Ipsen, MD, Family Practice, Duluth, MN

Jay Jaffee, Alcohol and Other Drug Abuse Prevention Coordinator, Minnesota Department of Health, retired; St. Louis Park, MN

Jeanette Johnsen, R.N., Mother/Baby nurse, Community Memorial Hospital, retired; Cloquet, MN

Judith Johnson, MD, Obstetrics & Gynecology; Duluth, MN

Maureen K. Johnson, Biologist, MPCA Superfund Hazardous Waste Cleanup Project Manager, retired; Stacy, MN

Bruce Johnson, Chemist, MPCA and MDNR, retired; Stacy, MN

Gretchen Karstens, MD, Pediatrics; Duluth, MN

Thomas Kottke, MD, MSPH; Consulting Cardiologist; St. Paul, MN

Ellen Lafans, RN, MSN; Eagan, MN

Christine Aas Larson, NP, Obstetrics & Gynecology; Duluth, MN

Don Lee, MS, PhD, Environmental Scientist, Ely, MN

Steven Long, MD, Family Practice; Duluth, MN

Nadia Maccabee-Ryaboy, MD, Pediatric Resident; Hopkins, MN

Andy McKibben, MD, FCCP, Internal Medicine, Pulmonary Medicine, Critical Care Practice in Hibbing, MN; Ely, MN

Elena Metcalf, MD, Child and Adolescent Psychiatry, Duluth, MN

Kara Nachtsheim, NP, Child and Adolescent Psychiatry, Duluth, MN

Sarah Nelson, MD, Family Physician; Duluth MN

Kim Nichols Dauner, PhD, MPH, Assistant Professor, Health Care Management Program, University of Minnesota Duluth; Duluth, MN

Amanda Nickel, MPH Candidate, Epidemiology, University of Minnesota; St. Paul, MN

Susan Nordin, MD, Family Practice, Duluth, MN

Nancy Olson, RN; Duluth, MN

Emily Onello, MD, Family Medicine; Duluth, MN

Minnesota Health Professionals and Scientists Request for PolyMet Health Assessment
October 20, 2014
Page 6

Jennifer Pearson, MD, Family Medicine; Duluth, MN

Patricia Peters, RN; Duluth, MN

Craig Peterson, MD, Anesthesiology; Duluth, MN

Diane M. Pittman, MD; True North Health Care; Bemidji, MN

Jake Prunuske, MD, Family Practice; Duluth, MN

Vitoria Puumala Heren, MD, Family Practice; Cloquet, MN

Laurie Radovsky, MD, Family Practice; St. Paul, MN

Elizabeth Raduege, MD, Family Practice; Duluth, MN

Karen Reichensperger, PhD, RN; Ely, MN

Eric Ringsred, MD, Emergency Medicine, Duluth, MN

Anne Rogotzke, MD, Obstetrics and Gynecology; Duluth, MN

Nancy Rova, MD, Family Practice; Duluth, MN

Margaret Saracino, MD, Child and Adolescent Psychiatry; Duluth, MN

Kathleen Schuler, MPH; Minneapolis, MN

Shelley Sherman, MPH, Maternal and Child Health; St. Paul, MN

Tracy Sides, PhD, Environmental Health Sciences, MPH, Epidemiology; St. Paul, MN

Leighton Siegel, MD, ENT, retired; St. Paul, MN

Kathy Spencer, LPN; Duluth, MN

Becky Stoner, Physical Therapist; Grand Marais, MN

Loren Stoner, MD, Chiropractic Medicine; Grand Marais, MN

Robert Stubenvoll, MD, ENT, Essentia Health; Duluth, MN

Jana Studelska, Certified Professional Midwife; Duluth, MN

Nancy Sudak, MD, Family Practice; Duluth, MN

Steve Sutherland, MD, Child and Adolescent Psychiatrist, Medical Director, Essentia Health Department; Duluth, MN

Peder Svingen, MD, Child and Adolescent Psychiatry; Duluth, MN

Chris Swensen, MD, Family Practice; Duluth, MN

Naomi Taylor, MPH; Minneapolis, MN

Nancy Vanderburg, PHN, Consultant for Newborn Screening; St. Paul, MN

Minnesota Health Professionals and Scientists Request for PolyMet Health Assessment
October 20, 2014
Page 7

Rick Lawrence von Bitter, RN, Cardiac Nursing; Minneapolis, MN

Vanessa von Bitter, RN, Cardiac Nursing; Minneapolis, MN

Kristan Wegerson, MD, Family Practice; Duluth, MN

Heather Winesett, MD, Pediatrics; Duluth, MN

John Wood, MD, Family Physician; Duluth, MN

Caroline Woods, PA, Physicians' Assistant; Duluth, MN

Dave Worley, MD, Family Practice; Duluth, MN

Matt Zak, MD, Psychiatrist; Duluth, MN

Timothy Zager, MD, Pediatrics; Duluth, MN

Doctors' view: On PolyMet, the priority is health

By [Drs. Susan Nordin, Emily Onello, Jennifer Pearson and Margar](#) on Nov 7, 2014 at 12:07 a.m.

As Duluth doctors, our first priority is the health of our patients and community. We do not align ourselves with industry or with advocacy groups. Instead, we listen, communicate and ask questions.

Just because we use a resource like copper in modern society does not mean we should refrain from asking critical questions of the industry. As physicians, we have serious questions about sulfide mining in Northeastern Minnesota and would not make statements without first educating ourselves and consulting with experts. We've done extensive reading on the issue, have reviewed the PolyMet Supplemental Draft Environmental Impact Statement and have met with the Minnesota departments of health and natural resources. Educating ourselves only has deepened our concern.

Minnesota has no experience with sulfide mining for copper. To date, we've been unable to identify any sulfide mine that has been developed, operated and closed without producing polluted drainage. This August, a tailings dam at a British Columbia copper and gold mine failed, sending 1.3 billion gallons of contamination into local waters. With 10 percent of the world's freshwater within PolyMet's watershed, our community has a lot at risk.

We must be proactive in asking, "How will PolyMet affect the long-term health of our community?" A health risk assessment for the PolyMet project is needed to answer this question.

As Duluth doctors, our concern is shared by many other health professionals. The Minnesota Public Health Association, the Minnesota Medical Association and more than 150 individual health professionals and scientists have asked for an assessment of PolyMet health impacts. Considering that the PolyMet plan involves several of the 10 toxins of major public health concern as identified by the World Health Organization —

mercury, lead, arsenic and air pollutants — we recommend a health risk assessment¹¹⁶ as part of the PolyMet environmental review to examine health risks in careful, scientific detail.

PolyMet's Supplemental Draft Environmental Impact Statement did not give us confidence that human health will be protected. We note that information on mercury release and the potential for mercury bioaccumulation is insufficient. Mercury, a toxic metal, affects the developing brains of infants and children. Studies have shown that exposure to low levels of mercury over time affects learning, attention, memory and IQ. We know this already is a problem in our region and that a Minnesota Department of Health study found that one in 10 newborns in Minnesota's Lake Superior basin was born with unsafe levels of mercury in the blood. This translates into behavior and learning problems for children. A recent study in the *Lancet*, a well-respected medical journal, discussed the rise of neurodevelopmental disabilities in children and pointed to industrial chemicals (including lead, mercury, arsenic and manganese) that injure the developing brain among the known causes for this rise in prevalence. Child and adolescent psychiatrists state that resources to address this already are strained.

More information also is needed on PolyMet's release of arsenic, lead, manganese, mineral fibers and other air pollutants. The medical literature has established clear effects of air pollution on asthma, lung and heart disease. PolyMet's proposed mine project also will result in the release of significant additional air pollution from electrical power generation used to operate the mine.

A growing number of doctors, nurses and professionals in Duluth and throughout the state want to make sure our community's health is protected before the PolyMet project is considered. We will all live with the consequences of the PolyMet project here in Northeastern Minnesota. Shouldn't we collectively expect better assurance that our health and the health of future generations is not placed at risk?

Drs. Susan Nordin, Emily Onello, Jennifer Pearson and Margaret Saracino practice in Duluth.

March 9, 2015

Governor Mark Dayton
Office of the Governor & Lt Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, Minnesota 55155

Commissioner Tom Landwehr, Minnesota Department of Natural Resources
Office of the Commissioner
500 Lafayette Road
St. Paul, MN 55155-4040

Commissioner Dr. Edward Ehlinger, Minnesota Department of Health
Office of the Commissioner
Minnesota Department of Public Health
P.O. BOX 64975
St. Paul, MN 55164-0975

Commissioner John Linc Stine, Minnesota Pollution Control Agency
Office of the Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road N
St. Paul, MN 55155-4194

RE: PolyMet NorthMet Sulfide Mining - Assessment of Health Effects

Dear Governor Dayton, Commissioners:

This letter is in reference to the proposed sulfide mining reports in northern Minnesota, particularly the PolyMet Project now under environmental review. We, as Lake Superior Chapter members of the Minnesota Academy of Family Physicians, would like to add our voice to our colleagues at the Minnesota Medical Association, Minnesota Department of Health, Minnesota Public Health Association and other medical professionals to request a comprehensive analysis of the health risks and public health impacts related to sulfide mining. We invite further dialogue with you and your Commissioners on this important health concern.

As Family Physicians, we have a front row seat to view the health of our patients and our community. We care for infants, elders, and all ages in between. We have chosen to speak out on this important issue in our region because the toxins and pollutants created by sulfide mining affect the health of our patients across their lifespans.

We are asking you to require that additional detailed and accurate scientific information be developed to help us understand about how the proposed NorthMet copper/nickel mine project, and others like it, will contribute to the amount of mercury, a neurotoxin, in our environment and our bodies. Additionally, we are concerned about additional contaminants and toxins related to this type of mining activity, such as arsenic and manganese.

We are not toxicologists, hydrologists or engineers. Like many of our neighbors, we had faith in the regulatory process. However, after reviewing the March 2014 Supplemental Draft Environmental Impact Statement, we were troubled by the lack of detail pertaining to human health effects in the document. We know that sulfide mining involves five of the ten World Health Organization’s “top ten chemicals of major public health concern” including mercury, arsenic, lead, asbestos and air pollution. These chemicals can cause illness and disease in our patients.

We also already know that our region is affected by mercury. A recent study by the Minnesota Department of Health found that one out of ten newborn babies in the Minnesota Lake Superior Basin has unsafe levels of mercury in his or her blood. Studies have shown that even *low* levels of mercury exposure in the prenatal period affect brain function. Consequently, we are concerned that even a small addition of mercury exposure prenatally and during childhood development could have lifelong and far-reaching impacts on the next generation of Northlanders.

We join our colleagues in the fields of medicine, nursing, and public health as well as our state Health Department to advocate for the health of our region. A health risk assessment and a health impact assessment are the next critical steps in understanding both the short and long term consequences that PolyMet’s NorthMet project may have on our health.

Governor Dayton, we would respectfully request a chance to meet with you and your Commissioners in person in order to better communicate our concerns. Please contact Emily Onello, MD at (218) 724-1269 or Kris Wegerson, MD at (218) 343-1445 to help us find a time that is convenient for you.

Sincerely,

Concerned Family Doctors from the Lake Superior Chapter of the Minnesota Academy of Family Physicians

2015 House of Delegates Report

Under the guidance of Speaker of the House, Dania Kamp, M.D., and Vice Speaker, Glenn Nemec, M.D., the 2015 House of Delegates took the following actions:

Medical Cannabis Distribution in Prescription Monitoring Program:

the MAFP will advocate to have medical cannabis dispensaries be required to report distributions to the Minnesota Prescription Monitoring Program for inclusion in the database, and invite other organizations, such as the MMA, to join in this advocacy.

Ask DEA to Reclassify Marijuana from a Schedule I to a Schedule II Drug:

the MAFP will support reclassifying marijuana from a schedule I to a schedule II drug to facilitate further research on the medical use of pharmaceutical cannabinoids, and forward this resolution to the AAFP and to the MMA for consideration to send to the AMA.

Task Force to Evaluate Medical Malpractice Reform for Minnesota:

the MAFP will investigate malpractice reform including alternative dispute resolution processes, and seek to partner with the MMA to create to a task force to study medical malpractice reform in Minnesota.

Request for Health Risk Assessment of Sulfide Mining in Northeast Minnesota:

the MAFP will request that a Human Health Risk Assessment be performed using the most current scientific modeling methods to evaluate the health effects of by-products of proposed mining projects, and supports the subsequent completion of a Human Health Impact Assessment for mining projects so that both health professionals and the public can make informed decisions.

MAFP Dues Increase: dues for members in the Active category be increased by \$25 effective with 2016 dues.

Increasing Presidential Honorarium: The Presidential Honorarium was increased to \$17,500 beginning with the outgoing President in 2017 and the amount will be reviewed annually by the Board of Directors, who will recommend any changes to the House of Delegates.

A resolution about **Periodic Driver Evaluations** was referred to the Board: It suggests that the MAFP propose and support legislation in Minnesota for the state to periodically test driver competency.

A resolution to **Assess Interest in Medical Society Based Health Insurance** was not adopted.

Minnesota Department of Natural Resources

500 Lafayette Road · Saint Paul, Minnesota · 55155-4037

Office of the Commissioner

651-259-5555



April 22, 2015

Emily Onello, MD
Lake Superior Community Health Center
4325 Grand Avenue
Duluth, MN 55807

Kristan Wegerson, MD
Mount Royal Medical Clinic
1400 Woodland Avenue
Duluth, MN 55803

Dear Doctors Onello and Wegerson:

I am writing in response to the March 9, 2015 letter from you and other members of the Minnesota Academy of Family Physician's Lake Superior Chapter. In that letter, you expressed concern with the potential human health impacts associated with nonferrous mining. You recommended that the State conduct a health risk assessment and a health impact assessment for PolyMet's proposed NorthMet project, and you requested an opportunity to meet with the State to discuss your concerns.

As you know, the Minnesota Department of Natural Resources (DNR) and its federal agency co-leads are in the process of reviewing and responding to the comments we received on the December 2013 Supplemental Draft Environmental Impact Statement (SDEIS). We are carefully considering all comments that we received on the SDEIS, including those related to human health concerns. We have met with both our Department of Health and a group of health professionals regarding comments that each submitted during the SDEIS public comment period. The final EIS will include the co-lead agencies' responses to the SDEIS comments we received.

The purpose of environmental review is to disclose the potential environmental effects of a proposed project and evaluate alternatives for mitigating those impacts. If a project proceeds beyond environmental review to the permitting phase, the State receives additional operational detail that documents specifically how the project is designed to meet applicable standards. There are additional public review opportunities associated with the State agencies' consideration of permit applications.

Although the comment period for the NorthMet SDEIS is closed, senior leadership from DNR, the Department of Health, and the Pollution Control Agency would be pleased to meet with your group to listen to your concerns, receive any additional information that you think we should have, and discuss the public process for the final EIS. Please understand, however, that we will not be in a position to discuss how DNR and its federal co-leads intend to respond to human health-related comments.

Thank you for your letter and for the work that you do. If you would like to schedule a meeting, please contact my assistant, Susan DeLeo at Susan.DeLeo@state.mn.us or 651-259-5555.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Tom Landwehr'.

Tom Landwehr
Commissioner

Copy: Governor Mark Dayton; MDH Commissioner Dr. Edward Ehlinger; MPCA Commissioner John Linc Stine;



July 22, 2015

Governor Mark Dayton
Office of the Governor and Lt. Governor
116 Veterans Service Building
20 W 12th Street
St. Paul, MN 55155

RE: Request for Human Health Risk and Human Health Impact Assessments

Dear Governor Dayton, Commissioners:

We appreciate the opportunity to convey our concerns about the potential health effects of copper-nickel sulfide mining in Northeastern Minnesota.

The Minnesota Academy of Family Physicians (MAFP) is the largest medical specialty organization in Minnesota, representing over 3000 family physicians, family medicine residents, and medical students. The House of Delegates is the elected representative body of the MAFP and holds its annual meeting in the spring. Physician delegates, representing every corner of Minnesota, bring forth resolutions promoting patient and public health. These resolutions are discussed, debated and voted upon by the entire House.

On April 15, 2015, The House of Delegates unanimously approved the following resolution:

BE IT RESOLVED, that the MAFP request that a Human Health Risk Assessment be performed using the most current scientific modeling methods to evaluate the health effects of the by-products of proposed mining projects, and

BE IT FURTHER RESOLVED, that the MAFP supports the subsequent completion of a Human Health Impact Assessment for mining projects so that both health professionals and the public can make informed decisions.

With the adoption of this resolution, the MAFP joins its voice to those of the Minnesota Medical Association (MMA), Minnesota Nurses Association (MNA), Minnesota Public Health Association (MPHA) and Dr. Edward Ehlinger and the Minnesota Department of Health (MDH) in requesting that the health impacts of sulfide mining be analyzed and addressed.

Human Health Risk and Health Impact Assessments have not been completed for the PolyMet NorthMet Project. As physicians, our priorities are the health of our patients and the communities we serve. We must be proactive in asking, "How will PolyMet's NorthMet Project affect the long-term health of our patients and communities?" Health Risk and Health Impact Assessments are needed to answer these questions.

Dr. Ehlinger stated in the comments he submitted on behalf of the MDH, "Health starts where we live, learn, work and play. To create and maintain healthy Minnesota communities, we have to think in terms of health in all policies." We urge you to consider completing health risk and health impact assessments for the PolyMet NorthMet Project and those to follow.

Thank you for your consideration.

Sincerely,

A handwritten signature in cursive script that reads "M. Tariq Fareed". The signature is written in dark ink and is positioned below the word "Sincerely,".

M. Tariq Fareed
President, MAFP

CC: Commissioner Tom Landwehr, Minnesota Department of Natural Resources
Commissioner Dr. Edward Ehlinger, Minnesota Department of Health
Commissioner John Linc Stine, Minnesota Pollution Control Agency

Minnesota Department of Natural Resources

500 Lafayette Road · Saint Paul, Minnesota · 55155-4037

Office of the Commissioner

651-259-5555



September 10, 2015

Dr. Tariq Fareed, President
Minnesota Academy of Family Physicians
600 S. Highway 169 – Suite 1680
St. Louis Park, Minnesota 55426

Dear Dr. Fareed:

We are responding to your letter of July 22, 2015, in which you urged Governor Dayton and the three agencies to complete health risk and health impact assessments for PolyMet's proposed NorthMet project and for future proposed mining projects. All three of our agencies stand behind the statement that "health starts where we live, learn, work and play." We also strongly believe that it is important to pursue a Health in All Policies approach to create and maintain healthy Minnesota communities.

We look forward to meeting with representatives of your group's Lake Superior Chapter on September 25, 2015 to hear your perspectives regarding the identification and analysis of potential health-related impacts associated with NorthMet and other proposed mining projects.

Please accept our sincere thanks for your active engagement in the NorthMet environmental review process.

Sincerely,

A blue ink signature of Tom Landwehr, Commissioner of the MN Department of Natural Resources.

Tom Landwehr, Commissioner
MN Department of Natural Resources

A black ink signature of Dr. Edward Ehlinger, Commissioner of the MN Department of Health.

Dr. Edward Ehlinger, Commissioner
MN Department of Health

A black ink signature of John Linc Stine, Commissioner of the MN Pollution Control Agency.

John Linc Stine, Commissioner
MN Pollution Control Agency

Sept. 25th Meeting at DNR

Review of issues presented by physicians attending

To Commissioners Landwehr, Linc Stine, Ehlinger , Assistant Commissioner Naramore, and Assistant Chief of Staff Dornfeld

Introduction: Jennifer Pearson, M.D., Family Medicine, Duluth

- Review of important letters voicing health concerns of SDEIS: *(copy of each of these of these letters attached)*
 - MPHA (October 2014): representing over 400 public health professionals
 - MN Nurses Association (March, 2014) representing over 20,000 nurses
 - Health Providers Letter (March, 2014) 46 doctors and nurses expanded to:
 - Individual Health Professionals letter (Oct. 2014): 94 individuals plus Healthy Food Action and Food and Water Watch for a total of 153 health professionals (October 2014)
 - MMA (Sept. 25th, 2014) Dr. Don Jacobs, representing over 10,000 physician members
 - Lake Superior Chapter Minnesota Academy of Family Physicians (March 2015 letter), followed in April 2015 by unanimous resolution of statewide MAFP, representing more than 3000 family physicians and residents (largest specialty organization in MN).
- Collective ASK: Comprehensive Health Risk Assessment of the NorthMet Project and Health Impact Assessment. Critical that these analyses not be just a desktop exercise, but scrutiny of underlying assumptions and use of independent science to provide objective assessments of risks and impacts.
- Quotes from PFEIS: response to concerns regarding human health:
 - “Completing an HIA between the SDEIS and FEIS would require significant time and effort, and would represent a considerable delay to the FEIS”
 - “The SDEIS did include extensive public health information relative to air and water quality”
 - “The additional information from and HIA would not significantly inform regulatory permits required for the project”
- Physician’s opinion: We do not believe that the conclusions of the Co-Lead agencies to the many comments requesting health analysis are sufficiently rigorous or protective of human health.

Closer look at Bullet Point Quotes:

- Bullet Point number 1:

- Physicians' concerns are for the health and wellness of region
- At least 5 of 10 Toxins of major public health concern to the World Health Organization (mercury, lead, arsenic, asbestos, particulate air pollution) are released from copper-nickel mining as well as sulfates released that increase mercury methylation and accumulation in the food chain
- If this door is opened, may never be able to close it
- Must take whatever time is needed assess the affects to human health, regardless of time needed. Health of future generations in our hands.
- Bullet Point #2: Covered by others- concerns about the extent and quality of information pertinent to public health remaining with the PFEIS
- Bullet Point #3:
 - Risk/Benefit of potential health effects needed to be better understood to make informed decisions
 - FDA regulations for any medication we prescribe; allow us to understand Risk/Benefit Ratio and discuss with patients
 - More and more medical literature about environmental toxins and the deleterious affects to human health
 - State of Minnesota must set a precedent that independent analysis, Health Risk Assessment and public Health Impact Assessment ARE necessary information to include in an FEIS before new industry that can potentially affect human health (sulfide mining and processing) is allowed to seek regulatory permits
 - Hippocratic Oath- first do no harm. Our duty as physicians.

Water Modeling/Containment: Areas of Concern that Support the Need for Human Health Impact Assessment Emily Onello, M.D., Family Medicine, Duluth

- Models used in PFEIS assert that there will be no off-site discharge of drainage water during operations. Current expert opinions in the literature dispute the feasibility of this assertion. Given the toxicity of this aqueous drainage, alternative models that include various rates of off-site discharge should be provided. (For example, what if only 80% or 60% of water seepage is captured for treatment?) **What would be the human health effects, if any, using these lower capture rates?**
- The PFEIS also asserts that after the mine closes, a greensand filter, pre-filters and a reverse osmosis system would be required to treat water to meet water quality standards well into the foreseeable future. **The document does not model what could happen to human health if this post-closure treatment were to end (due to unanticipated scenarios of malfunction, natural disaster or inadequate funding). How many people could get sick? And how sick could they become?**

- Analysis of the two scenarios described above should include modeling for methylmercury contamination as a result of sulfate releases, as well as releases of toxins including mercury, lead, arsenic and manganese. Potential *indirect* health effects of loss of water quality should be considered in the health impact analyses.
- Table 6.2.7-5 in the PFEIS estimates that NorthMet's direct GHG emission constitutes just over 1/1000th of the total GHG release of the state of Minnesota. Though a small fraction at first glance, when adding in indirect emissions, **could these GHG emissions have health significance?** Health-directed analyses could investigate this possibility.
- Current PFEIS models greenhouse gas (GHG) release but is not required to address how additional fossil fuel combustion related to the PolyMet project could affect human health. This connection is critical because links between increased air pollution and adverse health outcomes (for example, heart attacks and strokes) are well established in the medical literature. **Could the added air pollution from power generation affect human health in our region? More asthma attacks? Acute coronary events? Strokes? Higher prevalence of heart failure?**
- Estimates of direct and indirect GHG emissions only extend for 30 years in the PFEIS, yet the energy-demanding processes of water treatment will continue well beyond that time. Figure 5.2.7-9 gives an emission lifetime total of 15,790,752 metric tons of carbon dioxide-equivalent (CO₂e). **What would GHG emission projections look like beyond 30 years, say the 200 to 500 years where pollution from tailings and mine site may require active water quality treatment? Could the long-term electricity demand for wastewater treatment have significant direct and/or indirect effects on human health? If effects are identified, how might they differ under different models of power generation?**

Water Modeling/Containment Continued: Sue Nordin, M.D., Family Medicine, Duluth

- We question the statement that the area under the tailings basin will be impermeable. Independent review by JD Lehr and Don Lee (available on line at <http://www.waterlegacy.org/PolyMet-SDEIS-Comments>) points out that this claim is not substantiated.
- No evidence has been provided that in real field experience situations 90-99% capture of wastewater has been achieved. We would like to see modeling of pollutant outputs for lower levels of capture, along with evaluation of health consequences of less perfect capture.

Health Impacts Associated with Catastrophic Failure: Debbie Allert, M.D., Family Medicine, Duluth and President of Minnesota Academy of Family Physicians, Lake Superior Chapter

- We respectfully request that an in-depth, independent, rigorous, and adequately funded Health Impact Assessment and Health Risk Analysis be done for the proposed NorthMet project. This presentation centers on the likelihood and impact of catastrophic events on human health. Catastrophic events may involve dam failure, waste rock storage, tailings storage, or the transportation and storage of contaminated process water, concentrates, and sludge.
- Why is a Health Impact Assessment needed?
 - The current PFEIS does not adequately address the issues of either a catastrophic dam failure or multiple small breaches of the PolyMet tailings dam or of containment of PolyMet's highly toxic hydrometallurgical residue at the Hydrometallurgical Residue Facility (HRF). These events could have significant impacts on human health.
- What are the primary health concerns?
 - In the event of dam failures or breaches, highly toxic substances will be released into nearby watersheds, these include:
 - Heavy metals, such as manganese and lead, mercury that are known human neurotoxins.
 - Arsenic, a known carcinogen.
 - Mercury and sulfates, which are especially concerning because bacteria in the relatively acidic environment of bogs and wetlands produce methylmercury. Methylmercury is highly toxic to humans. Even small amounts bio accumulate in the food chain to toxic levels.
- How likely is it that catastrophic failures will occur?
 - Catastrophic events resulting in the introduction of contaminated water into surrounding watersheds have occurred recently in similar operations
 - In 2014 the Mount Polley, British Columbia copper and gold mine tailings pond breach spilled over 6 billion gallons of mine waste and polluted water into the surrounding lakes and watershed causing a major environmental disaster.
 - A 2015 study of tailings storage facility failures centering on those categorized as "serious" or "very serious" determined that such failures have increased not decreased over the last 20 years. The study also concluded that small mining companies have the highest failure rates partially because of financial constraints that can restrict them from implementing the best available technology. (Reference: The Risk, Public Liability, & Economics of Tailings Storage Facility Failures, Bowker and Chambers, July 21, 2015)
- Catastrophic events may occur in NE Minnesota in the future.
 - In June, 2012 parts of Northeast Minnesota experienced a 10 inch rainfall in 24 hours.

- The current PFEIS does not address how the tailings dams or HRF will be able to withstand rainfall in excess of 5.69 inches in a 24 hour period and fails to analyze more extreme weather events that may occur over the 200+ year life expectancy of the tailings dam.
- Whose health is at risk?
 - There are 34 homes that could be immediately affected by a PolyMet dam failure. Contaminated seepage could reach the first home in an hour.
 - Contamination of the watershed could affect thousands of people downstream. Flowage from the PolyMet site empties into both the Partridge and the Embarrass rivers which empty into the St. Louis River which is the largest tributary of Lake Superior, which is the largest source of clean water in world and serves heavily populated areas.
- How do these concerns relate to PolyMet?
 - PolyMet has no history with copper sulfide mining.
 - PolyMet has few assets and may not be able to invest in the best available technology in regard to contaminated water containment.
 - PolyMet's environmental documents fail even to consider the best available technology known as filtered dry tailings stacking, a technique recommended to reduce tailings dam failures as well as to reduce contaminated seepage from tailings.
 - As stated above, PolyMet environmental documents do not include any assessment of health risks of catastrophic dam failure or multiple small breaches.
- Conclusion
 - As physicians, we believe there is overwhelming potential for significant, far-reaching harm to the health of our community. We believe that there does not exist at this time adequate information regarding the human health impacts of the proposed NorthMet project. We believe that citizens and their health providers need to know what will happen if the sulfides mine engineering (especially the long-term containment of contaminants) works perfectly . . . and what will happen to our health if it doesn't. The current information is grossly inadequate to predict the human health impact of this project.
 - It is imperative those who will ultimately make final decision understand the true cost both in loss of health and in healthcare dollars that will result as a consequence of the NorthMet proposed project. Therefore we are requesting an independent and adequately funded rigorously scientific Health Risk Assessment and Health Impact Assessment prior to the completion the FEIS.

Mercury- Steve Bauer M.D., Medical Director of Community Mental Health Center which serves the Arrowhead of MN

- Industrial exposure to high levels of mercury is known to lead to mercury poisoning. “Mad Hatters Disease” was a common name reflecting consequences of high levels of ingestion when hat-makers used mercury to treat fur to make felt hats.
- Mercury exposures resulting from ingestion of fish contaminated with methylmercury can result neuropsychiatric issues including problems with brain development and sensory issues that can include paranoia and hallucinations.
- Mercury ingestion can also cause other adverse medical outcomes, including neurological, heart, kidney, immune system and problems with reproduction.
- As medical director my role is to not only treat but to minimize possible problems when possible.
- The adage “an ounce of prevention is worth a pound of cure” is applicable only when there is a cure.
- Unfortunately with mercury poisoning there is no way to “fix” the damage that results from exposure. Treatment may only lessen the severity. Prevention cannot be traded for “cure”.
- The assumptions made within the most recent EIS about potential mercury and methylmercury risks are not good science.
- The current modeling uses a “best case scenario” guesstimate and doesn't allow for many possible problems that may arise.
- After reviewing other information from experts that study how mercury and other heavy metals are available in the environment and what factors lead to changes, there are several points that need better consideration.
- Specifically the proposed reverse osmosis treatment of the wastewater does not address either reduction of mercury or the potential for production of methylmercury downstream, which is the version that becomes incorporated in our food chain.
- The amounts calculated for mercury increases in downstream waters express a false precision and don't include an important factor of the production of additional methylmercury downstream as a consequence of the increased sulfates being added to the watershed combining with other mercury that has accumulated in the bogs and rivers from atmospheric deposition and other discharge sources.
- Most experts who have read the environmental review documents conclude that PolyMet and its consultants have underestimated the increase in mercury methylation.
- Other examples of poor science include the laboratory test of absorption of mercury onto tailings, which only tested mercury samples for short periods of time. This test showed an initial drop in mercury levels, but then showed increasing levels in a period of just hours. This test is clearly insufficient to tell us how the long-term mixing of the waste rock in the tailings pond will

change with respect to mercury concentrations over the years of mining, reclamation and beyond.

- Science on the issue of mercury contamination should be objective to provide a more complete analysis of the future consequences of sulfide mining.
- We ask you to address this clear hazard to public health with independent analysis of health risks and a more broad and considered assessment of impacts to the community. An independent academic expert like Dr. Brian Branfireun has the needed perspective. Thank you.

Methyl Mercury – Margaret Saracino M.D., Child and Adolescent Psychiatry, Duluth

- Represent the patients with no voice- infants and children.
- This project's negative impact could be profound and have devastating consequences for infants and children due to the potential to increase heavy metals into the environment, including methylmercury, lead, arsenic, manganese, all of which cause neurodevelopmental disorders in infants and children.
- Neurodevelopmental disorders include ADHD, dyslexia, other learning disorders, autistic spectrum disorders, cerebral palsy, and intellectual disabilities.
- Neurodevelopmental disorders are one of the new pediatric morbidities- chronic conditions with no cure.
- Neurodevelopmental disorders can set the stage for neurodegenerative diseases later in life.
- Neurodevelopmental disorders occur in 3-8% of the approximately 4 million infants born each year.
- The National Academy of Sciences (NAS) estimated in 2000 that 3% of neurobehavioral disorders in American children are caused directly by toxic environmental exposures.
- Methylmercury exposure occurs due to ingestion of pregnant women and young children of fish with high methylmercury content. The placenta is not protective and the blood brain barrier of the infant is not well formed until after 2 years, leaving the developing brain vulnerable to injury. Permanent brain damage can occur, with loss of IQ points. Exposures to levels of methylmercury below what is considered toxic for adults are dangerous to the developing brain.
- Sulfide mining is known to release other neurotoxins and their negative affects can be synergistic.
- Treatment is actually management, as there are no cures. Children may need multiple supportive services including:
 - Educational assistance in the form of an IEP (Individualized Education Program) or 504 (disability accommodation) plan
 - Individual and family therapy
 - Occupational therapy, physical therapy, speech and language services

- Partial hospitalization, inpatient psychiatric hospitalization, residential placement, group home
- Juvenile detention (potential for incarceration as adults)
- SSDI (Social Security Disability Insurance)
- Possible group homes or supportive living environments as adults.
- Economic costs:
 - Each decrement in IQ is associated with lower wages, diminished lifetime earning power.
 - The loss of intelligence from methylmercury exposure has exacted a significant economic cost to American society amounting to at least hundreds of millions of dollars per year.
 - Lost wages for parents, loss of work due to meetings with care providers
 - Loss of economic growth for the community
 - Evidence from worldwide sources cite that the average national IQ scores are associated with GDP (gross domestic product)
 - Estimated costs of neurobehavioral disorders of environmental origin, US, 1997 is \$9.2 billion
- Lack of resources for management:
 - CDC (Center for Disease Control) reported in 2013 that only 20% of emotionally disturbed children and adolescents receive some kind of mental health services and only a fraction of them receive an evaluation by a child/adolescent psychiatrist
 - Children and adolescents with developmental disabilities have 3-4 times higher rates of mental, emotional and behavioral disorders than the general population (National Institute of Health 2001)
- First do no harm-Hippocratic Oath. This should apply to government agencies before allowing new industry with risks to human health.
- Issue of data/research- needs to be NON-biased. We do not accept studies that are supported financially by the drug industry as the research study has inherent bias.
- Risk/benefit ratio- if the risks outweigh the benefits, then need to look at alternatives.
- Potential risks of this project are profound. It is imperative that, before going forward, that we have an independent study, with realistic models, and accurate numbers, in order to decipher the true human health risks. Too much is at stake- costs to human health, the environment and economic costs to the community and the State.

Polymet Mine Workers: Douglas Wendland, M.D., Occupational and Environmental Health, Duluth

- Mine workers at PolyMet will have exposure to respirable crystalline silica which causes the disease silicosis.
- Mine workers will also have exposure to diesel particulates, nickel and other potentially toxic substances.
- The current Mine Safety and Health Administration (MSHA) exposure guidelines (30 C.F.R. 56.5001) are mainly based on the 1973 American Conference of Governmental Industrial Hygienists (ACGIH) guidelines and are therefore outdated and inadequate for mine worker protection.
- The current MSHA allowance for respirable crystalline silica is 4 times that recommended in current ACGIH TLV-BEI guidelines: 25 micrograms/cubic meter. (2014 ACGIH-BEI Guidelines)
- The National Institute for Occupational Health & Safety (NIOSH) has recommended and both MSHA and OSHA have proposed rule changes to reduce the exposure allowance for respirable silica to 50 mcg/m³. (See 30 C.F.R. 58, 29 C.F.R. Parts 1910, 1915, 1926)
- MSHA and the current PolyMet proposal do not mandate the medical surveillance of mine workers in order to evaluate the effectiveness of measures to limit the exposures to crystalline silica and other workplace exposure hazards.
- OSHA has published models for medical surveillance of workers exposed to a variety of chemical hazards including respirable crystalline silica. (29 C.F.R. Appendix A to 1926.1053)
- **Recommendations:**
 - Require that exposure levels of miners to respirable crystalline silica not exceed the level required in the current MSHA and OSHA proposals for rule change.
 - Require that for other exposures the 2015 ACGIH TLV-BEI Guidelines be used to define the permitted exposure.
 - Require a medical surveillance program for miners exposed to dusts, minerals and chemicals identified as significant health hazards at mine site and processing facilities with use of OSHA recommended model to guide creation of such monitoring programs.
 - The Final Environmental Impact Statement (FEIS) should include an assessment of the health impact on the community and health care resources that may result from workplace exposure both at mining sites and at related offsite workplaces. This assessment should include both cancer and non-cancer health risks.

Particulate Pollution Health Concerns- John Ipsen M.D., Family Medicine, Duluth

- Discharges of fine particulates including amphibole elongated mineral particles - pose a health risk to the mine workers and to the surrounding communities.
- The rock to be mined contains amphibole fibers: crystals with similarities to asbestos found in ore formations in the Duluth Complex where the mine would be located. Mining the ore will produce EMPs (elongated mineral particles, including amphibole mineral fibers) and other harmful particulates.
- The MN Department of Health and the PFEIS state that amphibole mineral fibers pose “an uncertain risk to human health”, an undetermined toxicity and potency. This is not reassuring. Without a thorough evaluation of the potential for exposures and the risks involved, we will be relegating the miners and the people in the surrounding communities who breathe the air to participate in an experiment they did not agree to be part of.
- Mesothelioma is a rare cancer directly linked to amphibole mineral fibers. Other identified risks of exposure include coronary artery disease (which is of course far more common than mesothelioma), and cancers of the larynx, stomach, and bladder. The personal and financial burden of these illnesses would be significant.
- The PFEIS evaluates airborne discharges in relation to PM10 and PM2.5 standards. However particulates 4 microns and below are likely to become lodged in the alveoli and so the PFEIS most likely underestimates the risk of PolyMet’s particulate releases.
- In addition there is recent research by Liuhua Shi et al. (referenced below) that has brought into question the EPA thresholds for PM2.5, and indicates human health is adversely affected by significantly lower levels of fine dust than was previously thought.
- The discussion of particulate air pollution control in the PFEIS does not provide adequate assurance of human safety.
- HEPA filters will be used downstream from bag filters, but only in some applications and only for part of the year (apparently due to energy costs). Where the trapped fines from the filters will go is not addressed.
- The tailings basin beaches will be a source of dust and the claim that capillary action will keep the surface moist and prevent the wind from blowing particulates aloft has not been substantiated and may represent wishful thinking.
- Water will be used in some operations to reduce dust, but wherever the particulate-laden water goes, once it evaporates, the dust will be exposed.
- The contribution to air pollution from what’s termed “fugitive dust” has not been not been rigorously analyzed. The control measures identified at the plant site are only theorized to provide adequate suppression of dust.
- The rail transport of ore from the mine site to the plant site is claimed to have minimal contributions to airborne particulates but there is concern that 6 miles of railbed could accumulate and release a significant quantity of dust

from the 32 thousand tons of ore transported daily and that the dust will be carried off by the wind.

- The particulates can travel far. We know that the airborne concentrations of amphibole fibers measured 12-15 miles away at sites near Ely are highest when the wind blows from the direction of the eastern Iron Range - due to activity at taconite operations that are about a mile from the proposed PolyMet site. Conversely the lowest amphibole particulate levels on record occurred during a taconite miners' strike. If these fibers are detectable in the air around Ely it is virtually certain higher levels are present at the mine site and surrounding area.
- Another significant omission in the EIS documents is the pollution that will be produced by remote power generation supporting the energy needs of the project. Much of this is likely to be supplied by coal combustion. In addition to its contribution to greenhouse gases, fossil fuel combustion to meet power needs of the PolyMet project will have deleterious health effects due to release of SO_x, NO_x, Mercury, and Particulates.
- In summation, the PFEIS incompletely addresses particulate air pollution. The analysis provided in the PFEIS is inadequate to reasonably address the health risks of the proposed mine – risks to the mine workers and to people living in the surrounding communities. A more comprehensive Health Risk Assessment as well as a Health Impact Assessment from a qualified independent evaluator is necessary to clarify the risks of this proposal.

HIA and the regulatory process – Dr. Kris Wegerson; Family Medicine, Duluth

- NEPA (1969) directs all agencies of the Federal government to take health impacts into account for all Federal actions “significantly affecting the quality of the human environment”. MEPA (1973) directs “all department and agencies of the state government to ...undertake, contract for or fund such research as is needed in order to determine and clarify effects by known or suspected pollutants which may be detrimental to human health or to the environment, as well as to evaluate the feasibility, safety and environmental effects of various methods of dealing with pollutants”.
- The National Research Council (NRC) has published a book which details health impact assessments, their roles and uses in: “Improving Health in the United States: The Role of Health Impact Assessments”. The NRC states that “the appropriate assessments of direct, indirect, and cumulative health effects under NEPA is a matter of law and not discretion”. (p. 12)
- The PFEIS doesn't adequately address cancer, brain damage or lung disease. It neither provides a baseline health status of the affected populations, nor analyzes in an objective way the potential adverse effects of the PolyMet Project.
- The PFEIS does not specifically address the potential health impacts to vulnerable populations, such as infants, children, the elderly, and persons

- who rely for subsistence on fish, wild rice or game species, where pollutants may bio-accumulate. Executive Order 13045 (1997) directs “each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children, and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks”. Executive Order 12898 directs “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States”.
- HIA is considered to be a “best practices” approach to responsible review of large-scale natural resource development projects in Alaska. Independent scientific analysis of issues such as seepage of contaminated water, capture and spills of contaminated seepage, and mercury methylation potential as well as independent HIA contracting are needed to objectively evaluate health risks and public health impacts of the PolyMet NorthMet project.
 - We do not believe that the health effects of the proposed NorthMet Project have been adequately addressed in the PFEIS. Comprehensive and independently produced health risk and health impact assessments must be completed for the NorthMet Project prior to completion of the FEIS.

Conclusion: Jennifer Pearson, M.D.

- PolyMet preliminary final EIS is insufficient in addressing our concerns for human health. What we are requesting is as follows:
 - That the statements about what will be released would be based on real experience, with realistic range for seepage, collection, as well as impacts of potential failures
 - Independent science rather than overly optimistic models by the mining company. Would our state want us as physicians to prescribe medications that had only been studied and regulated by the companies that made a profit on them?
 - That state agencies have analyzed the health risks of all chemicals released and have looked at human cancer, respiratory illness, brain damage, neurodevelopmental disorders.
 - That independent scientists have provided quantitative and qualitative analysis of what would happen to the vulnerable individuals in our population: infants, children, the elderly and people who have greater exposure or sensitivity as well as on-site workers
 - That the costs of illness, health care, and disability have all been evaluated and calculated. There is much less cost in preventing than in treating disease.

- We've been asking agencies for 18 months to provide an independent Health Risk Assessment and Health Impact Assessment. Hundreds of individual physicians and allied health professionals have been loudly voicing our concerns and our request for further science and analysis.
- We are disappointed in the response made by the agencies in PFEIS
- Mission of organizations
 - MN Dept of Health: "Protecting, maintaining, and improving the health of all Minnesotans"
 - MN Pollution Control Agency: "To protect and improve the environment and enhance human health"
 - MN Dept of Natural Resources: "To work with citizens to conserve and manage the state's natural resources, to provide outdoor recreational opportunities, and to provide for commercial uses of natural resources in a way that creates a SUSTAINABLE QUALITY of life"
- Hippocratic Oath: first, do no harm.
 - Our job to assure the health of our region.
 - We need to clearly understand the risk/benefits.... In an industry where there appears to be many risks
 - Comprehensive Health Risk Assessment of the NorthMet Project and Health Impact Assessment. Critical that these analyses not be just a desktop exercise, but scrutiny of underlying assumptions and use of independent science to provide objective assessments of risks and impacts.

Selected References:

Letters voicing concern about Health Risk (attached)

PolyMet NorthMet Preliminary Final EIS, Appendix A, Responses to Comments and selected PolyMet documents cited in the PFEIS.

The Risk, Public Liability, & Economics of Tailings Storage Facility Failures, Bowker and Chambers, July 21, 2015

Synopsis of Psychiatry by Kaplan and Sadock, 9th addition, page 367

Neurobehavioral effects of developmental toxicity, Philippe Grandjean, Philip Landrigan, *Lancet Neurol* 2014;13:330-38 (attached)

Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain, Leonardo Trasande, Philip Landrigan, Clyde Schechter, volume 113, May 2005

Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality and Costs for Lead Poisoning, Asthma, Cancer, and Developmental

Disabilities, Philip Landrigan, Clyde Schechter, Jeffrey Lipton, Marianne Fahs, Joel Schwartz, Volume 110, July 2002.

AACAP Workforce Fact Sheet

Expert Opinion of JD Lehr; Don Lee, PhD, PE; and Brian A. Branfireun, PhD, Concerning the NorthMet Mining Project and Land Exchange Supplemental Draft Environmental Impact Statement available on line at <waterlegacy.org/PolyMet-SDEIS>

Low-Concentration PM_{2.5} and Mortality: Estimating Acute and Chronic Effects in a Population-Based Study, Liuhua Shi, Antonella Zanobetti, Itai Kloog, Brent A.

Improving Health in the United States: The Role of Health Impact Assessments, The National Academies Press, Washington, D.C., 2001

Duluth News Tribune

Medical professionals' view: Minnesota medical professionals call for PolyMet health-impact assessment

By [Debbie Allert](#) on Nov 11, 2015 at 11:00 p.m.

Collectively, Minnesota medical-professional organizations representing thousands of medical professionals have expressed their concern about the potential for harm to human health from the proposed PolyMet mine. Careful consideration of health risks is essential before moving forward with project permitting.

These Minnesota medical professionals include the Minnesota Public Health Association, the Minnesota Nurses' Association, the Minnesota Medical Association and the Minnesota Academy of Family Physicians. Individual physicians representing multiple specialties also have expressed concerns on this issue. These organizations, which collectively represent more than 20,000 health professionals, have written letters to Gov. Mark Dayton and to the commissioners of the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Department Health and other state agencies about their concerns.

We at the Lake Superior Chapter of the Minnesota Academy of Family Physicians are very concerned about the potential for pollution and human health risks from the PolyMet project and how that might affect our region. In addition, our larger statewide Minnesota Academy of Family Physicians, representing more than 3,000 family doctors, unanimously passed a resolution calling for a health-risk assessment of copper-sulfide mining in Minnesota.

Our united concern is there is inadequate information in the current

Environmental Impact Statement to determine the potential human health¹⁴⁰ impact from the proposed PolyMet sulfide mining project.

Once sulfide mining is permitted to move forward, there will be no going back. We must ensure that the data on which permitting decisions are based is sound and thorough. We worry it will be incomplete and unsubstantiated in critical areas relating to toxic pollutants such as mercury.

The information in the EIS primarily was provided by the industry itself and a research firm paid for by PolyMet. We are concerned that information funded by industry is biased to show only the best-case scenario. Indeed, the impression one gets reading the EIS drafts has been that minimal pollution will occur, that operations will flow smoothly and that all will be well.

However, after reading critical reviews of the information in the EIS drafts, we are alarmed. Independent experts in the fields of hydrology and biogeochemistry have pointed out critical flaws and gaps in the data. An international mercury expert concluded that analysis concerning total mercury and methylmercury in waters potentially impacted by the proposed PolyMet project “are not sufficient to either adequately characterize the current mercury methylating environment nor to evaluate the potential for impact due to changes in hydrology, water quality or both as a result of the proposed project.”

At least five of 10 toxins of major public health concern to the World Health Organization (mercury, lead, arsenic, asbestos and particulate air pollution) are known to be released from copper-nickel mining as well as sulfates that can increase mercury methylation and accumulation in the food chain. These toxins are known to affect human health.

The PolyMet project’s negative impact could be profound and could have devastating consequences for infants and children due to the potential increase of heavy metals in the environment, including methylmercury, lead, arsenic and manganese. The environmental toxins listed have a risk of causing neurodevelopmental disorders.

The adage “an ounce of prevention is worth a pound of cure” is applicable¹⁴¹ only when there is a cure. Unfortunately with many pollutant exposures, there is no way to “fix” the damage that occurs. Treatment may lessen the severity but cannot restore a damaged brain, heart or lung. Prevention cannot be traded for “cure.”

The voices of thousands of doctors, nurses and public-health professionals across the state of Minnesota trying to prevent toxic pollution and protect patients and communities deserve to be heard. We ask Gov. Mark Dayton and his commissioners to join our call for a thorough, independent and objective assessment of health risks related to the PolyMet sulfide mine project.

Dr. Debbie Allert, who practices in Two Harbors, is president of the Lake Superior chapter of the Minnesota Academy of Family Physicians and wrote this on behalf of the chapter. Others who contributed to the writing include Dr. Jen Pearson of Duluth, Dr. Emily Onello of Duluth, Dr. Susan Nordin of Duluth, Dr. John Ipsen of Duluth, Dr. Kris Wegerson of Duluth and Dr. Randy Rice of Sturgeon Lake, Minn. Others who signed on as supporters of the views in this commentary include family physicians Dr. Nancy Sudak, Dr. Brigid Pajunen, Dr. Jacob Prunuske, Dr. Christine Swensen, Dr. Lynn T. MacLean, Dr. Carol Farchmin, Dr. Jane Rudd, Dr. Sheri Bergeron, Dr. Kirsten Bich, Dr. Lisa Prusak and Dr. Steven Long; and child psychologists Dr. Margaret Saracino and Dr. Steven Bauer.



December 7, 2015

To: The Honorable Mark Dayton, Governor of the State of Minnesota

From:

Edward P. Ehlinger, M.D., M.S.P.H.
Commissioner
Minnesota Department of Health

John Linc Stine
Commissioner
Minnesota Pollution Control Agency

Tom Landwehr
Commissioner
Department of Natural Resources

Subject: Health Impact Assessment for Polymet's copper-nickel mining project.

We are writing to explain the basis of the decision, which the three of us support, not to conduct a separate Health Impact Assessment (HIA) for PolyMet's proposed copper-nickel mining project.

As you know, the Co-lead Agencies (MDNR, USFS, and USACE) recently published the Final Environmental Impact Statement (FEIS) for this project. Prior to that, a Supplemental Draft EIS (SDEIS) was published in December 2013 with a 90-day public comment period and three public meetings. The MDH provided comments on the SDEIS that included both specific technical comments related to the document and a suggestion that an HIA be considered for the project. MDH is fully satisfied that the specific technical concerns raised with the SDEIS were addressed in the FEIS. MDH is also convinced that an HIA would not provide any additional scientific information regarding public health impacts and risks.

Human health information is summarized in section 7.3.4 of the FEIS, and is organized and presented in a manner that is easily understandable by members of the public. This section also directs readers to other sections of the FEIS where human health risks are examined and mitigations are explained in very specific detail. The information in section 7.3.4 covers concerns regarding potential health impacts from:

1. Exposure to air contaminants, particularly airborne amphibole mineral fibers;
2. Exposure to contaminants in drinking water, surface water, and food sources (e.g., wild rice, and fish);

Governor Mark Dayton
December 7, 2015
Page 2

3. Increased risk of traffic accidents involving chemicals;
4. Increased exposure to noise and vibration; and
5. Strain on emergency response services.

These are among the general concerns that led MDH to suggest that an HIA be considered. However, the three of us are confident that these concerns are properly addressed in the FEIS and MDH no longer believes an HIA is necessary.

We have received additional requests from members of the public, including a group of Duluth area physicians, for an HIA. We have considered the information provided as the basis for these requests and have concluded that the FEIS adequately addressed public health impacts based on water and air quality evaluation criteria and regulatory standards that are protective of human health. Public health impacts were addressed in sections of the EIS related to water quality, air quality and toxics, including potential effects to drinking water and food sources as required by the Minnesota Environmental Policy Act and National Environmental Protection Act. Further, as stated above, the FEIS includes a new section that concisely summarizes human health related information and impact assessments within the document (section 7.3.4). Thus, it is still our strong opinion that an HIA will not significantly inform the decisions regarding permits required for the project beyond the information already available in the FEIS.

Furthermore, we do not believe it is practically or procedurally possible to pursue an HIA outside of the EIS or permitting process at this point. An HIA would have the potential to introduce unintended delay in decision making, legal risks, and public confusion about the linkage between the HIA and FEIS processes and applicable laws. In particular, we are concerned that deciding to conduct an HIA would call into question the completeness and adequacy of the FEIS and could lead a court to order another supplemental draft EIS.

Our three agencies are deeply committed to protecting human health and the environment. We also strongly believe that it is important to pursue a health in all policies approach to create and maintain healthy Minnesota communities. Thus, as state agencies charged with making important decisions about the future of our state, we are committed to carefully evaluating PolyMet's proposed NorthMet Project before making any permitting decisions.

Summary Opinion of Margaret Saracino, M.D.
regarding Morbidity Associated with Methylmercury Exposure
and other Neurotoxic Chemicals Potentially Released by the
PolyMet NorthMet Copper-Nickel Mine Project
December 7th, 2015

Summarized for :
Paula Maccabee, Esq.
Counsel/Advocacy Director for WaterLegacy
1961 Selby Avenue
St. Paul, MN 55014

My name is Margaret Saracino, M.D. and I am a child, adolescent and adult psychiatrist working at a community mental health center in Duluth, Minnesota. I went to the University of Minnesota Medical School and did my residency training at the Mayo Clinic in Rochester, Minnesota. As a medical physician, I have grave concerns about copper-nickel mining and its inherent deleterious effects not only on the environment in Northern Minnesota, but also on human health of those living in that area.

I have read sections of the PolyMet NorthMet environmental impact assessment documents related to potential pollution releases and health impacts of the project and the reports of Dr. Brian Branfireun related to mercury and methylmercury. I defer to Dr. Branfireun and other experts in hydrology, ecology and biochemistry to evaluate the extent of risk that the PolyMet mine project poses in terms of producing substantial increases in levels of mercury, methylmercury or other toxic metals in fish tissue or drinking water. My opinion focuses on the consequences to human health should elevated levels of toxic pollutants result from this mine project.

Copper-Nickel mining is unique in that it produces acid mine waste and sulfates which mobilize releases of heavy metals into the environment, many of which are known neurotoxins, such as lead, methylmercury, manganese, arsenic and toluene. Five of the top 10 pollutants identified by the World Health Organization of major concern to public health are produced by this mining process. To date, there has not been an independent assessment of the human health risk of this form of mining in the water rich area of Northern Minnesota..

“Neurodevelopmental disorders” is a category for many illnesses of the brain and central nervous system. These conditions include diagnoses such as attention deficit hyperactivity disorder, learning disorders, autistic spectrum disorders, language disorders, and intellectual disabilities. Neurodevelopmental disorders have become the new pediatric morbidity, meaning, they are not treatable acute illnesses, but rather are chronic conditions which can only be managed, not cured.

The causes of neurodevelopmental disorders are multifactorial, but toxic exposures to heavy metals, particularly methylmercury, lead, arsenic, and manganese are well known.

In terms of methylmercury, exposure is largely due to ingestion of fish with high mercury content. Methylmercury builds in the food chain. When pregnant women eat fish high in methylmercury, the fetus is then exposed to this lipophilic heavy metal. The placenta is not protective and the blood brain barrier is not well formed until after age two years, which makes fetuses, infants and young children most vulnerable to methylmercury's neurotoxic effects. Neurons in the developing brain multiply at a rapid rate and are particularly vulnerable to toxic effects of heavy metals, hence brain damage is more likely to occur during this vulnerable time. Neurotoxicity is also transferred to the infant through breast milk.

The adverse effects of methylmercury depend on timing and amount of exposure. Methylmercury is a strong toxin that influences enzymes, cell membrane function, causes oxidative stress, lipid peroxidation and mitochondria dysfunction, affects amino acid transport and cellular migration in the developing brain. Exposure in utero can cause motor disturbances, impaired vision, dysesthesia, and tremors. Even lower level exposure can result in lower intelligence, poor concentration, poor memory, speech and language disorders, and decrease in visual spatial skills in children exposed to methylmercury in utero. Fetuses, infants, and young children are four to five times more sensitive to the adverse effects of methylmercury exposure than adults.

Methylmercury can also cause reproductive toxicity such as chromosomal anomalies, low birth weight, reduced fetal survival rate, and fetal deformities.

Methylmercury exposure has also been shown to create free radicals, promote platelet aggregation and blood coagulation, cause sclerosis of the arteries and increase blood pressure, thus raising the risk of myocardial infarction and coronary artery disease. In the case of cardiovascular disease risk, there is a higher toxicity in adults than children.

In addition to the cardiovascular risks, exposure to excess methylmercury may result in neurodegenerative disorders in adults, manifest as tremors, numbness, tingling of the lips, tongue, and extremities. At higher exposures, walking, vision, speech and language, and hearing may be affected. Toxic levels of exposure may be fatal.

In addition to methylmercury, lead is also a byproduct of the copper-nickel mining process. Lead is a known neurotoxin for which no level is considered to be safe. Fetuses and children exposed to lead are at risk for intellectual disability and criminal behavior due to reduced ability to regulate emotions and control impulses. If lead toxicity is not treated before age 5 years, it can cause permanent brain damage. The cost to society of incarceration from criminal activity is high.

There is also a known synergistic effect of neurotoxins, i.e. low level exposures of many neurotoxicants may be additive and together, cause significant harm.

Neurodevelopmental disorders cause significant emotional and financial costs to families and communities. Children with these disorders may require occupational therapy, physical therapy, speech and language therapy. They often require special education services such as a 504 plan or an Individualized Education Plan. They may require outpatient individual and family therapy. All of these services take parents away from their jobs for the needed services and result in financial costs to affected communities, as well as personal suffering and distress.

Comorbid psychiatric conditions are common in children with neurodevelopmental disorders; these include major depression, anxiety disorders, and behavioral disorders, such as oppositional defiant disorder, and conduct disorder. These comorbid conditions often require psychiatric consultation and intervention. If symptoms are severe, the child may need partial hospitalization or day treatment services. In the most severe cases, inpatient hospitalization or residential placement may be needed. All these interventions take an emotional and financial toll on the family and community.

Studies show that the economic costs of lower IQ's are significant. One study showed that each point of decrement in IQ is estimated to decrease average lifetime earning capacity by US \$18,000 in 2008 currency. The most recent estimates from the United States indicated the annual costs of methylmercury toxicity are roughly \$5 billion. Lower and lost wages of parents, loss of jobs for parents, and lost future earnings for individuals with lower IQ's and neurobehavioral disorders reduce the potential for economic growth in the community. Evidence from world-wide sources [Grandjean, Landrigan, Lancet Neurology 2014;13:330-38] shows that average national IQ scores are associated with gross domestic product. Since IQ losses represent only one aspect of developmental neurotoxicity, the total costs are considered much higher.

Resources for children's mental health in Northern Minnesota and nationally are lacking. There is a dearth of psychiatric resources for children in general, and even fewer services available for children with neurodevelopmental disorders. It is not uncommon for a family in Northern Minnesota with a child in a psychiatric emergency to find that the local inpatient psychiatric unit is full. Hence, they may need to wait in the ER for days until a bed, somewhere in or out of state, is available. The need clearly is higher than the current resources.

The Center for Disease Control (CDC), in 2013, identified that only 20% of emotionally disturbed children and adolescents receive some kind of mental health services, and only a small fraction of them receive an evaluation by a child psychiatrist.

Demand for services for child and adolescent psychiatrists was projected to increase by 100% between 1995-2020. Children and adolescents with neurodevelopmental disorders have 3-5 times higher rates of mental, emotional and behavioral disorders than the general population. (National Institutes for Health 2001).

For special populations, such as children with neurodevelopmental disorders, there are few child and adolescent psychiatrists trained specifically to care for their needs. The scarcity of treatment programs for these children increases the risk that they may end up in the criminal justice system by default.

If there is a lack of resources now, what will happen if children in Northern Minnesota are exposed to increase levels of environmental toxins and the incidence of neurodevelopmental disorders, thus, increases?

It is already known, from a study from the Minnesota Department of Health from Nov 2011, that 10% of infants born in Minnesota in the Lake Superior Basin have a higher level of cord blood mercury level than is considered safe by the U.S. Environmental Protection Agency.

More methylmercury in the environment would only result in more neurodevelopmental disabilities and associated mental health issues.

It is my opinion based on concern for my patients and my community that it is imperative that human health risks be assessed prior to going forward with any plan to allow copper-nickel mining in the water rich area of Northern Minnesota. Potential emotional, behavioral and financial costs to our future children, families, communities and society are dangerously high. It is imperative to proceed with caution, as human lives for generations may be adversely affected.

Enclosed:

List of References

Curriculum Vitae of Margaret Saracino, M.D.

REFERENCES

Granjean P, Landrigan P. Neurobehavioral effects of developmental toxicity. *Lancet Neurol* 2014; 13:330-38

Hong, Y-S, Kim YM, and Lee KE. Methylmercury Exposure and Health Effects. *Journal of Preventative Medicine and Public Health*. 2012 Nov; 45 (6):353-363.

Tresande L, Landrigan P, Schechter C. Public Health Consequences of Methyl Mercury Toxicity to the Developing Brain. *Environmental Health Perspectives* May 2005, volume 113, number 5.

Landrigan P, Schechter C, Lipton J, Fahs M, Schwartz J. Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities. *Environmental Health Perspectives* July 2002, volume 110, number 7.

Haggerty R, Rothman J. Press IB. *Child Health and the Community*. New York: John Wiley and Sons, 1975

Minnesota Pollution Control Agency, Health and environmental effects of mercury. Website last modified 9/12/13. www.pca.state.mn.us/index.php/topics/mercury/health-and-environmental-effects-of-mercury.html.

United States Environmental Protection Agency, Health Effects of Exposures to Mercury. www2.epa.gov/mercury/health-effects-exposures-mercury.

McCann P. Mercury Levels in Blood from Newborns in the Lake Superior Basin, Minnesota Department of Health, Division of Environmental Health. Nov 2011

Sulfide-Ore Mining Fact Sheet. Northeastern Minnesotans for Wilderness. www.nmworg.org.

American Academy of Child and Adolescent Psychiatry Work Force Fact Sheet: Prevalence and Magnitude of Child and Adolescent Psychiatric Problems

Margaret Saracino, M.D.
 1401 East 1st Street
 Duluth, Minnesota, 55805
 218-728-4491

BOARD CERTIFICATIONS

American Board of Psychiatry and Neurology

Child and Adolescent Psychiatry 1997-Certificate Number 4413

General Psychiatry 1996-Certificate number 43146

EMPLOYMENT

September 1998 to Present

Staff Psychiatrist

Human Development Center- Community psychiatry practice treating children, adolescents and adults in 3 outpatient settings in Northern Minnesota and Wisconsin.

-Provide consultation and collaboration to pediatricians and primary care physicians affiliated with St. Luke's Hospitals and Clinic. This helps increase accessibility of mental health interventions to local children and adolescents. Also provide psychiatric consultation to the Northwood Children's Services CADI homes.

July 1997-July 1998

Staff Child and Adolescent Psychiatrist

-Abbott Northwestern Hospital, Minneapolis, Minnesota-Inpatient and partial hospitalization care to children and adolescents

-Minneapolis Psychiatric Institute-Outpatient psychiatric care to children, adolescents and adults.

July 1994-December 1995

Moonlighting during residency

-Federal Medical Center, Rochester, M

-Faribault Psychological Services, Faribault, MN

-Austin Mental Health Center, Austin, MN

December 1990-July 1991-

Medical Risk Manager-Naval Hospital San Diego, San Diego, CA

EDUCATION

July 1995-June 1997

Fellowship, Child and Adolescent Psychiatry, Mayo Graduate School of Medicine, Rochester, MN

November 1991-July 1995

Residency, Adult Psychiatry, Mayo Graduate School of Medicine, Rochester, MN

June 1990-December 1990

Internship, Naval Hospital San Diego, San Diego, CA

August 1986-June 1990

Medical Degree-University of Minnesota School of Medicine, Minneapolis, MN

September 1980-May 1984

BA degree in Biology-graduated summa cum laude, Drake University, Des Moines, IA

RESEARCH

“Long Term Outcome Study of Anorexia in a Community Based Population.” Presented at the annual meeting of the American Academy of Child and Adolescent Psychiatry, October 1994.

PROFESSIONAL ACTIVITIES

3-4 times from 2003 to 2012- was a faculty who helped teach the *Healer's Art* course at the University of MN Duluth Medical School. This unique course taught the healing art of medicine through large and small group facilitation.

2002-2004- Co-facilitator, Infertility Support Group, coordinated through Northland Obstetrics and Gynecology.

1999- 2005- Board Examiner- American Board of Psychiatry and Neurology, examining candidates in general and in child and adolescent psychiatry.

1995-1997- Co-facilitator of a sexual abuse support group for adolescent females in Rochester, MN.

1994-1995- Co-facilitator of a sexual abuse support group for adult women.

PROFESSIONAL AFFILIATIONS- December 1998 to present -*Clinical Assistant Professor*,
University of Minnesota-Duluth School of Medicine

Member, American Academy of Child and Adolescent Psychiatry

EDUCATIONAL ACTIVITIES

Speak Your Mind- televised local talk show discussing various mental health diagnoses- was a participant 2 times over the last 5 years.

Doctors on Call- participant on a medical panel to discuss issues on Emotional Aspects of Infertility, 2003

1998-present- Have given various lectures in the community for mental health providers and pediatricians on various topics including eating disorders, emotional aspects of infertility, PTSD, Mood and anxiety disorders, ADHD and other behavioral disorders.

February 1996-“Family Violence and Abuse, Clinical Issues”- 2 day seminar presented to Honduran mental health clinicians in Tegucigalpa, Honduras.

April 1996- “Psychiatry in the Alaskan Bush” Mayo Department of Psychiatry Grand Rounds.

November 1993-“Gay and Lesbian Adolescent Suicide” Mayo Department of Psychiatry Grand Rounds.

HONORS

Resident of the Year, Mayo Graduate School of Medicine, 1994-1995

Phi Beta Kappa, 1984

Alpha Epsilon Delta, Pre-Medical Honor Society, 1984

Omicron Delta Kappa, Mortar Board, Scholastic honor societies, 1984

Athletic scholarship for cross country and track, Drake University, 1980-1984

INTERESTS AND ACTIVITIES

Spending time with my family and friends, running, hiking, camping, reading

Opinion of John Ipsen, M.D., PhD
Particulate Air Pollution from the Proposed NorthMet Project
Risks to Human Health
Prepared for WaterLegacy - December 10, 2015

There are unanswered questions about particulate air pollution from the proposed NorthMet Project. Discharges of fine particulates including amphibole elongated mineral particles - pose a health risk to the mineworkers and to the surrounding communities.

The FEIS indicates the proportion of amphibole fibers is expected to be 9% of total fibers and there are 2% chrysotile (serpentine) fibers present. They argue these are low concentrations and not worthy of attention. However because the total quantity of particulates produced is great, the amount of amphibole and chrysotile fibers is significant.¹

The MN Department of Health and the FEIS state that these fibers represent an uncertain risk to human health and have the potential for an undetermined toxicity and potency. There is ample information in the scientific literature to raise concern. Without a thorough evaluation of the potential for exposures and the risks involved, we will be relegating the miners and the people in the surrounding communities who breathe the air to participate in an experiment they did not plan to be part of.

Amphibole fibers have been shown in the 6-year Taconite Workers' Health Study to be associated with increased risk of mesothelioma and other diseases. There is a 2.7-fold increase in mesothelioma in miners exposed to taconite air pollution. The risk of mesothelioma rises 3% for every year of exposure. That becomes 75% over a 20-yr career and 130% over a 30-yr career.

Other identified risks include an 11% increase in Coronary Artery Disease (which is of course far more common than mesothelioma), and cancers of the larynx, stomach, and bladder. The personal and financial burden of these illnesses would be significant.

The EPA has set thresholds for particulate air pollution. The PM10 standard is for coarser dust 10 microns and below and the PM2.5 standard is for fine dust 2.5 microns and below. PM2.5 would contain most of the elongated mineral fibers. The FEIS analyzes discharges of these two sizes of particulates. However, according to Dr. Ehlinger's comments on behalf of the MN Department of Health, silicate mineral particles sized 4 microns and below are hazardous because 4 microns is closer to the cutoff for particles that become lodged in the deeper parts of the lung. The FEIS does not address this and thus it likely underestimates the risk of particulate releases.

In addition there is recent research by Shi et al. that has brought into question the EPA thresholds for PM2.5, and indicates human health is adversely affected by much lower levels of fine dust than was previously thought.

The FEIS indicates in Table 6.2.7-6 that cumulative noncancer risks do not exceed the threshold risk of 1, but simple addition indicates they do. By rounding values that exceed 1 to one significant digit, the FEIS declares a 20% exceedence of the recommended limit to be of no concern.

Containment of fine particulates at mining operations is challenging. The FEIS discusses a number of control measures planned at the plant site. The plans do not provide enough assurance that particulate releases will be adequately suppressed.

HEPA filters will be used downstream from bag filters, but in only 23 of 35 dust-producing units (and in 8 of the 23 only during heating season). Bag filters reduce the PM 2.5 burden to 2.5 micrograms per cubic foot of air, but as the volume of air produced is great, the particulate burden is more significant than they would like to admit. Where the trapped fines from the filters will go is not addressed.

The tailings basin beaches will be a source of dust and the claim that capillary action will keep the surface moist and prevent the wind from blowing particulates aloft has not been substantiated or quantified.

Water will be used in some operations to reduce dust, but wherever the particulate-laden water goes, once it evaporates, the dust will be exposed.

The contribution to air pollution from what's termed "fugitive dust" has not been not been rigorously analyzed. The control measures identified at the plant site are only theorized to provide adequate suppression of dust.

The rail transport of ore from the mine site to the plant site is claimed to have minimal contributions to airborne particulates but there is concern that 6 miles of railbed could accumulate a significant quantity of dust from the 32 thousand tons of ore transported daily and that the dust will be carried off by the wind.

The FEIS indicates that the concentration of airborne fibers drops off quickly as distance from the point source increases. However we know the particulates can travel far. For example, we know that the airborne concentrations of amphibole fibers measured 12-15 miles away at sites near Ely are highest when the wind blows from the direction of the eastern iron range - due to activity at taconite operations that are about a mile from the proposed PolyMet site. Conversely the lowest amphibole particulate levels on record occurred during a taconite miners' strike.

Another significant omission in the EIS documents is the pollution that will be produced by remote power generation supporting the energy needs of the project. Much of this is likely to be supplied by coal combustion and on top of its contribution to greenhouse gases this will have deleterious health effects due to release of SO_x, NO_x, mercury, and particulates. This could have a major impact on the consequences of the NorthMet Project but beyond the contribution to greenhouse gases it is not addressed.

In sum, the FEIS incompletely addresses particulate air pollution. The analysis provided in the FEIS is inadequate to reasonably address the health risks of the proposed mine – risks to the mineworkers and to people living in the surrounding communities. A Health Impact Assessment from a qualified independent evaluator is necessary to clarify the risks of this proposal.

John Ipsen, MD, PhD

Endnote

¹ It is noteworthy the data used in preparing the FEIS fiber analysis were obtained by a non-standard technique using a grinding process (grinding rock specimens with mortar and pestle to a fine powder) that brings into question the results.

References

Bernstein D, et al. Testing of Fibrous Particles: Short-Term Assays and Strategies. *Inhalation Toxicology: International Forum for Respiratory Research* [17](#)(10) 2005, 497-537.

Coffin DL, et al. Tumorigenesis by a ferroactinolite mineral. *Toxicology Letters*. 13(1982) 143-150.

Cook PM, et al. Interpretation of the carcinogenicity of amosite asbestos and ferroactinolite on the basis of retained fiber dose and characteristics in vivo. *Toxicology Letters*. 13(1982) 151-158.

Ehlinger EP. Letter to Lisa Fay, EIS Project Manager, Minnesota Department of Natural Resources. Minnesota Department of Health. 13 March 2014.

Environmental Resources Management. Amphibole mineral fiber toxicological literature review. St. Paul MN. 13 March 2009.

Jaurand MC. Mechanisms of fiber-induced genotoxicity. *Environmental Health Perspectives*. Sept 1997(105) Suppl 5:1073-84.

Minnesota Taconite Workers Health Study, School of Public Health, University of Minnesota, 24 November 2014.

NorthMet Mining Project and Land Exchange Final Environmental Impact Statement, Volume II, Chapters 5-6, November 2015.

Ring SJ. Expert Statement. Roseville MN. March 2014. 16pp.

Shi L, et al. Low-concentration PM_{2.5} and mortality: estimating acute and chronic effects in a population-based study. *Environmental Health Perspectives* DOI:10.1289/ehp.1409111.

Straif K, et al. A review of human carcinogens-part C: metals, arsenic, dusts, and fibres. *Lancet Oncol*. 2009, 10:453-454.

John D. Ipsen MD, PhD

3726 E 3rd St
 Duluth, MN 55804-1826
 (218)-724-5453
 ipsjod@gmail.com

Employment:

1994 – present Family Physician, Mt Royal Medical Clinic, Duluth MN
 1993-1994 Urgent Care Physician, LaSalle Clinic, Appleton WI
 1990-1993 Resident Physician, Appleton Family Practice Clinic, Appleton WI
 1988-1989 Rural Physician Associate, Fairmont MN
 1985-1986 Associate Scientist, Biochemistry Dept, U of MN, St Paul MN
 1983-1986 Biotechnology Consultant, St Paul MN
 1982-1983 Assistant Professor, Rutgers University
 1981-1982 Lab Director, Butler Research & Engineering, St Paul MN
 1980-1981 Postdoctoral Fellow, U of IA, Iowa City IA

Education:

1990-1993 Family Practice Residency, St Elizabeth Hospital, Appleton WI
 1988-1990 U of MN Medical School (Doctor of Medicine), Minneapolis MN
 1986-1988 UMD School of Medicine, Duluth MN
 1976-1980 U of MN College of Pharmacy (PhD in Pharmacognosy, Microbiology minor)
 1973-1975 Cornell University (BS – Biological Sciences), Ithaca NY
 1971-1973 Carleton College (Liberal Arts), Northfield MN

Professional Organizations:

Diplomate, ABFM, Board Certified in Family Practice, 1993 – present
 American Academy of Family Physicians, 1990 - present
 Minnesota Academy of Family Physicians, 1994 - present
 Lake Superior Medical Society, 1994 – present

Honors:

Delegate, Lake Superior Chapter of MN Academy of Family Physicians, 2015
 President, Lake Superior Medical Society, 2011-2012
 Bagley Scholarship Award, UMD College of Medicine, 1988
 Dean's List, Cornell University, 1973 -1975



December 14, 2015

Dr. Jennifer Pearson
 Minnesota Academy of Family Physician
 600 S. Highway 169
 Suite 1680
 St. Louis Park, MN 55426

Dear Dr. Pearson:

We are responding to questions raised in your notes from the meeting of September 25, 2015 and your email sent October 12, 2015 to Assistant Commissioner Barb Naramore of the Minnesota Department of Natural Resources (DNR), urging Governor Dayton and the three of us to consider conducting health risk and Health Impact Assessments (HIA) for the PolyMet, NorthMet Copper-Nickel mining project.

We would like to thank you for your interest in the project, and for taking time to share your concerns regarding human and environmental health risks. As you are aware, the Final Environmental Impact Statement (FEIS) for the project has been released for public comment. We have carefully considered the information you provided and it is still our opinion that a Health Impact Assessment (HIA) would not significantly inform the decisions regarding regulatory permits required for the project, beyond the information already available in the FEIS. This conclusion and its rationale are further explained in the attached Memo to Governor Mark Dayton from the three of us.

Please be aware that our three agencies are deeply committed to protecting human health and the environment. We also strongly believe that it is important to pursue a health in all policies approach to create and maintain healthy Minnesota communities. That is why the administration of Gov. Mark Dayton and the state agencies charged with making important decisions about the future of our state are so carefully evaluating the proposed PolyMet NorthMet Project before any permitting decisions are made. We assure that we will continue to promote public health and environmental quality should the proposed project move forward.

Thank you for your continued interest in this issue.

Sincerely,

Edward P. Ehlinger, M.D., M.S.P.H.
 Commissioner
 Minnesota Department of Health
 P.O. Box 64975
 St. Paul, MN 55164-0975

John Linc Stine
 Commissioner
 Minnesota Pollution Control Agency
 520 Lafayette Road
 St. Paul, MN 55155

Tom Landwehr
 Commissioner
 Department of Natural Resources
 500 Lafayette Road North
 St. Paul, MN 55155



December 7, 2015

To: The Honorable Mark Dayton, Governor of the State of Minnesota

From:

Edward P. Ehlinger, M.D., M.S.P.H.
Commissioner
Minnesota Department of Health

John Linc Stine
Commissioner
Minnesota Pollution Control Agency

Tom Landwehr
Commissioner
Department of Natural Resources

Subject: Health Impact Assessment for Polymet's copper-nickel mining project.

We are writing to explain the basis of the decision, which the three of us support, not to conduct a separate Health Impact Assessment (HIA) for PolyMet's proposed copper-nickel mining project.

As you know, the Co-lead Agencies (MDNR, USFS, and USACE) recently published the Final Environmental Impact Statement (FEIS) for this project. Prior to that, a Supplemental Draft EIS (SDEIS) was published in December 2013 with a 90-day public comment period and three public meetings. The MDH provided comments on the SDEIS that included both specific technical comments related to the document and a suggestion that an HIA be considered for the project. MDH is fully satisfied that the specific technical concerns raised with the SDEIS were addressed in the FEIS. MDH is also convinced that an HIA would not provide any additional scientific information regarding public health impacts and risks.

Human health information is summarized in section 7.3.4 of the FEIS, and is organized and presented in a manner that is easily understandable by members of the public. This section also directs readers to other sections of the FEIS where human health risks are examined and mitigations are explained in very specific detail. The information in section 7.3.4 covers concerns regarding potential health impacts from:

1. Exposure to air contaminants, particularly airborne amphibole mineral fibers;
2. Exposure to contaminants in drinking water, surface water, and food sources (e.g., wild rice, and fish);

Governor Mark Dayton
December 7, 2015
Page 2

3. Increased risk of traffic accidents involving chemicals;
4. Increased exposure to noise and vibration; and
5. Strain on emergency response services.

These are among the general concerns that led MDH to suggest that an HIA be considered. However, the three of us are confident that these concerns are properly addressed in the FEIS and MDH no longer believes an HIA is necessary.

We have received additional requests from members of the public, including a group of Duluth area physicians, for an HIA. We have considered the information provided as the basis for these requests and have concluded that the FEIS adequately addressed public health impacts based on water and air quality evaluation criteria and regulatory standards that are protective of human health. Public health impacts were addressed in sections of the EIS related to water quality, air quality and toxics, including potential effects to drinking water and food sources as required by the Minnesota Environmental Policy Act and National Environmental Protection Act. Further, as stated above, the FEIS includes a new section that concisely summarizes human health related information and impact assessments within the document (section 7.3.4). Thus, it is still our strong opinion that an HIA will not significantly inform the decisions regarding permits required for the project beyond the information already available in the FEIS.

Furthermore, we do not believe it is practically or procedurally possible to pursue an HIA outside of the EIS or permitting process at this point. An HIA would have the potential to introduce unintended delay in decision making, legal risks, and public confusion about the linkage between the HIA and FEIS processes and applicable laws. In particular, we are concerned that deciding to conduct an HIA would call into question the completeness and adequacy of the FEIS and could lead a court to order another supplemental draft EIS.

Our three agencies are deeply committed to protecting human health and the environment. We also strongly believe that it is important to pursue a health in all policies approach to create and maintain healthy Minnesota communities. Thus, as state agencies charged with making important decisions about the future of our state, we are committed to carefully evaluating PolyMet's proposed NorthMet Project before making any permitting decisions.



MINNESOTA ACADEMY OF
FAMILY PHYSICIANS

House of Delegates
Minnesota Academy of Family Physicians
April 13, 2016

1 **Resolution #3: Request for strengthening Minnesota Rules to require completion of a Health Impact**
2 **Assessment (HIA) for sulfide mining proposals**

3
4 **Submitted by: Lake Superior Chapter**

5
6 WHEREAS, Minnesota is poised to develop reserves of copper, nickel, platinum group elements and
7 other minerals; and

8
9 WHEREAS, mining and processing of these minerals releases toxins known to be harmful to human
10 health; and

11
12 WHEREAS, Minnesota government officially espouses a “health in all policies” approach to natural
13 resource development and more than two dozen HIAs have already been completed or are in process in
14 Minnesota; and

15
16 WHEREAS, in 2015 the MAFP supported the “completion of a Human Health Impact Assessment for
17 mining projects so that both health professionals and the public can make informed decisions”
18 (Resolution 3);

19
20 BE IT RESOLVED, that the MAFP supports the preparation of a comprehensive, independently produced
21 Health Impact Assessment (HIA) for all sulfide mining projects requiring the completion of an
22 environmental assessment worksheet (EAW) or an environmental impact statement (EIS), and

23
24 BE IT FURTHER RESOLVED, that the MAFP also supports changing Minnesota Administrative Rules in
25 Chapter 4410 to include the requirement that a comprehensive and independent HIA be prepared for all
26 sulfide mining projects requiring an EAW or EIS.

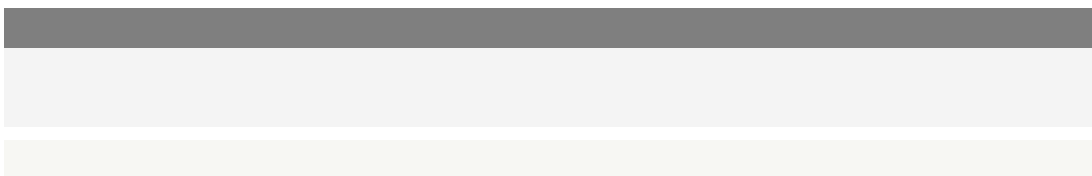
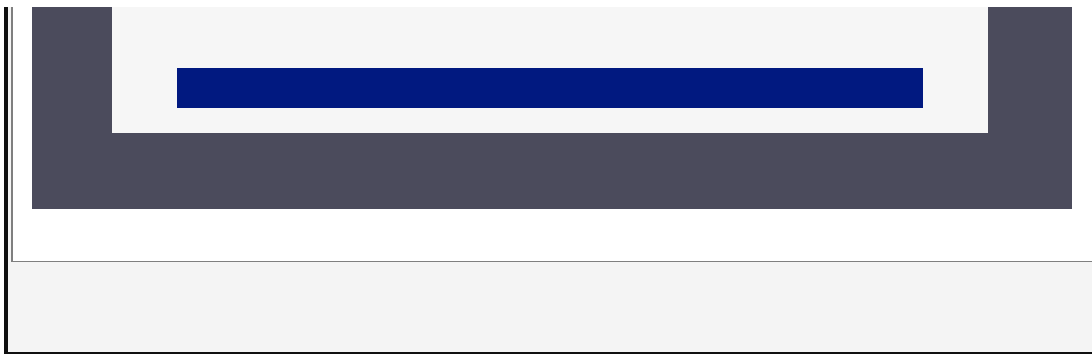
k

**LAKE SUPERIOR CHAPTER
RESOLUTION TO
THE MAFP HOUSE OF DELEGATES**

APRIL 13, 2016

*Request for strengthening Minnesota Rules to require completion of a Health Impact Assessment (HIA) for sulfide mining proposals;
WHEREAS Minnesota is poised to develop reserves of copper, nickel, platinum group elements and other*

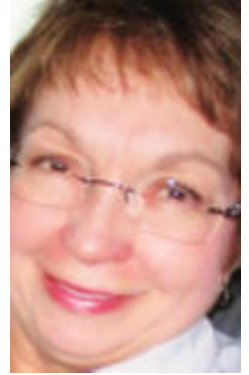
*minerals; and
WHEREAS mining and processing of these minerals releases toxins known to be harmful to human health; and
WHEREAS Minnesota government officially espouses a "health in all policies" approach to natural resource development and more than two dozen HIAs have already been completed or are in process in Minnesota; and
WHEREAS in 2015 the MAFP supported the "completion of a Human Health Impact Assessment for mining projects so that both health professionals and the public can make informed decisions" (Resolution 3);
BE IT RESOLVED, that the MAFP supports the preparation of a comprehensive, independently produced Health Impact Assessment (HIA) for all sulfide mining projects requiring the completion of an environmental assessment worksheet (EAW) or an environmental impact statement (EIS), and
BE IT FURTHER RESOLVED, that the MAFP also supports changing Minnesota Administrative Rules in Chapter 4410 to include the requirement that a comprehensive and independent HIA be prepared for all sulfide mining projects requiring an EAW or EIS.*



Duluth News Tribune

Nurse's View: PolyMet sulfide mine threatens downstream health

By [Aggie Cook](#) on May 5, 2016 at 10:00 p.m.



The Minnesota Department of Natural Resources held a session on permitting for the proposed PolyMet copper-nickel mine on April 19 in Aurora. Some community leaders talked about mining jobs and some about the potential effects on the Boundary Waters Canoe Area Wilderness. As public health professionals, those of us involved with the Minnesota Public Health Association believe we must all be concerned about PolyMet's downstream effects on human health in the Lake Superior basin.

The proposed PolyMet copper-nickel project would be located in the Superior National Forest, upstream of residential drinking water wells, a city drinking water source, and important fisheries reaching as far downstream as Lake Superior. A leading international expert on wetlands and mercury, Dr. Brian Branfireun, has concluded that increased mercury methylation from sulfate and mercury pollution and from hydrological changes in the highly methylating wetlands at the PolyMet site would increase the mercury contamination of fish – not only near the PolyMet site but downstream in the St. Louis River, the largest U.S. tributary to Lake Superior.

The Fond du Lac Reservation is located on the St. Louis River downstream of the PolyMet site, as is the city of Duluth and the St. Louis River estuary. The estuary and lower reaches of the St. Louis River are known to contain, from PolyMet's proposed site downstream to Lake Superior, particularly high levels of mercury in fish. The PolyMet project could create risks to human health.

The Minnesota Public Health Association is an all-volunteer professional organization for public health professionals throughout the state of Minnesota.

Our mission is to create a healthier Minnesota through effective public health¹⁶⁴ practices and by engaging citizens. We recently have focused on the need to reduce disparities in the health of Minnesotans.

The Minnesota Public Health Association and other leading medical and health organizations in Minnesota – including the Minnesota Nurses' Association, the Minnesota Medical Association and the Minnesota Academy of Family Physicians – have called for a detailed assessment of the dangers posed by the PolyMet project to human health before the state issues permits for the project. This assessment has not yet been done.

Methylmercury contamination of fish is already widespread in Minnesota. We must prevent additional mercury from entering the environment and damaging the developing brains of Minnesota children. Fetuses, infants and young children are four to five times more sensitive to the adverse effects of methylmercury exposure than are adults.

The Minnesota Department of Health found that one out of 10 infants in Minnesota's Lake Superior Region are born with unsafe levels of mercury in their blood. The percentage of Minnesota infants at risk for neurologic impairment from mercury was higher than in neighboring states. The danger is greatest for communities which rely on fish for subsistence, including Minnesota's Native American tribes.

The PolyMet project may also increase lead, manganese and arsenic in Minnesota drinking water. Lead and manganese, like methylmercury, cause brain damage in infants and children. Arsenic is a potent carcinogen. Pollutants can act together to cause toxicity and illness. Neurological disorders from even low doses of lead and mercury cannot be cured. If the PolyMet project was allowed to increase these toxic pollutants, public health costs to Minnesota communities would be irreversible.

PolyMet also has the potential to harm workers and public health as a result of

emissions of toxic metals and asbestos-like fibers at the mine and plant and¹⁶⁵ due to air pollution from burning coal to generate the huge amounts of electricity required to run the plant.

Across the country, the track record of sulfide mining has been poor. Minnesota has no prior experience with this type of mining. Minnesota infants, children and adults would be facing new and unprecedented health risks from the PolyMet sulfide mine project. The proposed location of the PolyMet mine and tailings waste facility – in the midst of wetlands and peatlands that are particularly likely to increase mercury methylation – poses a unique risk to Minnesotans living in downstream communities. The possibility of mercury contamination in fish because of PolyMet could increase health disparities for tribal members and low-income people.

The Minnesota Public Health Association believes permits should not be considered for the PolyMet project until a detailed assessment has been done of methylmercury increases, contamination of drinking water and fish, and other health risks.

***Aggie Cook** of Sartell, Minn., is a retired registered nurse for the Minnesota Department of Health and currently is the volunteer president of the Minnesota Public Health Association, which represents 400 public health professionals from across the state.*



June 17, 2016

Minnesota Environmental Quality Board
520 Lafayette Road
St Paul, MN 55155

RE: Support for Petition of Minnesota Academy of Family Physicians
for Rulemaking under Minn. R. 1400.2040 and 1400.2500

Dear Environmental Quality Board (EQB) members,

This letter is submitted on behalf of the Minnesota Public Health Association. The Minnesota Public Health Association (MPHA) is an all-volunteer professional organization for public health professionals throughout the state of Minnesota. Our mission is to create a healthier Minnesota through effective public health practice and engaged citizens.

We write to support the petition of the Minnesota Academy of Family Physicians (Family Physicians) for rulemaking to require that a comprehensive, independently produced Health Impact Assessment (HIA) be prepared for all sulfide mining projects requiring the completion of an environmental assessment worksheet (EAW) or an environmental impact statement (EIS). The MPHA Executive Committee approved this position at our Executive Committee meeting on June 9, 2016.

We have read the Family Physicians' letter of May 25, 2016, the Petition under Chapter 4410 of Minnesota Rules for the Environmental Quality Board to engage in rulemaking, and the specific rule change that the Family Physicians have requested. The MPHA supports the specific proposal made by the Family Physicians and joins in requesting that the specific rule changes that they proposed to Minnesota Rules be adopted as soon as possible.

The MPHA has been concerned about sulfide mining since we read environmental review documents and expert reports related to the PolyMet NorthMet open pit copper-nickel mine project upstream of the St. Louis River, the Fond du Lac Reservation, the City of Duluth, and Lake Superior. In the enclosed October 2014 letter from our President we requested a comprehensive analysis of the health risks and public health impacts of the Poly Met sulfide mine project before any decisions were made about this controversial project.

MPHA expressed our concerns that the proposed PolyMet copper-nickel mine project could have significant adverse impacts on human health and on health disparities as a result of

pollutants released to air, surface water and drinking water. We believed and continued to believe that the analysis performed thus far on the PolyMet project is insufficient to assess important adverse impacts to human health, particularly the risks posed by increased mercury contamination of fish in downstream waters and resulting impacts on neurotoxicity to the developing brains of fetuses, infants, and children in Minnesota.

In addition to mercury risks, a health impact assessment is also needed to evaluate individual and synergistic adverse impacts of sulfide mining pollutants such as crystalline and asbestos-like fibers, nickel, dioxins and particulates released to air and toxic contaminants such lead, manganese, and arsenic released to drinking water.

We believe that a health impact assessment is needed to evaluate risks to workers in sulfide mining facilities as well as to nearby and downstream communities. Disparate impacts to fetuses, infants, children and persons who rely on fish and wild rice for subsistence must be evaluated as well as the adverse impacts of air pollution from fossil fuel combustion on cardiovascular health and the public costs of health care, special education and other services.

Across the country, sulfide mining has resulted in significant public costs for remediation of pollution. We believe that careful health impact assessment should take place while a sulfide mining project is still under review, rather than after-the-fact when morbidity may not be reversible.

Please enact rules to ensure that Minnesotans understand the health impacts of any sulfide mining project before permits are issued. We would suggest that the EQB conduct a public hearing so that doctors and public health professionals could speak in support of the proposed rules requiring a Health Impact Assessment (HIA) for any Minnesota sulfide mine project as part of environmental review.

Please also include the MPHA in any discussions of next steps that the EQB plans to take regarding the Family Physicians' petition for rules requiring an HIA for sulfide mine projects. We look forward to working with you to protect the health of Minnesotans as sulfide mining projects are considered.

Thank you for your consideration of the Family Physicians' petition for HIA rulemaking, to which petition the MPHA adds our strong support.

Sincerely yours,



Lindsey E.A. Fabian, MPH
President, Minnesota Public Health Association
President@mpha.net

Enclosure

MEETING

**On July 19th 2016 at University of MN Medical School Duluth, Room 162
Minnesota Academy of Family Physicians (MAFP)
and Minnesota Public Health Association (MPHA)
with Minnesota Environmental Quality Board (MEQB)**

Commissioner Dave Frederickson, MEQB Chair
Will Seuffert, MEQB Executive Direction
Courtney Ahlers-Nelson, MEQB Planning Director

Introduction: Dania Kamp, M.D. – MAFP President

As the largest medical specialty organization in Minnesota, representing over 3,100 family physicians, residents and students – we are grateful to the Commissioner and staff for taking the time to meet with representatives from Minnesota Academy of Family Physicians (MAFP) to discuss this important issue. At our April 2016 House of Delegates meeting, which is our policy making body, delegates unanimously voted to support this request to you. Our mission as an organization is to support family physicians as they provide high quality, comprehensive and continues medical care for patients of all ages, and we believe that all of our patients deserve to live in healthy communities. Thank you for taking the time to hear our concerns about the impact sulfide mining will have on our patients.

Emily Onello, M.D. – MAFP Member, Member of Lake Superior Chapter

Welcome to our guests Commissioner Frederickson; Executive Director Seuffert; and Planning Director Ahlers-Nelson from the Minnesota Environmental Quality Board. Welcome to our visitors from the Minnesota Academy of Family Physicians, MAFP President Dr. Dania Kamp and MAFP Executive Vice President, Maria Huntley. Welcome to RN, Aggie Cook, our representative from the Minnesota Public Health Association and attorney Paula Maccabee from the Just Change Law firm in St. Paul.

And welcome to my physician colleagues, Drs. Kamp, Allert, Ipsen, and Wegerson. My name is Emily Onello and I am a faculty member here at the medical school, and as such, I would like to welcome you to the University of Minnesota Medical School Duluth campus. I am a Family Physician and member of the Minnesota Academy of Family Physicians. I practice medicine here in Duluth at the Lake Superior Community Health Center. Previously, I practiced in the small mining town of Silver Bay up the shore of Lake Superior.

Though we are not gathered today with any “official” medical school connection, I think that it is appropriate that we are holding our gathering here at the medical school. As many of you may know, four decades ago, this medical school campus was created by a concerned and visionary state legislature that responded to an alarm call from the state’s practicing rural Family Physicians: Who would replace them in greater Minnesota as they retired? At that time, the main University medical school (as with many medical schools in the United States) was producing primarily specialists and subspecialists for the urban and suburban metro communities. This campus was created with the primary objective of training the next generation of Family Physicians for rural practice. The health of rural communities was always at the forefront of this school’s mission.

Since then, a second important mission has been added; to meet the needs of Native American communities and to train Native American physicians as a way of meeting tribal community needs. Research has been the third mission of this medical school since its inception. Researchers at the medical school and at University of Minnesota Duluth continue to provide important insight into our environment's health.

There were many skeptics who believed this medical school would fail and close its doors after a few years. Many believed that its goals were not achievable. I am proud to say that this campus has been extraordinarily successful at meeting its missions and has exceeded the original goals set forth by the legislature. Most medical schools are lucky to break 10% in terms of the number of medical students who select the specialty of Family Medicine. Consistently, between 40-50% of our Duluth graduates select the specialty of Family Medicine—the highest percentages in the nation. And our graduates settle in micropolitan and rural communities to practice and to stay.

In my work here at the medical school, I am privileged to travel all across our state to visit our medical students when they are on rural clerkships. It is inspiring to see so many of our alumni in rural practice, and to consider what the healthcare landscape of rural Minnesota would look like *without* the past 40 years of the Duluth campus.

Given the priority that this school has placed on the health of Minnesota's rural and tribal communities, it is very appropriate and timely that we are meeting here to discuss the Minnesota Academy of Family Physicians' petition for rulemaking to require HIAs and sulfide mining projects. Proposed sulfide mining projects preferentially involve and most directly impact our rural communities. I am grateful that our visitors from the Twin Cities and points south and southwest have taken the time to meet us here today.

Timeline of Medical Professional Involvement
RE: Request for Human Health Impact Assessment for Sulfide Mining Proposals

I would like to provide background on physician involvement in the sulfide mining issue by means of a timeline. We hope that by hearing about the *sustained effort of health professionals* to advocate for an Health Impact Assessment for sulfide mining projects, the EQB will appreciate the Minnesota Academy of Family Physicians' (MAFP) urgent call for an Health Impact Assessment (HIA).

Disclaimer: there are many health professionals who have been concerned about the health effects of sulfide mining in Minnesota prior to 2014. However, I have chosen to begin our story there, as that is when members of our MAFP Chapter become involved.

2014	SDEIS Comment period: Health Professionals begin to express concern about potential health effects of sulfide mining in MN
February 2014	Physician Letter of Concern reported in newspapers, including the Duluth News Tribune

March 10, 2014	Minnesota Nursing Association writes a letter supporting further health inquiry into sulfide mining effects
March 11, 2014	Physicians hold Press Conference in Duluth MN on Health Concerns of Sulfide Mining
March 13, 2014	Commissioner of Health, Ed Ehlinger MD MPH, writes letter that includes request for Health Impact Assessment (HIA) for PolyMet project
March 13, 2014	Multiple health professional groups ¹ submit written comments to the DNR requesting assessment of public health impacts of proposed PolyMet NorthMet sulfide mine
March 13, 2014	DNR Public Comment Period Closes on the Supplemental Draft Environmental Impact Statement for NorthMet
March 14, 2014	Two Duluth family physicians meet with MN Senator Roger Reinert to discuss mining health concerns
May 19, 2014	Two Duluth physicians and others meet with representatives at the MN Department of Health, St. Paul MN, to discuss mining health concerns
July 24, 2014	Duluth physicians ² and others meet with DNR representatives in St. Paul MN to discuss mining health concerns and explore ways that an HIA might be completed for the PolyMet NorthMet sulfide mining project.
August 4, 2014	Beginning of the Mt. Polley copper and gold mine disaster with a breach of the tailings pond dam that ultimately resulted in release of contaminated water in British Colombia Canada; this event significantly alarms MN physicians and emboldens their efforts to model health effects to include unanticipated events.
September 18, 2014	Dr. Nordin presents information on human health for a Citizen Forum in Duluth, MN on mercury contamination of the St. Louis River.
September 25, 2014	On behalf of the Minnesota Medical Association, its President, Donald M. Jacobs MD, writes letter to Governor Dayton and Commissioners of Health, DNR, and MPCA supporting HRA and HIA for PolyMet NorthMet sulfide mine project.
October 20, 2014	Concerned medical professionals ³ write letter to Governor Dayton and some of his Commissioners asking for health risk and impact assessment of sulfide mining project, PolyMet's NorthMet proposal.
October 2014	Minnesota Public Health Association writes a letter of support for a "comprehensive analysis of the health risks and public health impacts of the PolyMet sulfide mine project."
October 21, 2014	Physicians deliver a community presentation on sulfide mining health concerns in Duluth MN.

¹ Minnesota Nurses Association; Minnesota Department of Health; 46 independent health professionals.

² Drs. Saracino, Child and Adolescent Psychiatrist; Drs. Nordin, Onello and Pearson, Family Physicians

³ 153 individual MN doctors, nurses, scientists and health professionals.

- November 20, 2014 Presentation to the Lake Superior Chapter of the Minnesota Academy of Family Physicians (MAFP) on sulfide mining's potential health effects, Duluth MN.
- March 9, 2015 Physicians from the MAFP write a letter to Governor Dayton and his Commissioners of Health, DNR, MPCA to reiterate the strong need for health impact assessment for the PolyMet sulfide mining proposal.
- April 13, 2015** MAFP House of Delegates unanimously passes resolution supporting independent health risk and health impact assessment for sulfide mining proposals.
- April 22, 2015 MAFP physicians receive a response from DNR Commissioner Landwehr with an invitation to meet.
- July 22, 2015 MAFP President, Tariq Fareed MD, writes a letter in support of health assessment.
- September 10, 2015 DNR Commissioner Landwehr provides a response to MAFP President Dr. Fareed's letter.
- September 25, 2015** Concerned physicians⁴ and others meet at the DNR in St. Paul MN with Commissioners Landwehr (DNR), Linc Stine (MPCA), Ehlinger (MDH), and Governor Dayton's representative, Ms. Joanna Dornfeld, to request Health Risk and Impact Assessments for the PolyMet project. At this gathering, the DNR suggests that we amend MN rule 4410 to include health impact assessment.
- December 14, 2015 Final letter from three Commissioners to Dr. Jennifer Pearson and the MAFP. The letter responds to issues from the September 25, 2015 meeting and states that an HIA will not be completed. This letter included an attached memo written from the Commissioners to Governor Dayton dated December 7th, 2015 with the subject line "Health Impact Assessment for PolyMet's copper-nickel mining project."
- March 3, 2016 DNR Commissioner Landwehr determines that the Final EIS is adequate and state environmental review is complete for PolyMet project.
- April 2016** MAFP House of Delegates unanimously passes resolution supporting a petition for HIA Rulemaking to require that a comprehensive, independently produced HIA be prepared for all sulfide mining projects requiring the completion of an environmental assessment worksheet (EAW) or an environmental impact statement (EIS).
- May 25, 2016** MAFP submits a petition for rulemaking to require that a comprehensive, independently produced HIA be prepared for all sulfide mining projects requiring the completion of an environmental assessment worksheet (EAW) or an environmental impact statement (EIS) along with supporting letter and materials.

⁴ Psychiatrists Drs. Bauer and Saracino,; Family Physicians Allert, Fareed, Ipsen, Nordin, Onello, Pearson, Wegerson, Wendlund

June 17, 2016 On behalf of the Minnesota Public Health Association, President Lindsey E.A. Fabian MPH, writes a letter *in support* the MAFP petition for rulemaking to require an HIA for sulfide mining environmental review.

Totalling over 30,000 in collective health professional membership, the Minnesota Medical Association, Minnesota Nursing Association, Minnesota Public Health Association, and the Minnesota Academy of Family Physicians support the completion of health impact assessment for sulfide mining projects.

Kris Wegerson, M.D. – MAFP Member, Member of Lake Superior Chapter

We believe that it is necessary to amend MN Administrative Rules Chapter 4410, Environmental Review, to require that a comprehensive and independent Health Impact Assessment (HIA) be prepared for all sulfide mining projects requiring an EAW or EIS.

It is the intent and letter of the law that health impacts be considered. The purposes of NEPA (1969) are to “stimulate the health and welfare of man... assure for all Americans safe, healthful, productive... surroundings... attain the widest range of beneficial uses of the environment without degradation, risk to health or safety.”

MEPA (1973) has verbatim identical language. Chapter 116D.03 Action By State Agencies Subd 2. Duties, states: “All departments and agencies of the state government shall... (8) undertake, contract for or fund such research as is needed in order to determine and clarify effects by known or suspected pollutants which maybe detrimental to human health or to the environment, as well as to evaluate the feasibility, safety and environmental effects of various methods of dealing with pollutants.”

It is the spirit of the law that health impacts be considered. Commissioner Ehlinger asked for an HIA in his March 13, 2014 comments on the SDEIS for the PolyMet NorthMet Project. He stated: “Health starts where we live, learn, work and play. To create and maintain healthy Minnesota communities, we have to think in terms of health in all policies.”

Commissioners Landwehr, Ehlinger and Linc Stine replied to a letter from Dr. Tariq Fareed, then president of the MAFP, on September 10, 2015, stating, “all three of our agencies stand behind the statement that “health starts where we live, earn, work and play.” We also strongly believe that it is important to pursue a Health in All Policies approach to create and maintain healthy Minnesota communities.”

These Commissioners replied to Dr. Jennifer Pearson, a UMD School of Medicine faculty member, in a letter dated December 14, 2015. They stated, “Our three agencies are deeply committed to protecting human health and the environment. We also strongly believe that it is important to pursue a health in all policies approach to create and maintain healthy Minnesota communities.”

Unfortunately, they stated that an HIA would not be required for the PolyMet NorthMet Project. They cited their rationale for this decision in a letter to Governor Dayton dated December 7, 2015:

“[W]e do not believe it is practically or procedurally possible to pursue an HIA outside of the EIS or permitting process at this point. An HIA would have the potential to introduce unintended delay in decision making, legal risks, and public confusion about the linkage between the HIA and FEIS processes and applicable laws. In particular, we are concerned that deciding to conduct an HIA would call into question the completeness and adequacy of the FEIS and could lead a court to order another supplemental draft EIS.”

We had initially asked for an HIA in our comments to the PolyMet SDEIS dated March 11, 2014. There would have been adequate time to perform an HIA.

Governor Dayton stated on November 17, 2015 that he would consider the request by health professionals to have an HIA included in the PolyMet environmental review process. He stated: “I, frankly, am told that the Department of Health makes these types of assessments.”

Governor Dayton is correct: The MDH does HIAs. The MDH website under Health Impact Assessment (HIA) lists as its goal “promoting health in all projects and policies.” The website also says, “The MDH supports Health Impact Assessments (HIA) as a tool to ensure that health is considered in important decisions. HIA emphasizes a comprehensive approach to health. MDH is aware of 31 HIAs that have been completed or in process in Minnesota. “ In fact, three HIAs have been completed for Duluth area projects. In June 2010 the 6th Ave East Duluth Redesign Concept/Complete Streets Policy HIA was completed. We don’t understand how the redesign of one street in Duluth can require an HIA, but the largest and costliest natural resource development project in the history of Minnesota doesn’t require an HIA.

In September 2012 the MDH submitted to the MEQB a study entitled “Incorporating Health and Climate Change into the Minnesota Environmental Assessment Worksheet.” On page 13 of this document it states: “Integrating HIA with environmental review provides the opportunity to examine the health impacts of industry and government actions, which is one of the original purposes of NEPA in addition to many state Environmental Policy Acts.”

Further on page 14 of this study, it reads, “If health was a higher priority in the review process, authorities and political leaders might provide more resources, incentives and linkages to health professionals, who have experience and expertise, for determining health impacts within the environmental review process...Bringing health professionals to the table will highlight the public health impacts undergoing environmental review. Authorities may not be aware that public health is a high priority issue because the problems have not been brought to their attention.” We have been trying to bring this to your attention for over two years.

And I further quote this document: “An issue related to the relative importance of public health is the resulting informality of the current attempts to integrate HIAs with environmental review process. Without the support of an explicit formal requirement and clear administrative procedures, the quality and content of informal attempts are inconsistent and potentially ineffective”. (p.15) “This report concludes that HIA is one tool that can be used to more comprehensively assess the health and climate change impacts that go through the environmental review process.” (p.25) We ask that you accept our petition.

John Ipsen, M.D., PhD - MAFP Member, Member of Lake Superior Chapter

We appreciate the opportunity to speak and present our petition to you.

The World Health Organization has a 10 most *unwanted* list: that is to say a list of the 10 pollutants causing the greatest damage to human health around the globe.

Hardrock mining, called by the EPA “the most toxic industry”, produces 5 of those agents: Mercury, Lead, Arsenic, Asbestos, and Air Pollution.

Four of these five pollutants were inadequately reviewed in the PolyMet FEIS. In spite of the fact that we brought this to the attention of the DNR in our comments on the SDEIS on March 11, 2014 and then after the PFEIS was available to a gathering of state officials on September 25, 2015, three of our Commissioners subsequently sent a letter to Governor Dayton urging him not to require an HIA on the PolyMet project. More recently, on March 7th, the Governor went on record expressing opposition to the hardrock projects that wait in the wings on the edge of the Boundary Waters, after reconsidering the great potential for harm this type of mining has.

Hardrock mining has precisely the WORST environmental track record of any industry around the world. It has never failed to pollute and its impact has been worse where it has been attempted in water-rich environments like the projects proposed in Minnesota.

The PolyMet FEIS did not adequately address Air Pollution and Asbestos. These pollutants are known to cause a variety of respiratory and heart diseases. Production and control of these pollutants was not fully addressed in the FEIS and the contribution to pollution from remote energy production was not fully considered.

The PolyMet FEIS did not adequately address lead, and a recent study showed Minnesota leads the country in having 10.3% of children under the age of 6 with toxic lead levels. Lead has been linked to diminished IQ and to ADHD. The FEIS didn't use a surface water or a groundwater evaluation criterion for lead though Commissioner Ehlinger recommended use of a groundwater criterion in his March 13, 2014 comments on the PolyMet SDEIS.

The PolyMet FEIS did not adequately address mercury. While there will be direct production of mercury by the project, a more significant contribution is anticipated from the conversion of mercury to its toxic form methylmercury in the environment that is promoted by sulfate release into the water. In this regard, the concentration of sulfate in the wastewater is not as telling as the absolute amount of sulfate, which will be great because the volume of water released will be great. A major study has shown 10% of infants born on the Minnesota side of Lake Superior have toxic mercury levels in their blood and this has been linked to neurodevelopmental problems – diminished IQ and mental health disorders.

Drs. Peg Saracino and Steve Bauer, child psychiatrists from Duluth, were not able to join us here today due to prior commitments. As Dr. Saracino summarized during our meeting with state officials last September:

“More methylmercury in the environment would only result in more neurodevelopmental

disabilities and associated mental health issues. It is my opinion based on concern for my patients and my community that it is imperative that human health risks be assessed prior to going forward with any plan to allow copper-nickel mining in the water rich area of Northern Minnesota. Potential emotional, behavioral and financial costs to our future children, families, communities and society are dangerously high. It is imperative to proceed with caution, as human lives for generations may be adversely affected.”

In sum, we feel the potential health impacts of sulfide mining need to be thoroughly reviewed in projects of this magnitude. Those who are directed by the spirit and the letter of the law and who have pledged to protect human health in all things owe it to the people of Minnesota to require that comprehensive, *independently* performed Health Impact Assessments be done for sulfide mining projects. In order to accomplish this, Minnesota Rule 4410 needs to be amended.

Aggie Cook, R.N., M.P.H. - Immediate Past President of MPHA

My name is Aggie Leitheiser Cook. I am the Immediate Past-President of the Minnesota Public Health Association and am here with the endorsement of the Governing Council, representing over 400 members of our organization. MPHA is an all-volunteer professional organization for public health professionals throughout the state of Minnesota. Our mission is to create a healthier Minnesota through effective public health practice and engaged citizens.

I am a registered nurse with a Master’s in Public Health. I worked in public health for over 40 years, most of that time at the Minnesota Department of Health where I served as Assistant Commissioner for the Health Protection Bureau for 10 years prior to my retirement.

MPHA supports the petition of the Minnesota Academy of Family Physicians for rulemaking to require that a comprehensive, independently produced Health Impact Assessment be prepared for all sulfide mining projects requiring the completion of an environmental assessment worksheet or an environmental impact statement. MPHA joins the MAFP in requesting that the specific Minnesota Rule changes be adopted as soon as possible.

The MPHA has been concerned about health effects from sulfide mining since we read environmental review documents and expert reports related to the PolyMet NorthMet open pit copper-nickel mine.

In October 2014, we wrote a request to the Governor and the Commissioners of the Department of Natural Resources, Department of Health and Pollution Control Agency to conduct a comprehensive analysis of the health risks and public health impacts of the PolyMet sulfide mine project before any decisions were made. MPHA expressed our concerns that the project could have significant adverse impacts on human health and on health disparities as a result of pollutants released to air, surface water and drinking water. We believed and continued to believe that the analysis performed thus far on the PolyMet project is insufficient to assess important adverse impacts to human health, particularly the risks posed by increased mercury contamination of fish in downstream waters and resulting impacts on neurotoxicity to the developing brains of fetuses, infants, and children in Minnesota.

We also authored a commentary piece that was published in the May 5, 2016 Duluth News Tribune to call for a detailed assessment of the dangers posed by the PolyMet project to human health before the state issues permits for the project.

And in June of this year, MPHA wrote to support the request from the Minnesota Academy of Family Physicians for Rulemaking to require a Health Impact Assessment for all sulfide mining projects.

Across the country, the track record of sulfide mining has been poor. Minnesota has no prior experience with this type of mining. Minnesota infants, children and adults would be facing new and unprecedented health risks from sulfide mine projects.

A health impact assessment is needed to evaluate at least the following five areas:

- * the impacts to fetuses, infants, children and persons who rely on fish and wild rice for subsistence;
- * the adverse impacts of air pollution from fossil fuel combustion on cardiovascular health and the public costs of health care, special education and other services;
- * individual and synergistic adverse impacts of sulfide mining pollutants such as crystalline and asbestos-like fibers, nickel, dioxins and particulates released to air;
- * toxic contaminants such as lead, manganese, and arsenic released to drinking water; and
- * risks to workers in sulfide mining facilities as well as to nearby and downstream communities.

A health impact assessment should take place while a sulfide mining project is still under review, rather than after-the-fact when morbidity may not be reversible.

Minnesota currently requires assessment and attention to the health of animals, fish, water and air. It would seem important to add humans to the list of those potentially impacted by sulfide mining. Please enact rules to ensure that Minnesotans understand the human health impacts of any sulfide mining project before permits are issued.

Thank you for your consideration of the Family Physicians' petition for rulemaking to require a Health Impact Assessment be prepared for all sulfide mining projects requiring an EAW or EIS. The Minnesota Public Health Association adds our strong support to this petition.

Deb Allert, M.D. – MAFP Lake Superior Chapter President

My name is Debbie Allert, I am the current president of the Lake Superior Chapter of Family Physicians.

I work and live in northern Minnesota. I have practiced in Two Harbors for 25 years. My job is to protect my patients' and my community's health. My patients trust that I have their best welfare in mind and I take that as a sacred trust. I believe that the people of Minnesota trust that the state is protecting their health as stated in the mission statements from:

- MDH, "protecting, maintaining and improving the health of all Minnesotans".
- MPCA "To protect and improve the environment and enhance human health".

- MN DNR “To work with citizens to conserve and manage the state’s natural resources to provide outdoor opportunities and to provide for commercial uses of natural resources in a way that creates a SUSTAINABLE QUALITY of life”.

Today we have endeavored to give you a history of our varied medical professional groups’ repeated efforts to influence our state agencies to allow for an independent Health Impact Assessment to be done regarding sulfide mining. We also explained how agency leaders themselves recommended that we take this action.

Those that have collectively raised their voices through their state organizations represent over 30,000 Minnesota medical professionals. We are trying to protect our patients and our communities from what we believe may have significant potential to increase toxins in our water and food supply. As stated repeatedly, there is a substantial risk that we will see far reaching harm into the foreseeable future. Because the current environmental review process has not voluntarily provided enough information to adequately evaluate the effect on human health, it is more than reasonable to require a specific health impact assessment so that higher quality public health information will be made available prior to any permitting for the sulfide mining.

Sulfide mining is not ferrous mining. Understanding the human health impact with the potential for acid leaching of heavy metals into our water supply is crucial. Sulfide mining has never been done in Minnesota.

We are unaware of any effort previously in the state of Minnesota where so many medical professionals have come together through their state organizations to try to get the attention of our state agencies whose job it is to protect the health and wellbeing of its citizens. Please let that effort speak for itself. The Minnesota Health Department has also called for the use of health impact assessments in environmental review since its 2012 report. We are asking as loudly and as forcefully as we can that environmental review rules be changed in this year’s upcoming process to require a health impact assessment where it is most needed – a large, risky project where Minnesota has no prior experience.

Requiring an independent HIA would give us a chance to understand the risks that our patients are likely to face should sulfide mining be allowed. Please implement the advice of Minnesota’s Health Department and our collective request and change Minnesota rules so that an HIA will be done for any sulfide mine. In my opinion, to do any less would be betrayal of the trust the people of Minnesota have placed in our agencies.

Now, we would like to hear your response to our request and your explanation of the next steps that will be taken to consider our rule proposal.



**Minnesota Academy of Family Physicians
Minnesota Environmental Quality Board Staff
Commissioner Frederickson
July 19, 2016 – 10:30 a.m.
University of Minnesota – Duluth – Medical School
Room 162 SMed**

Attendance:

Dania Kamp, M.D. – MAFP Board President
Deb Allert, M.D. – MAFP Lake Superior Chapter President
Kristan Wegerson, M.D. – MAFP Board Member, member of Lake Superior Chapter
John Ipsen, M.D. – MAFP Member, member of Lake Superior Chapter
Emily Onello, M.D. – MAFP Member, member of Lake Superior Chapter
Aggie Cook, RN MPH - Immediate Past-President of the Minnesota Public Health Association
Paula Maccabee Esq. – Just Change Law
Maria Huntley, CAE – MAFP Executive Vice President
Commissioner Frederickson – Minnesota Department of Agriculture
Will Seuffert – Executive Director – Minnesota Environmental Quality Board
Courtney Ahlers-Nelson – Planning Director - Minnesota Environmental Quality Board

Agenda

1. Welcome and introductions
Emily Onello MD, Commissioner Dave Fredrickson, All Participants
2. Explanation of Petition History & Rulemaking Request
Opening remarks from MAFP President Dania Kamp MD

Emily Onello MD

Kris Wegerson MD

John Ipsen MD
3. Support from Minnesota Public Health Association
Aggie Leitheiser Cook RN MPH
4. Summary
Deb Allert MD
5. Comments from Commissioner Fredrickson & EQB Staff
6. Questions and Answers

Letters of Support



**Non-Profit and Grassroots Groups Supporting
*Health Impact Assessment in Environmental Review of Sulfide Mining***

August 4, 2016

Courtney Ahlers-Nelson, Planning Director (courtney.ahlers@state.mn.us)
Minnesota Environmental Quality Board -Environmental Review Rulemaking
520 Lafayette Road
St Paul, MN 55155

RE: Support for Petition of Minnesota Academy of Family Physicians to amend
Minnesota Rules Chapter 4410 to Require a Health Impact Assessment in
Environmental Review of Sulfide Mining

Dear Environmental Quality Board (EQB) members,

This letter is submitted on behalf of the following conservation, civic and environmental health and justice organizations representing many tens of thousands of Minnesota and downstream citizens: Center for Biological Diversity, Conservation Minnesota, Friends of the Boundary Waters Wilderness, League of Women Voters Duluth, League of Women Voters Minnesota, Minnesota Public Interest Research Group, North American Water Office, Northeastern Minnesotans for Wilderness, Organic Consumers Association, Save Lake Superior Association, Save Our Sky Blue Waters, Sierra Club North Star Chapter, Voyageurs National Park Association, WaterLegacy, Wilderness Watch, Wisconsin Resources Protection Council.

We received notice that the Environmental Quality Board (EQB) is reviewing amendments pertaining to mandatory categories for environmental review under Minnesota Rules Chapter 4410. Under the Data Practices Act, we obtained copies of a petition filed by the Minnesota Academy of Family Physicians requesting an amendment pertaining to environmental review of sulfide mining projects requiring an environmental assessment worksheet (EAW) or environmental impact statement (EIS).

The undersigned groups strongly support the petition of the Minnesota Academy of Family Physicians for a rule change in Minnesota Rule Chapter 4410 to require that a comprehensive, independently produced Health Impact Assessment be prepared for all sulfide mining projects requiring the completion of an EAW or EIS.

We are concerned about the effects of sulfide mining emissions of crystalline fibers and other carcinogens on the health of workers within the property line of mine facilities; the impacts of groundwater contamination with lead and manganese on the developing brains of children drinking from nearby residential wells; the increases in toxic methylmercury in fish in downstream rivers and lakes; and the impacts on heart and lung disease of air emissions from fossil fuel combustion to power the mines. Human health harms from sulfide mining would disproportionately affect infants, children and communities that rely on fish for subsistence. Adverse health impacts of sulfide mining could also increase public costs to Northern Minnesota communities.

Many of our groups have read the final environmental impact statement for the PolyMet NorthMet copper-nickel mine project. In this 3,576-page document, only 5 pages were given to discussion of "Human Health Considerations." Significant health impacts, such as the risk of cancer to on-site workers and the risk of brain damage to communities eating fish from the St. Louis River were simply dismissed without analysis.

Without a rule requiring a Health Impact Assessment as part of environmental review, Minnesota could fail to analyze the human health risks and public costs of proposed sulfide mines, despite the dismal record of sulfide mining. Experience has shown that every sulfide mine in a water-rich environment - like that in Northern Minnesota - has contaminated groundwater and/or surface water with acid mine drainage and/or toxic metals. That is a 100% failure rate. Although Minnesota has had taconite mines, we have no experience with mining copper and nickel from sulfide-bearing rock, which has a greater potential for toxic risks.

Our undersigned groups request that the EQB hold a hearing this fall on the Minnesota Academy of Family Physicians' petition to require a Health Impact Assessment in environmental review of sulfide mining and provide members of the public with the opportunity to comment and testify regarding this proposed protection of public health. We further request that, at this upcoming hearing, the EQB support the Family Physicians' proposed change to Chapter 4410 environmental review rules and immediately direct EQB staff to draft for adoption their proposed rule amendment requiring a comprehensive Health Impact Assessment in environmental review of sulfide mining.

Respectfully submitted,

Marc Fink
Senior Attorney
Center for Biological Diversity

Paul Austin
Executive Director
Conservation Minnesota

Paul Danicic
Executive Director
Friends of the Boundary Waters Wilderness

Maria Isley
President
League of Women Voters Duluth

Susan Sheridan Tucker
Executive Director
League of Women Voters Minnesota

Mahyar Sorour
Lead Environmental Justice Organizer
Minnesota Public Interest Research Group

Lea Foushee
Environmental Justice Director
North American Water Office

Jon Nelson
Co-Chair
Northeastern Minnesotans for Wilderness

Ronnie Cummins
International Director
Organic Consumers Association

LeRoger Lind
President
Save Lake Superior Association

Elanne Palcich
Board Member
Save Our Sky Blue Waters

Margaret Levin
State Director
Sierra Club North Star Chapter

Christina Hausman
Executive Director
Voyageurs National Park Association

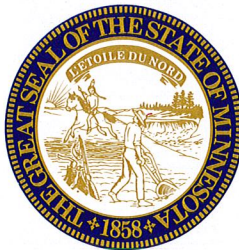
Paula Maccabee
Advocacy Director and Counsel
WaterLegacy

Kevin Proescholdt
Conservation Director
Wilderness Watch

Al Gedicks
Executive Secretary
Wisconsin Resources Protection Council

Jennifer Schultz
State Representative

District 07A
St. Louis County
Duluth



Minnesota House of Representatives

October 3, 2016

Minnesota Environmental Quality Board
Environmental Review Rulemaking
520 Lafayette Road
St. Paul, MN 55155

RECEIVED
OCT 04 2016

BY:

RE: Petition of Minnesota Academy of Family Physicians to amend Minnesota Rules Chapter 4410 to Require a Health Impact Assessment in Environmental Review of Non-Ferrous Mining

Dear Environmental Quality Board (EQB) members,

I support the petition of the Minnesota Academy of Family Physicians for adoption of a rule amendment to require an independent Health Impact Assessment in the process of environmental review for non-ferrous mining projects. This petition was initiated by Lake Superior Chapter Family Physicians, who are my constituents and provide medical care to many thousands of patients who live in the communities I represent.

I support Minnesota state rulemaking to require that human health impacts be assessed for non-ferrous mining projects. My constituents live downstream of proposed copper-nickel mining. Their health could be affected, and their taxes would pay for any needed medical and social services if there were resulting public health problems.

In making permit and financial assurance decisions regarding copper-nickel mining projects, it is important that Minnesota agencies have information about human health impacts and public health costs. I believe common sense requires that officials and citizens know what we may be facing in terms of public health before making decisions about new non-ferrous mining now being proposed in Minnesota. The Minnesota Health Department has had substantial experience with Health Impact Assessments, which can improve the quality of information on public health and increase transparency of decisions for our citizens.

An amendment to Minnesota Rules Chapter 4410 to require a Health Impact Assessment during the process of non-ferrous mining environmental review would help protect the interests of our Northern Minnesota communities. I request that the EQB move forward to draft and adopt such a rule amendment.

Sincerely,

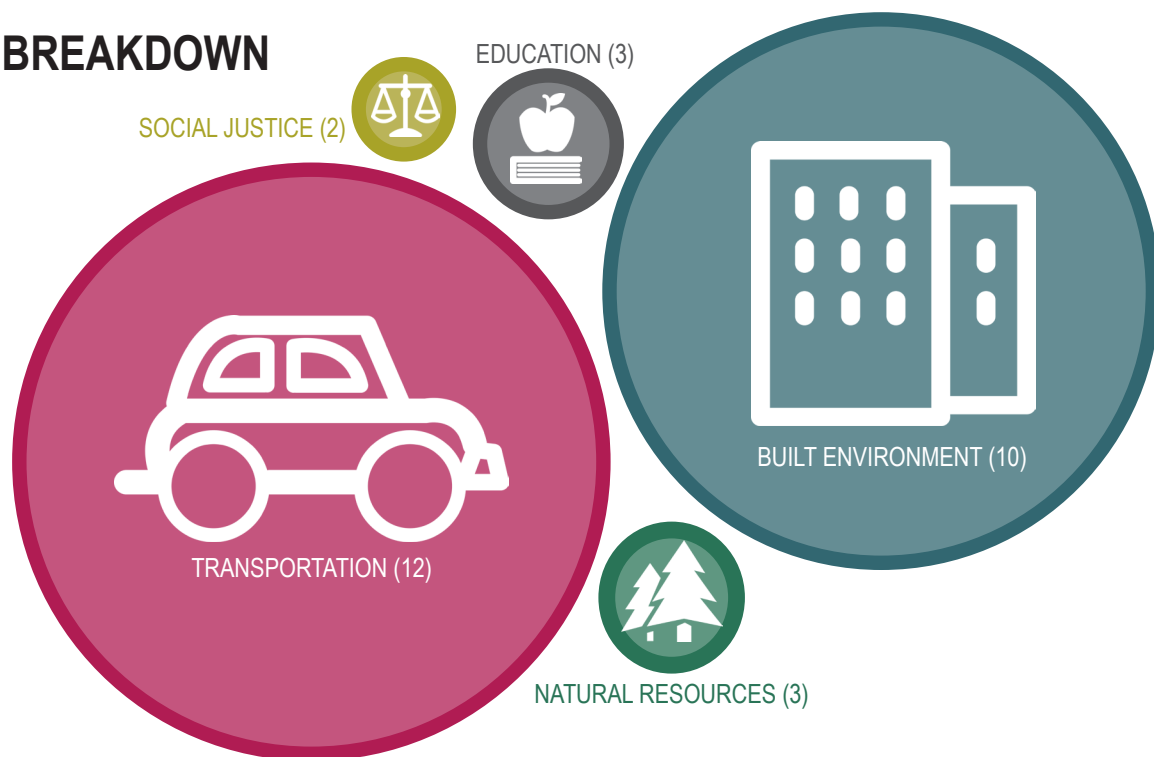
Jennifer Schultz
State Representative



Informational Materials from the Minnesota Department of Health and
the Minnesota Department of Natural Resources

HEALTH IMPACT ASSESSMENT (HIA) PROJECTS IN MINNESOTA

SECTOR BREAKDOWN



BUILT ENVIRONMENT

- » Gary/New Duluth Small Area Plan HIA 2014
- » Goodhue County Zoning Districts HIA 2014
- » Lincoln Park Small Area Plan HIA 2014
- » Winona County Active Living Plan HIA 2014
- » Above the Falls HIA 2013
- » Divine Mercy Development Environmental Assessment Worksheet HIA 2011
- » Douglas County Comprehensive Plan HIA 2010
- » St. Louis Park Comprehensive Plan HIA 2010
- » City of Apple Valley Comprehensive Plan 2030 Update HIA 2008
- » City of Ramsey Threshold HIA 2008

NATURAL RESOURCES

- » Region Nine Development Commission Climate Change Adaptation HIA 2016
- » Marshall GreenStep Cities HIA 2015
- » St. Paul Emerald Ash Borer Policy HIA 2014

SOCIAL JUSTICE

- » Payday Loan Reform HIA 2016
- » Minnesota Drug Sentencing Reform HIA 2016

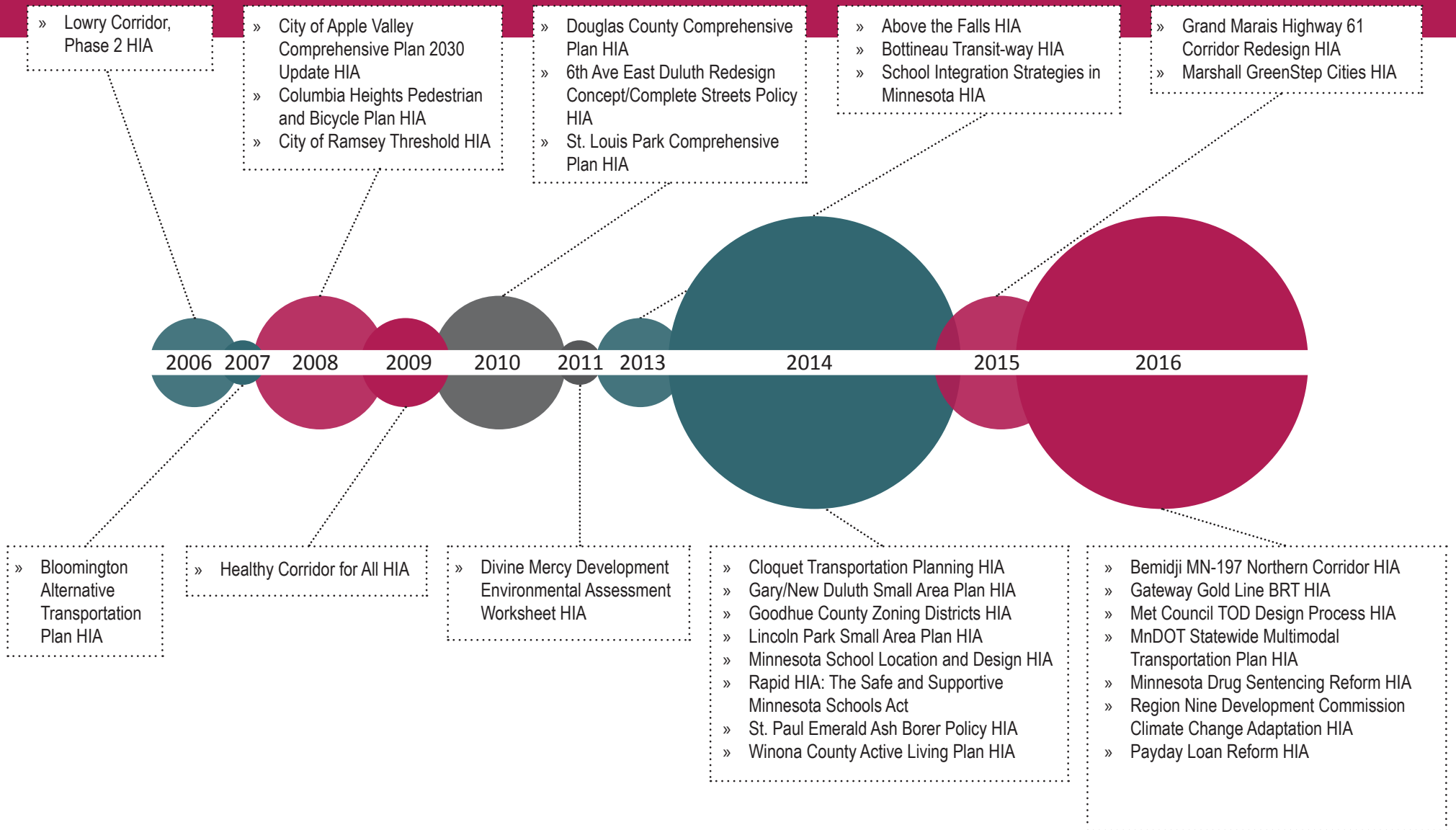
EDUCATION

- » Minnesota School Location and Design HIA 2014
- » Rapid Health Impact Assessment: The Safe and Supportive Minnesota Schools Act 2014
- » School Integration Strategies in MN HIA 2013

TRANSPORTATION

- » Bemidji MN-197 Northern Corridor HIA 2016
- » MnDOT Statewide Multimodal Transportation Plan HIA 2016
- » Met Council TOD Design Process HIA 2016
- » Gateway Corridor Gold Line BRT HIA 2016
- » Grand Marais Highway 61 Corridor Redesign HIA 2015
- » Cloquet Transportation Planning HIA 2014
- » Bottineau Transitway HIA 2013
- » 6th Ave East Duluth Redesign Concept/Complete Streets Policy HIA 2010
- » Healthy Corridor for All HIA 2009
- » Columbia Heights Pedestrian and Bicycle Plan HIA 2008
- » Bloomington Alternative Transportation Plan HIA 2007
- » Lowry Corridor, Phase 2 HIA 2006

HEALTH IMPACT ASSESSMENT (HIA) PROJECTS IN MINNESOTA



Talking Points WHAT IS A

“HEALTH IMPACT ASSESSMENT”?

A Health Impact Assessment (HIA) is an evidence-based tool used to influence decisions on policies, plans, and projects before they are finalized to create more equitable, healthier communities.

EVIDENCE-BASED TOOL

- » Also known as “HIA.”
- » HIAs combine scientific data, public health expertise, and stakeholder and community input.
- » HIAs evaluate real life conditions that affect health and well-being, including economic, political, social, psychological, and environmental factors. This could range from air quality to living wages.
- » HIAs promote cross-sector collaborations to bring health considerations to projects outside the health sector.
- » More than 350 HIAs have been completed, or are in progress, in the United States, with 30 of those in Minnesota.

USED BEFORE DECISIONS ARE FINALIZED

- » HIA is a proactive, collaborative process that precedes decision making – and that’s where the value lies.
- » Early and often stakeholder engagement reduces the risk of failure and helps avoid costly fixes down the road.
- » HIA is a rigorous process that includes six steps: Screening, Scoping, Assessment, Recommendations, Reporting, and Monitoring and Evaluation.
- » HIA is a flexible framework that can be completed rapidly by one person or over the course of a year by several people from multiple organizations or communities.

TO CREATE MORE EQUITABLE, HEALTHIER COMMUNITIES

- » HIAs attempt to quantify the potential health benefits and adverse health effects of policies, plans, or projects.
- » HIAs examine the equitable distribution of benefits or burdens across different communities or populations. This can lead to more equitable, healthier communities.
- » Because of HIA’s participatory process, a main benefit is increased awareness and understanding of health consequences by stakeholders.
- » The experience of an HIA is uniting – it builds relationships to help ensure that health remains a critical consideration.

Site would be lost to timber production and other forest uses for the short-term use as a mine. This would represent an unquantified opportunity cost in which the lands and resources could not be used for forest purposes. The Proposed Connected Actions Alternative B would result in 4,397.3 acres lost under General Forest – Longer Rotation management and 355.3 acres under the General Forest management category. These losses would be replaced by the acquisition, through the Land Exchange Proposed Action, of land for Forest purposes.

7.3.3 *Unavoidable Adverse Effects*

Regardless of the inclusion of all reasonable mitigation, some effects may not be avoided. For example, the NorthMet Project Proposed Action would utilize technologies to mitigate effects on water quality, which have been demonstrated through modeling to meet applicable water quality evaluation criteria (refer to Section 5.2.2). However, effects on water quality would remain after all reasonable mitigation measures have been applied.

After the implementation of mitigation measures that have been built into the design, the NorthMet Project Proposed Action would have unavoidable adverse effects on wetlands, vegetation, wildlife, air quality, noise and vibration, visual resources, cultural resources, water resources, and aquatic species. Unavoidable direct effects on surface features such as wetlands, vegetation, and wildlife resources would be offset by gains through off-site mitigation (wetlands) and through lands acquired through the Land Exchange Proposed Action. Unavoidable noise and vibration, air, and water emissions from the NorthMet Project Proposed Action would affect the existing conditions, but would not trigger new exceedances of relevant water quality evaluation criteria (with two exceptions, refer to Section 5.2.2) and would result in comparatively small increases to existing levels. The residual practical effects of the Land Exchange Proposed Action would be the loss of federal land, which would be used for the NorthMet Project Proposed Action, and the gain of non-federal lands.

7.3.4 *Human Health Considerations*

7.3.4.1 Introduction

This section summarizes relevant health issues and potential impacts for the NorthMet Project Proposed Action and identifies where specific health information can be found in the FEIS.

Public comments on the SDEIS identified several concerns based on potential interactions between the NorthMet Project Proposed Action and resources/receptors in the area. Public concerns identified potential health impacts as a result of the following:

- Exposure to air contaminants, particularly airborne amphibole mineral fibers;
- Exposure to contaminants in drinking water, surface water, and food sources (e.g., wild rice, and fish);
- Increased risk of traffic accidents involving chemicals;
- Increased exposure to noise and vibration; and
- Strain on emergency response services.

7.3.4.2 Baseline Community Health

A baseline assessment of community health can be found at the America's Health Rankings website (www.countyhealthrankings.org). The health rankings are based on composite indices of health outcomes (e.g., premature death, diabetes prevalence) and health determinants (circumstances that can affect the future health of a population, such as lifestyle behaviors, health policies, and environmental quality).

Minnesota's population health status is good relative to other states in the nation (ranking sixth-best out of 50 (www.americashealthrankings.org/MN)). Within Minnesota, health in Cook County is above the state average as it ranks 28th out of 87 counties for health measures (United Health Foundation 2014). Health in Lake and St. Louis counties are poor relative to other counties in Minnesota, ranking 82nd and 75th out of 87, respectively. The FEIS did not analyze how or whether these counties' community health rankings would be affected by the NorthMet Project Proposed Action.

7.3.4.3 Human Health Impacts

The following sections describe how human health could be affected by exposure to airborne and waterborne chemicals from the NorthMet Project Proposed Action. This information is drawn from the relevant resource sections in Chapter 5 of the FEIS.

7.3.4.3.1 Exposure to Chemicals in Air Emissions

Industrial emissions to air have the potential to affect human health in several ways by the hazardous chemicals and dust irritants they may contain. State and federal ambient air quality standards have been established to protect human health and the FEIS analysis was conducted using these standards as threshold criteria to determine the magnitude and level of significance of the potential air quality impacts of the NorthMet Project Proposed Action. Section 5.2.7.2.3 analyzes human health risks from Mine Site and Plant Site air emissions. The quantitative analysis evaluated 11 chemicals to determine the lifetime cancer and non-cancer health risks of the NorthMet Project Proposed Action. The assessment found that Mine Site and Plant Site emissions would not exceed MDH lifetime cancer and non-cancer guidance levels.

An AERA addressing the emissions from site operations of the NorthMet Project Proposed Action was conducted and is summarized in Section 5.2.7.2.3 of the FEIS. Separate AERAs were conducted for the Mine Site and Plant Site due to the distance (approximately 6 miles) between Mine Site and Plant Site sources.

The AERA included an evaluation of the most sensitive health endpoint for each chemical, e.g., neurological morbidity from manganese, reproductive toxicity of methylmercury, and the carcinogenic potential of diesel, nickel, and arsenic. The FEIS concludes that there would be negligible lead emissions as a result of the NorthMet Project Proposed Action (Section 5.2.7.1.3). Toxicological information for arsenic, cobalt, diesel, nickel, manganese, mercury, and methylmercury (plus additional chemicals) was obtained from the MPCA Risk Assessment Screening Spreadsheet (RASS) and is found as an appendix to the AERA. The AERA includes an analysis of the potential health effects of those chemicals (MPCA 2013b).

Controls were incorporated to reduce airborne mercury emissions. The MPCA reviewed the NorthMet Proposed Action and determined that it would not impede State mercury reduction

goals (MPCA 2013b). At the levels estimated in the FEIS, airborne mercury emissions resulting from the NorthMet Project Proposed Action were found to not be a health concern.

In summary, the FEIS concludes that the NorthMet Project Proposed Action, as designed and with the addition of mitigation measures, would meet all NAAQS (Section 5.2.7).

7.3.4.3.2 Exposure to Airborne Amphibole Mineral Fibers

The NorthMet Project Proposed Action would mine ore from the Duluth Complex, which may contain amphibole mineral fibers. The potential air emissions of amphibole mineral fibers were analyzed in Section 5.2.7.5 of the FEIS. The vast majority of potential emissions of MN-fibers for the NorthMet Project Proposed Action would occur from the ore-crushing operations at the Plant Site, with minor potential emissions from the Tailings Basin and the Mine Site (Barr 2007o). Fine-particulate matter emission controls were incorporated to minimize any release of fiber emissions.

Overall, amphibole mineral fibers were found to represent a relatively small percent of the mineral fibers associated with the processing of NorthMet Deposit ore (Flotation Pilot Testing in July and August 2005), approximately 9 percent of the fibers identified from all collected samples of ore, tailings, and process water. Chrysotile mineral fibers were not found in samples of ore, tailings, or process water collected from the flotation pilot-testing. However, PolyMet's petrographic observations indicate that chrysotile minerals are about 2 percent of the minerals associated with the waste rock from the NorthMet Project Proposed Action.

The University of Minnesota conducted a research effort, known as the Minnesota Taconite Workers Health Study (University of Minnesota 2013), funded by the State of Minnesota, to better understand taconite worker health issues, including an epidemiological investigation into causes of excess rates of disease, including mesothelioma, among taconite workers. The Study did not rule out amphibole mineral fibers as a potential source of health risk or as playing some role in the incidence of disease among taconite workers. Mine workers' health is regulated by the U.S. Department of Labor, Mine Safety and Health Administration. Exposure limits for airborne contaminants, including amphibole mineral fibers, is found in 30 CFR, Ch. 1, Subc. K, Part 56, § 56.5001

The MDH considers the role of non-asbestiform amphibole mineral fibers in the induction of health effects to be uncertain at this time. The MDH concludes that non-asbestiform amphibole mineral fibers have the potential for an undetermined toxicity and potency.

7.3.4.4 Health Impacts from Chemicals in Water

Human health impacts could occur by ingestion of water borne chemicals either directly through drinking water or through food sources. In addition, sulfates in wild rice stands could reduce productivity which may affect its availability as a subsistence food source.

7.3.4.4.1 Drinking Water

Potential arsenic and lead releases to groundwater and surface water are evaluated in Section 5.2.2.3. GoldSim model output indicates that the dominating chemical controls on arsenic concentrations in Colby Lake (a drinking water source) are natural surface runoff, natural groundwater baseflow, and contaminant sources contributing directly to Colby Lake, all of which are not related to the NorthMet Project Proposed Action.

For conditions where arsenic would cause or add to an exceedance of the evaluation criterion in Colby Lake, the NorthMet Project Proposed Action would not likely change concentrations by more than +2.0 percent. It is therefore concluded that the NorthMet Project Proposed Action would not significantly impact Colby Lake.

Examination of GoldSim results show that lead would infrequently cause or add to an exceedance of the evaluation criterion at the Plant Site. In Unnamed Creek, when lead concentrations at PM-11 are predicted to be elevated, the flow at PM-11 is dominated by WWTP discharges. In GoldSim, the WWTP effluent lead concentration is assumed to be 3 µg/L.

Given that pilot testing shows that 2 µg/L lead concentration is achievable in the WWTP effluent, it is likely that actual lead concentrations at PM-11 would have acceptably low frequencies of exceedances.

Based on the analysis, the FEIS found that no discharges of water or seepage from the NorthMet Project Proposed Action would affect off-site domestic water wells or public sources in the area.

Amphibole mineral fibers may be found in water that has come in contact with ore at the Mine Site. There is no applicable water quality standard specific to non-asbestiform amphibole mineral fibers. The USEPA has developed drinking water standards for asbestos for drinking water utilities (USEPA 2015). This standard, called an MCL, is 7 million fibers per liter. The USEPA has provided proven methods of water treatment to meet the MCL, including coagulation/filtration, direct and diatomite filtration, and corrosion control.

Water in contact with waste rock, ore, and pit walls would be treated at the WWTF during operations utilizing a greensand filter. No discharge would occur off site during operations. During post-closure, a greensand filter, pre-filters, and a RO system or equivalently performing technology would be used to treat water to meet water quality standards prior to discharge. This treated water would be discharged into the Partridge River, which flows into Colby Lake, the only lake in the area used for drinking water. It is the source of drinking water for the City of Hoyt Lakes. Currently, the City utilizes sand filters, coagulation, and settling and has been in compliance with the USEPA asbestos standards. When the RO treatment system would be constructed at the Mine Site, it would operate in the same fashion as the City's treatment system. As such, the discharge from the Mine Site would be expected to be in compliance with the federal standard prior to it being treated again by the City of Hoyt Lakes.

7.3.4.4.2 Fish

The AERA assessed the health effects for recreational and tribal fishermen and their families consuming fish which may contain elevated bioaccumulated levels of methylmercury. It estimated a potential small change in fish mercury concentration based on modelled emissions and deposition. The FEIS concludes that this potential change in methylmercury concentration is not statistically measurable given the variability in background concentrations and the current laboratory analytical methods (see also Barr 2013j and Barr 2015g). Given that evidence and finding, no potential change in human health risks related to the fish consumption pathway is expected (Sections 5.2.2.3.4, 5.2.6.2.1, and 5.2.6.2.2 describe the impacts on water and aquatic resources, respectively, that would have a pathway to potential human health). Section 6.2.6 of the FEIS contains an assessment of cumulative effects to aquatic resources. It found that the NorthMet Project Proposed Action, in combination with other reasonably foreseeable projects, could increase solute concentrations for many constituents in the Partridge River and Embarrass

River, although not above water quality evaluation criteria. This change in existing water quality and the interactions between effects from a number of projects in the area, natural conditions, and current and future hydrology could be addressed as part of the non-degradation analysis for the NorthMet Project Proposed Action in permitting. The NorthMet Project Proposed Action, in particular, but to some extent in combination with other existing and reasonably foreseeable projects, would shift treatment of water discharged into the Partridge River and Embarrass River from natural systems (i.e., essentially an ecosystem service) to mechanical systems (e.g., the NorthMet Project Proposed Action WWTF and WWTP). Given that the solute concentrations for constituents in the Partridge River and Embarrass River are not expected to increase above water quality evaluation criteria, cumulative impacts to aquatic species due to changes in water quality from the NorthMet Project Proposed Action, in combination with other reasonably foreseeable projects, are not anticipated.

7.3.4.4.3 Wild Rice

Waters downstream from the NorthMet Project area are used as a source of wild rice by the Ojibwe people who continue to harvest it in traditional ways. Research indicates that increased sulfate levels in wild rice habitat can adversely affect its growth and productivity during certain times of its lifecycle. It is possible that Tribal member health could be indirectly affected if their diet would need to increasingly rely on less-healthy replacement foods if wild rice production were to decrease as a result of the NorthMet Project Proposed Action.

In order to protect this food source, the State has issued regulations that place limits on the allowable level of sulfate in waters used for production of wild rice (*Minnesota Rules*, part 7052.0100). Sections 5.2.2.3.2 and 5.2.2.3.3 of the FEIS analyze any sulfate released from the NorthMet Mine Site and Plant Site, respectively, that could affect the production of wild rice downstream from both the Mine Site and Tailings Basin. The analysis concludes that in the Partridge River the NorthMet Project Proposed Action would not cause or add to exceedances of the sulfate evaluation criteria of 10 mg/L applicable at the draft MPCA staff-recommended wild rice production waters near SW-005 and SW-006. In the Embarrass River, the NorthMet Project Proposed Action would decrease sulfate concentrations at PM-13 near the draft MPCA staff-recommended wild rice production waters. In neither case would wild rice productivity be adversely affected or reduce its availability as a subsistence food source.

7.3.4.5 Health Impacts from Traffic Accidents Involving Chemicals

Section 5.2.13 discusses risks involved in the transportation, storage and use of regulated hazardous materials used in mining and ore processing. These materials are regulated by state and federal rules, which limit the potential risks of off-site effects, especially if large quantities were transported to and from the NorthMet Project area. The hazardous materials analysis also included a risk assessment of large scale events which could affect populations along the transportation routes. This analysis found that given overall design and operational commitments of the NorthMet Project Proposed Action, there would not be any significant adverse effects from the proposed transportation of hazardous wastes.

7.3.4.6 Health Impacts from Noise and Vibration

Impacts of noise and ground vibration from the NorthMet Project Proposed Action are discussed in Section 5.2.8. While health effects were not explicitly discussed, modelling shows that the NorthMet Project Proposed Action would meet State of Minnesota noise and vibration limits and would not, therefore, result in health concerns.

7.3.4.7 Health Impacts from Strain on Emergency Response Services

Section 5.2.10.2 of the FEIS discusses changes in the local area's work force (local versus population influx), and demands on available services, including the medical infrastructure. A sudden increase in population can place strain on local health resources including emergency management services, primary care, and acute health care services. Similarly, a large-scale emergency event can put a strain on emergency resources. The FEIS found that the NorthMet Project Proposed Action would result in minimal population and employment changes. Hence, it is not expected that the NorthMet Project Proposed Action would place a strain on existing emergency and health care services in the area.

As a requirement of the permit to mine, the operator of the NorthMet Mining Project would be required to prepare an Emergency Response Plan, which would require them to coordinate their emergency response planning with local agencies, as described in Section 5.2.13.2.4.

7.3.5 *Land Exchange Public Interest Consideration*

The ROD from the USFS will describe how the public interest is served under 36 CFR 254.3(b). As stated in Section 1.4.3 of this FEIS, factors that must be considered include the opportunity to: achieve better management of federal lands and resources to meet the needs of state and local residents and their economies and secure important objectives, including but not limited to protection of fish and wildlife habitats, cultural resources, watersheds, and wilderness and aesthetic values; enhancement of recreation opportunities and public access; consolidation of lands and/or interests in lands, such as mineral and timber interests, for more logical and efficient management and development; consolidation of split estates; expansion of communities; accommodation of existing or planned land use authorizations; promotion of multiple-use values; implementations of applicable Forest Land and Resource Management Plans; and fulfillment of public needs (see 36 CFR 254.3(b) and 254.4(c)(4)). The ROD will also incorporate the finding of these factors and how the factors relate to how the public interest would be served by the Land Exchange Proposed Action, Land Exchange Alternative B, and the Land Exchange No Action Alternative. Table 7.3.5-1 below presents a comparison of how the alternatives address these factors.