Memo of Transmittal

To: Rebecca Felter, University of Minnesota
From: Blythe Williams, University of Minnesota
Date: 16 December 2024
Subject: Memo of Transmittal

I hope this memo finds you well,

You will find my report on asbestiform-related illness and regulations enclosed within this document. My report includes an analysis and discussion of asbestiform research and related policies. Additionally, this report will include recommendations for future improvements to federal and state regulations on mining operations within asbsetiform-dense regions.

This project is limited to current Minnesota policy impacts. In the future, I suggest that a follow-up report be made to analyze the reasons behind regulatory decisions and determine the feasibility of this report's recommendations.

If you have any questions, please contact me at Will7438@umn.edu.

Best regards,
Blythe Katherine Williams

Asbestiform-Related Regulations and Their Impact on Northeastern Minnesota

Blythe K. Williams

University of Minnesota

16 December 2024

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Executive Summary

The Asbestiform-Related Regulations and Their Impact on Northeastern Minnesota report questions the effectiveness of regulations for asbestiform deposits in preventing asbestiform-related diseases such as asbestosis and mesothelioma. This report will cross-reference current federal and state policy with academic sources and asbestiform-related disease rates to determine the effectiveness of current asbesiform policies.

This report will conclude that the current Minnesota and Federal regulatory policies on asbestiform materials are severely lacking and require comprehensive reform. Recommended steps to improve regulations include required personal protective equipment (PPE), employee training, dust control practices, and mandatory geological surveys.

Introduction

Asbestiform minerals are naturally occurring fibrous rocks found in fault lines, foothills, and mountain ranges (see Figure 1). The most well-known asbestiform mineral is asbestos, which was popular as a natural, non-flammable material until the 1970s.

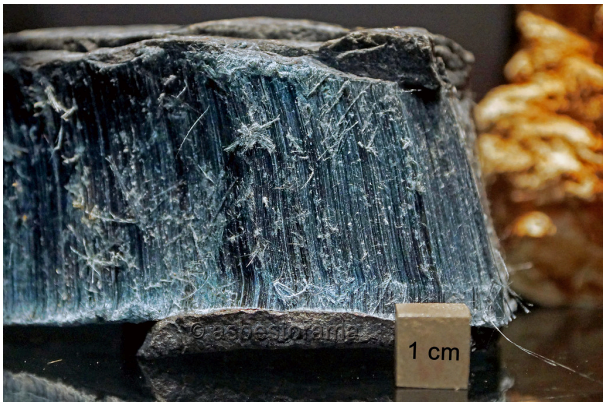

Figure 1. Asbestiform crocidolite mineral sample. (Asbestorama, 2014)

In the 1970s, scientists discovered multiple severe health conditions linked to asbestos exposure, such as asbestosis and mesothelioma. Asbestosis is a fatal, incurable lung disease caused by small fibers of asbestiform minerals trapped in the lungs. The Trapped fibers lead to severe damage to connective tissues (Harbut, 2009., Bhandari, 2022). Mesothelioma is a cancer of the lungs frequently caused by pre-existing asbestosis. Less than 5% of patients survive more than 5 years after mesothelioma diagnosis (Cancer Research UK, 2023).

After scientists connected mesothelioma and asbestosis to asbestos exposure, the United States created sprawling regulations on asbestos production to prevent further exposure. However, although mining within pure-asbestos deposits is regulated, mining within asbestiform deposits —materials that have similar fibrous structures to asbestos —continues to be overlooked. To this day, mining companies still operate within asbestiform deposits, spilling toxic dust into the air and risking their workers' lives. (Lee, 2008., MDH, 2022) Unsurprisingly, counties in Minnesota with mining operations inside asbestiform deposits have asbestosis death rates 81% above the United States average (see Figures 2 & 3) (Brunner, 2008).

Unfortunately, asbestiform materials are difficult to regulate due to a 20-year latency period between initial exposure and onset of symptoms. Data can quickly become obscured through repeated exposure or population movement. Furthermore, the public health impact of asbestosis exposure outside rural mining communities is minimal. Some lawmakers argue that the cost of regulation far exceeds the positive impact on the public (Lee, 2008).

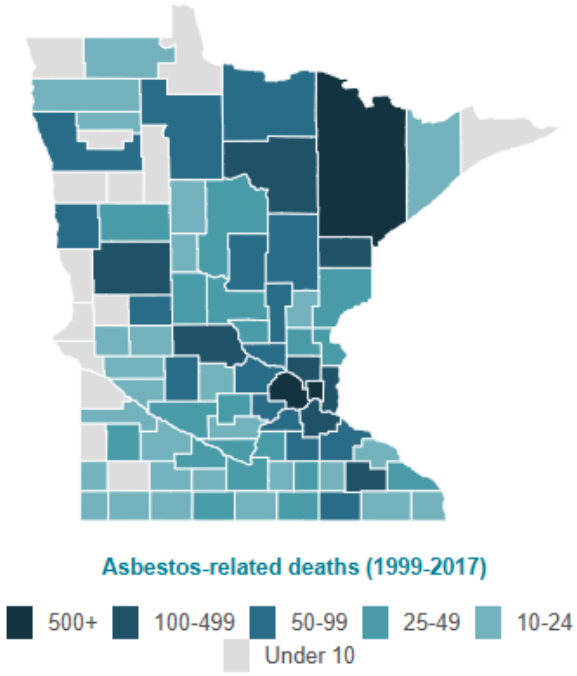

Figure 2. County breakdown of asbestos-related illness (Asbestos Nation, 2024)

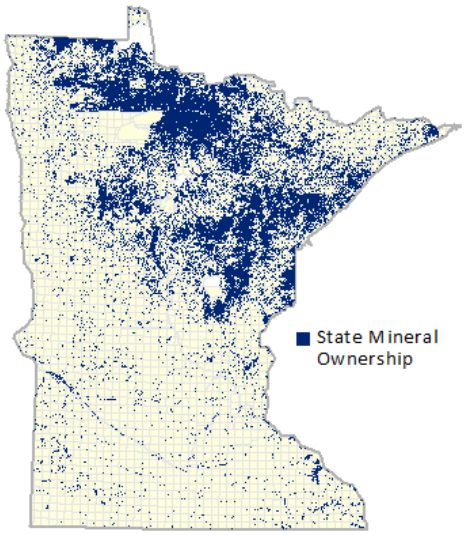

Figure 3. Map of MN Mineral Leases for Mining Operations (Minerals Coordinating Committee, n.d.)

Report Goal

This report asks: What is the efficacy of Minnesota state and Federal mining regulations concerning asbestiform deposits? Furthermore, what is the impact of these regulations on asbestiform-related disease in Minnesota?

Methods

Academic Research

This report is informed by a collection of academic research on naturally occurring asbestos deposits from the online University of Minnesota Libraries and Google Scholar. Other non-academic online sources dedicated to asbestosis research or advocacy were identified through Google search. This report utilizes academic and online research to provide background information on policy and gather information on changing asbestosis rates in Minnesota.

Policy Research

This report analyzed a mixture of Minnesota state and federal regulations from the Minnesota Office of Statutes and Federal sources like the Centers for Disease Control (CDC), the Mine Safety and Health Administration (MSHA), and the Department of Labor. Policy reaserch included several case studies from failed mine inspections to inform how asbestiform exposures occurred and collect government recommendations for asbestiform dust control.

Empirical Research

This report interprets Stephanie Hempill's Minnesota Public Radio interview with Bob Skiba, a taconite miner from northeastern Minnesota who contracted asbestosis in 2007. It uses his interview to compare the government's stated actions in official reports with actual actions in the field from the perspective of Minnesotan miners.

Research

Case Studies

Academic reaserch on asbestiform-related illness remains limited. Regardless, there is a significant number of cases of asbestiform-related illness due to unmanaged asbestiform dust exposure. Most of these cases originate from mining operations in non-asbestos asbestiform deposits–such as erionite, taconite, and vermiculite–where proper dust controls are lacking.

The asbestiform mineral erionite has been especially tricky because it forms close to the surface and easily spreads as asbestiform dust. As a result, erionite deposits have significantly increased mesothelioma rates in local mining communities across Nevada and North Dakota (Weissman, D., Kiefer, M. 2019). Like many asbestiform minerals, erionite is equally as dangerous as asbestos but is often overlooked because it is not *specifically* classified as asbestos.

Similarly, the asbestiform mineral taconite has become an issue in Northeastern Minnesota. Many of Minnesota's iron deposits are found within taconite-dense areas, and as a result, many Minnesota miners have been exposed to taconite dust (Breuer, 2008). Some Minnesota mining companies do not even train their employees on the dangers of taconite dust (Haney, 2005).

Even when miners are lucky not to inhale asbestiform materials from the air, asbestiform minerals can also be carried on mined materials. In 1990, asbestos-like dust settled on mined vermiculite, which was found in an asbestiform deposit. Asbestos dust from the Vermiculite was ingested and inhaled by miners weeks after the Vermiculite's initial extraction (NIOSH, 2023). In other cases, asbestiform dust from taconite mines traveled on miners' clothing and into their communities, exposing children and partners to asbestiform materials (Harbut, 2009).

Policy Research

Asbestos-related Federal or Minnesota state mining regulations are minimal, likely because the last asbestos mine closed in 2002. However, there is also a lack of non-asbestos asbestiform regulation, despite potential worker illness due to asbestiform dust exposure in iron mines in Northeast Minnesota. In fact, Minnesota state policy on naturally occurring asbestiforms is nonexistent. Some federal agencies, like the CDC and the MSHO, acknowledge the existence of asbestiform-related illnesses but do not provide any regulations or general guidelines to prevent them. (MSHO, 2008., Weissman 2003).

In many cases, negligence from state or federal agencies has caused deaths. According to Bob Skiba, a Minnesota mine mill worker, his company and the Minnesota Department of Health were aware of the amount of asbestiform dust in the air, but neither informed workers nor enforced anti-dust policies (Hemphill, 2007). As a result, many workers like Skiba have contracted fatal asbestiform-related illnesses from dust exposure.

Asbestiform-Related Illness Rates

Although asbestos mining ceased in 2002, most asbestos mines in the United States were shut down between 1970 and 1990. As a result, considering the 20-year latency of symptom onset for asbestosis, a decrease in asbestosis and mesothelioma rates should be observed between 1990 and 2020. However, despite a decrease in mesothelioma rates after the peak in 1990, mesothelioma rates have not been dropping to the expected extent, considering decreased asbestos use (see Figure 4). It is unlikely that this plateau is exclusive because of asbestiform mining operations, but counties where asbestiform mining operations occur have seen even less mesothelioma decline (see Figure 5) (MDH, 2022).

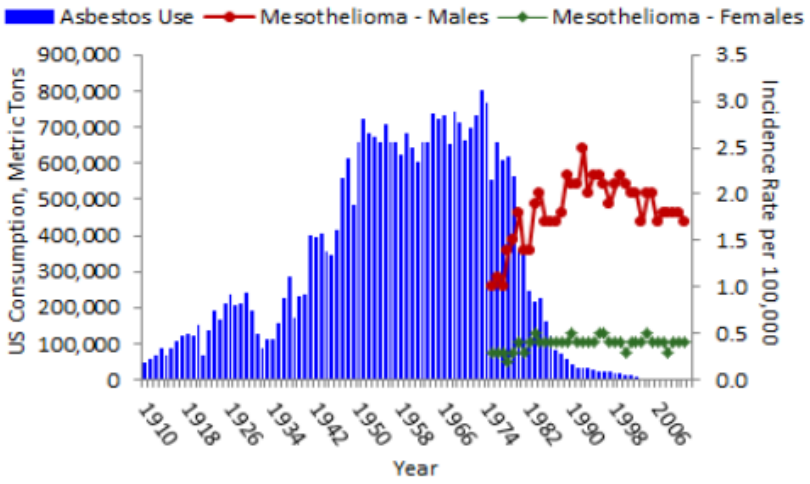

Figure 4. Rates of mesothelioma in the US vs. rates of asbestos consumption from 1975-2011

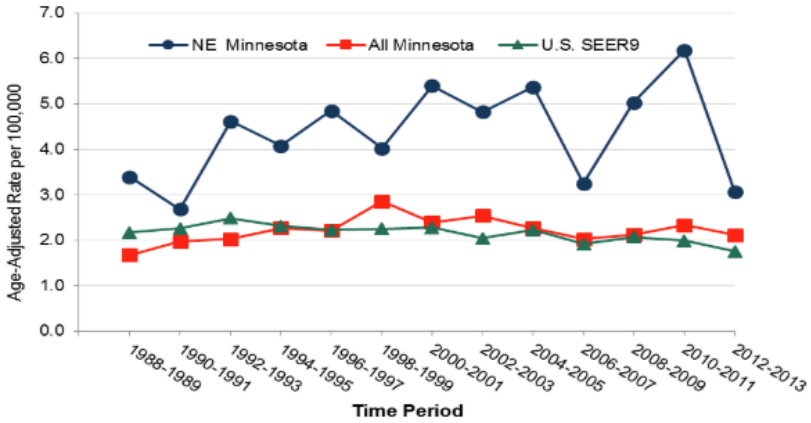

Figure 5. National vs. Minnesota vs. Northeast Minnesota average rates of mesothelioma from 1992-2013

Discussion

Although national mesothelioma and asbestosis rates have generally declined over the past 50 years, the rate of asbestiform-related diseases in Northeastern Minnesota has seen much less positive change. This failure is because neither Minnesota nor Federal law instates safety regulations for handling asbestiform materials, despite knowing their dangers.

Since 2003, multiple government reports and the Minnesota Taconite Workers Study have linked mining in naturally occurring asbestiform areas and much higher mesothelioma rates (Brunner, 2008., MSHA, 2002., Weissman, 2006). Furthermore, multiple agencies have suggested that mining operations update their procedures and safety practices to include asbestiform materials (HHS, 2006., MSHA, 2002.). However, none of these proposed changes were based on state or federal law; instead, they were simply recommendations made by the health department. Scientists have called for testing and regulation of asbestiform mining sites since 2005, but no efforts on the part of lawmakers have been successful (Lee, 2007).

Factors Contributing to Asbestiform-Related Disease Rates

Using case studies by the health department, this report has compiled a list of factors associated with higher mesothelioma rates in Minnesota's mining communities. The Health and Human Services Agency for Toxic Substances and Disease Registry has studied each item on the list and found that it causes higher disease rates. (HHS, 2006)

The reason for high asbestiform-related diseases can be reduced to a mix of the following factors:

A. Lack of on-site safety training for miners and mill operators in Northeast Minnesota.
B. Lack of safety policy enforcement by mine operators and the health department.
C. Lack of health guidelines for naturally occurring asbestos or asbestiform materials from Federal or State agencies.
D. Lack of education on asbestiform-related disease

Any agency wishing to stem the tide of asbestiform-related diseases must mandate preventative training and procedures to minimize the amount of dust in the air. Preventative procedures should be implemented as soon as possible to minimize asbestiform exposure to mining communities and to ensure that asbestiform-related disease rates are reduced by 2040.

Recommendations

Regulations must be implemented to minimize asbestiform exposure and increase access to care for asbestiform-related diseases. Fortunately, the MSHA has made unofficial guidelines for asbestiform dust control as a standard response to asbestiform-related investigations (MSHA, 2005). This report primarily used the MSHA guidelines with additions from the HHS guidelines for handling asbestos dust.

This report suggests implementing the following regulations, policies, and guidelines immediately to prevent further cases of asbestiform-related disease:

- **Wet Mining**: Wet mining is a technique designed to decrease the dust produced by mining operations. The method involved wetting equipment with water during extraction to produce minimal airborne dust. Wet mining also requires higher cleanliness standards for vehicles.
- **Dust Management**: Extra dust vents and fans should be installed inside mining facilities to funnel dust out of areas where miners are working. These dust extraction fans should always be powered and contain dust rather than let it back into the air.
- **Water Pollution Control**: Slurry and other waste materials should be contained and disposed of safely through a regulated source, rather than being stored in waste ponds. When waste ponds are used, regulations should be met to prevent flooding.
- **Geological Surveys**: Surveys should be performed to prevent mining into asbestiform deposits whenever possible. When asbestiform deposits are mined, the type of asbestiform deposit should be known and reported to a central regulatory body.
- **Miner Training:** Mining operations should be required to train their employees on the use of respirators and take-home procedures. These at-work procedures will minimize the amount of asbestiform dust to which workers are exposed and ensure that asbestiform dust is not carried into their community. Furthermore, employees should be trained on recognizing asbestosis and be allowed free asbestosis check-ups by doctors, especially if the worker is over 45.
- **Management Training**: Management of mining operations should be trained on the dangers of asbestiform dust and the corresponding death rates. Policies should always dictate that asbestiform dust exposure should be minimal.
- **Asbestiform-free Zones**: Mining operations should provide uniforms and appropriate changing rooms at the mine facilities to prevent debris from being carried home on clothing.

Conclusion

Asbestos is a non-flammable carcinogen popular in the first half of the twentieth century. In the 1970s, scientists discovered that asbestos caused lung cancers and other fatal diseases. By the early 2000s, federally mandated asbestos abatement was nearly complete, and all mining operations in the United States had ceased. However, despite the end of asbestos mining, rates of what appeared to be asbestos-related diseases kept appearing in non-mining communities at relatively unchanged rates. In 2003, asbestiform materials, fibrous naturally occurring rocks that cause the same health problems as asbestos, became well known in the scientific community. However, dispite scientific outcry to regulate asbestiform mining, no laws or regulations were made beyond vague individual suggestions for specific mining operations.

The lack of federal or state regulations has caused Northeast Minnesota to become especially burdened. Minnesota remains one of the top states for asbestiform-related disease, primarily from Northeast Minnesota, where asbestos rates are 81% higher than the national average.

This report outlines the exact factors contributing to high rates of asbestiform-related disease. These reasons include poor mining practices, lack of training for mine employees, and lack of preventative healthcare or screenings. Furthermore, this report recommended decreasing asbestiform exposure by implementing specific training, wet mining, dust control, water pollution control, management awareness, and mandatory geological surveys. This report suggests that these policies be implemented immediately to reduce further risk to current mine workers and aid workers who have already contracted asbestiform-related disease.

This report has a limited scope as data for asbestiform-related conditions in Minnesota has been sparse since 2013. Furthermore, regulations and academic papers were largely pulled from 1970 to 2013, which may have decreased the accuracy of my report. This report recommends additional research on rates of asbestiform-related disease since 2013 for a more accurate account of current asbestiform-related disease rates and factors. This report also suggests the creation of a committee of mixed scientists, lawmakers, and mine operators to create a cost analysis of asbestiform regulations.

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