

Minnesota Taconite Workers Lung Health Partnership

June 12, 2008



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Agenda

- Welcome, Project Updates
- Legislative Update
- Minnesota Department of Health Update
- Research Project Overview
 - Health Research
 - Geology Research
- Updates from Partners
- Discussion, Questions



Updates

- Introduction of Partnership Co-Chair
- New website features



University of Minnesota School of Public Health

Taconite Worker Health Studies



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Taconite Worker Health Studies

- What are the key points in what's known?
- What are the main questions we're trying to address?
- How are we going to address these questions and where are we in the process?
- Meet the investigators



7 Known Key Points

1. 58 cases identified within the cohort of taconite workers
2. Cases had jobs across the range, but length of time not determined so risk of job location not determined
3. Total number of mesothelioma cases in NE Minnesota in line with expected (outside of Conwed and Taconite cohorts)



7 Known Key Points

- 4. No women identified with mesothelioma within the taconite cohort
- 5. Mesothelioma rates in women in NE Minnesota appear less than expected



7 Known Key Points

- 6. Exposures in relation to the existing cases have not been determined



7 Known Key Points

7. Without the exposure information we can only speculate as to the origin of the cases which could include:

1. taconite workplace exposure from naturally occurring asbestos
2. taconite workplace exposure from commercial asbestos use
3. workplace asbestos exposure outside of taconite industry
4. non-workplace asbestos exposure



Questions we are trying to address.

1. What workplace factors are most related to the 58 mesothelioma cases?
2. Are taconite workers at increased risk of death from other diseases besides mesothelioma?
3. Are current and former taconite workers and their spouses at risk for having other respiratory conditions as a result of workplace dust exposures?



How we are going to answer questions?

1. Workplace exposure assessment
2. Cause-of-death (mortality) study (mortality rates for all major disease categories)
3. Cancer registry linkage study (factors associated with cases, particularly exposure factors)
4. Respiratory health screening study (current and former workers and spouses)



Investigative Team for Health Studies

University of Minnesota

Jeffrey H Mandel, MD
G. Ramachandran, Ph.D.,
C.I.H.
Peter Raynor, Ph.D., C.I.H.
Bruce Alexander, Ph.D.
Ian Greaves, MD
David Perlman, MD

Minnesota Department of Health

Alan Bender, DVM, Ph.D.
Allan Williams, Ph.D.

Science Advisory Panel

James Merchant, MD, DrPH
Harvey Checkoway, Ph.D.
Karl Kelsey, MD, MOH.
Carol Rice, Ph.D.



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Exposure Assessment Team

- Dr. Gurumurthy Ramachandran, Ph.D, CIH
 - Industrial Hygiene, Exposure Assessment
- Dr. Peter C. Raynor, Ph.D
 - Industrial Hygiene, Assessment of exposure controls
- Monika Vadali
 - Graduate Student
- Jooyeon Hwang
 - Graduate Student



Part 1: Exposure Assessment



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Goals for Exposure Assessment

1. **Assess historical exposures** of workers to dust from taconite operations and relevant components (asbestos and non-asbestos fibers, respirable dust, and respirable silica).
2. **Assess current exposures** of workers to the dust from taconite operations and relevant components.
3. **Evaluate existing practices and methods** to control worker exposures in this industry.



Assessing Historical Exposures - 1

- Identify all the sources of primary exposure measurements for the time period 1955-present.
 - Mining companies' internal databases
 - Mine Safety and Health Administration.
 - Previous studies conducted by University of Minnesota (mid-1980's)
 - Studies conducted by the Department of Health



Assessing Historical Exposures - 2

- Reconstruct historical exposures of workers for studies of the relationship between exposures and health effects.
 - Available measurements
 - Exposure modeling
 - Interviews with plant personnel and veteran workers
 - Statistical techniques that allow combining these various sources of information in a systematic manner.



Assessing Current Exposures

- Observation of tasks performed by workers in various job titles
- Interviews with supervisors, workers, and union representatives
- Identify areas and jobs for assessing current exposures



Assessing Current Exposures

- **In selected areas/processes within the industry, characterize current exposures of workers to**
 - Asbestos fibers
 - Respirable silica dust
 - Other components of dust from taconite operations of health relevance
 - Mineralogical analysis of dust samples through certified laboratories.



Assessing Controls in Current Workplaces

- Gather process and work environment information
- Evaluate existing exposure control measures through detailed walkthrough surveys
- Make concrete recommendations, if needed, for improvement of control measures



Exposure Assessment Timeline

- Evaluating exposure controls: Starting August 2008
- Assessing current exposures: Starting January 2009
- Assessing historical exposures: Starting June 2008



Part 2: Cause of Death Studies



Taconite Workers Health Study

Studies of Mesothelioma, Other Cancers,
and Mortality



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Goals

- Evaluate risk of
 - Mesothelioma
 - Other cancers
 - Other causes of death
- In relation to
 - Employment in the taconite industry
 - Exposure to dust from taconite industry



Approach

- Identify all deceased members of the Taconite Mining Cohort and obtain causes of death
 - Allows us to broadly evaluate health
- Identify all cancers in Taconite Mining Cohort using Minnesota Cancer Surveillance System
 - Cancers diagnosed in Minnesota from 1988 forward (how mesotheliomas were identified)
 - Allows us to ascertain all cancers



Part 3: “Case-Control” Study



Approach

- Select a representative sample of Taconite Mining Cohort to serve as a reference population
- Estimate exposures to the study population
 - Work histories
 - Information from exposure reconstruction



Challenges

- Creating uniform job definitions
- Assessing work/exposure experience from 1984-2008
- Separating exposure to various components of taconite dust



Tentative Timeline

- “Clean-up” cohort June 2008
- Select referent population October 2008
- Link to death certificates Summer 2009
- Link to cancer registry Summer 2009
- Abstract work histories: Through 2009
- Develop exposure models: 2010
- Analyses 2010-2011



Part 4: Health Screening Study



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Respiratory Health Screening

- Will be based on randomly selected current and former workers and spouses
- Our effort is to scientifically assess the health of the entire industry. People need to be selected randomly to do this.



Respiratory Health Screening

- If we select patients randomly, not everyone with illness will be included.
- Despite the scientific needs, we also need to assist non-screened people however we can.



Respiratory Health Screening

- **Problems with involving everyone**
 1. Bias - those with health problems will want to participate more than those without problems overestimate disease
 2. Study has funding for 2000 people.



Respiratory Health Screening

- **Problems with not involving everyone**
 1. People feel that their problem wasn't counted.
 2. People may feel that they are being left out of the process (all mesotheliomas will be included in mortality and case-control studies).



Respiratory Health Screening

- **What we're planning for those not selected**
 1. Call-in help line (in operation)
 2. CME presentations for range health care providers (including information on screening for health care providers)
 3. Referral lists for potential patients



Respiratory Health Screening

- **What we're planning (continued)**

4. Informational packets

- a. What screening can and can't do.
- b. Things your doctor can do to assess your situation.
- c. Payment information (costs of tests, options for coverage).



Objectives of Screening Study

- Determine the respiratory health effects of exposure to dust generated by taconite mining in miners and their spouses.
- To try to relate any health findings to exposure levels.
- To try to understand the impact of confounding variables such as smoking, commercial asbestos etc. . .



Subjects

- 1200 current and former taconite workers and their spouses - approx 2000 total.
- Any former or current mine worker will be eligible.
- Subjects must be randomly selected.
- Sample will be representative:
 - Geography
 - Age
 - Length of exposure / Time since initial exposure



Components of Screening

- Lung Function Testing
- Chest X-ray
- Detailed history including:
 - Detailed work history (including non-taconite jobs)
 - Smoking history
 - Other pertinent medical conditions
 - Presence of disease in other members of household
- Physical Exam
- Respiratory and Quality of Life Questionnaire
- Blood sample for biomarker study



Logistics of Screening

- Current plan is for screening to be done at a single site – Virginia Medical Center.
- Transportation and/or reimbursement will be available for people who have to travel a long distance.
- Will take place over a 12-15 month period, likely starting in summer of 2009 with possible pilot study sooner.
- All subjects will receive a report of their screening results.
- Results will be reviewed on an ongoing basis to ensure prompt follow-up of any abnormal results if required.
- Subjects with abnormal findings will be given appropriate referral information.

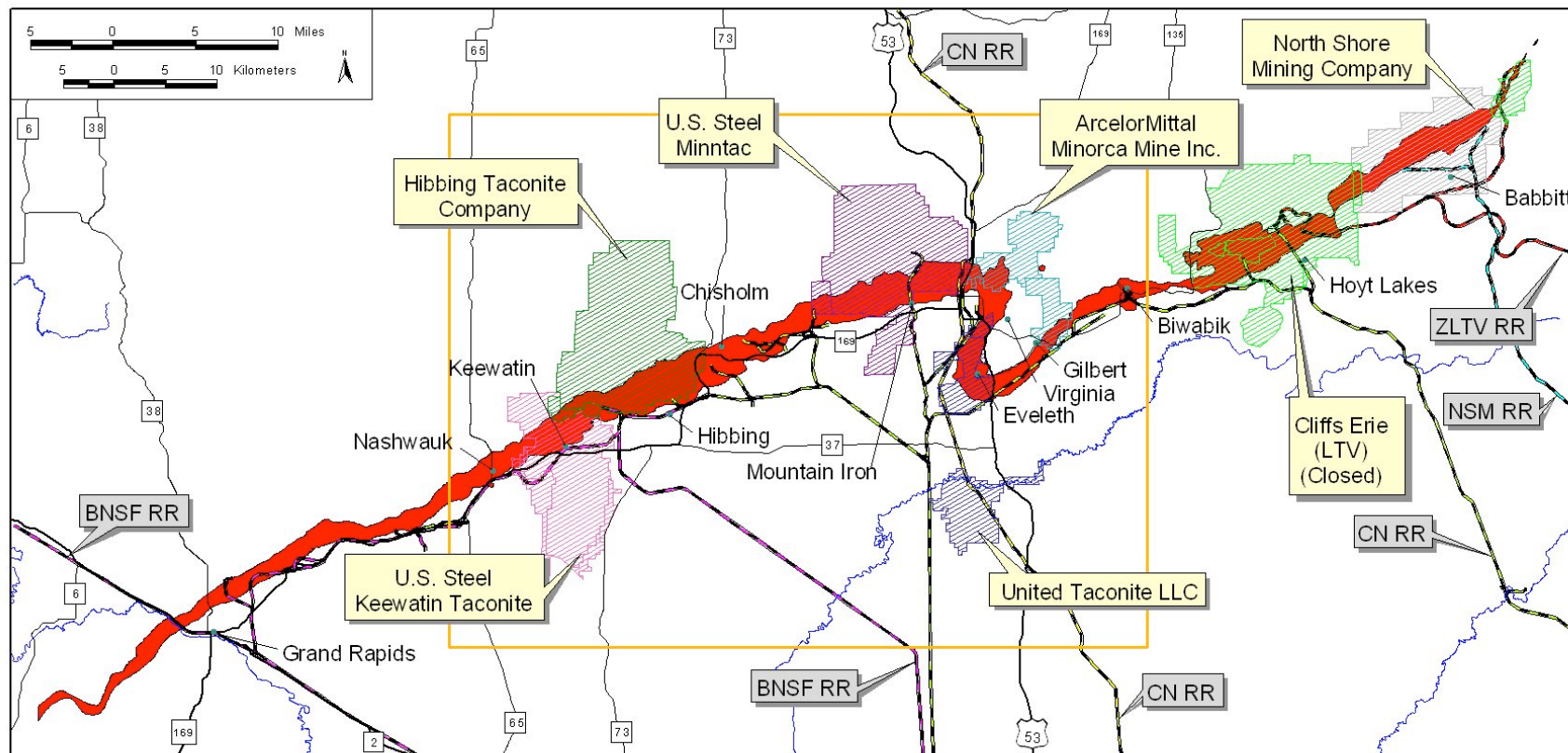


Environmental Study -- commencement of sampling and analysis



Sampling Sites

★ Ely



★ Silver Bay

★ Confirmed Sampling Site

★ Additional Desired Sampling Site



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Virginia



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Virginia (City Hall)



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Sampling with MOUDI Impactor



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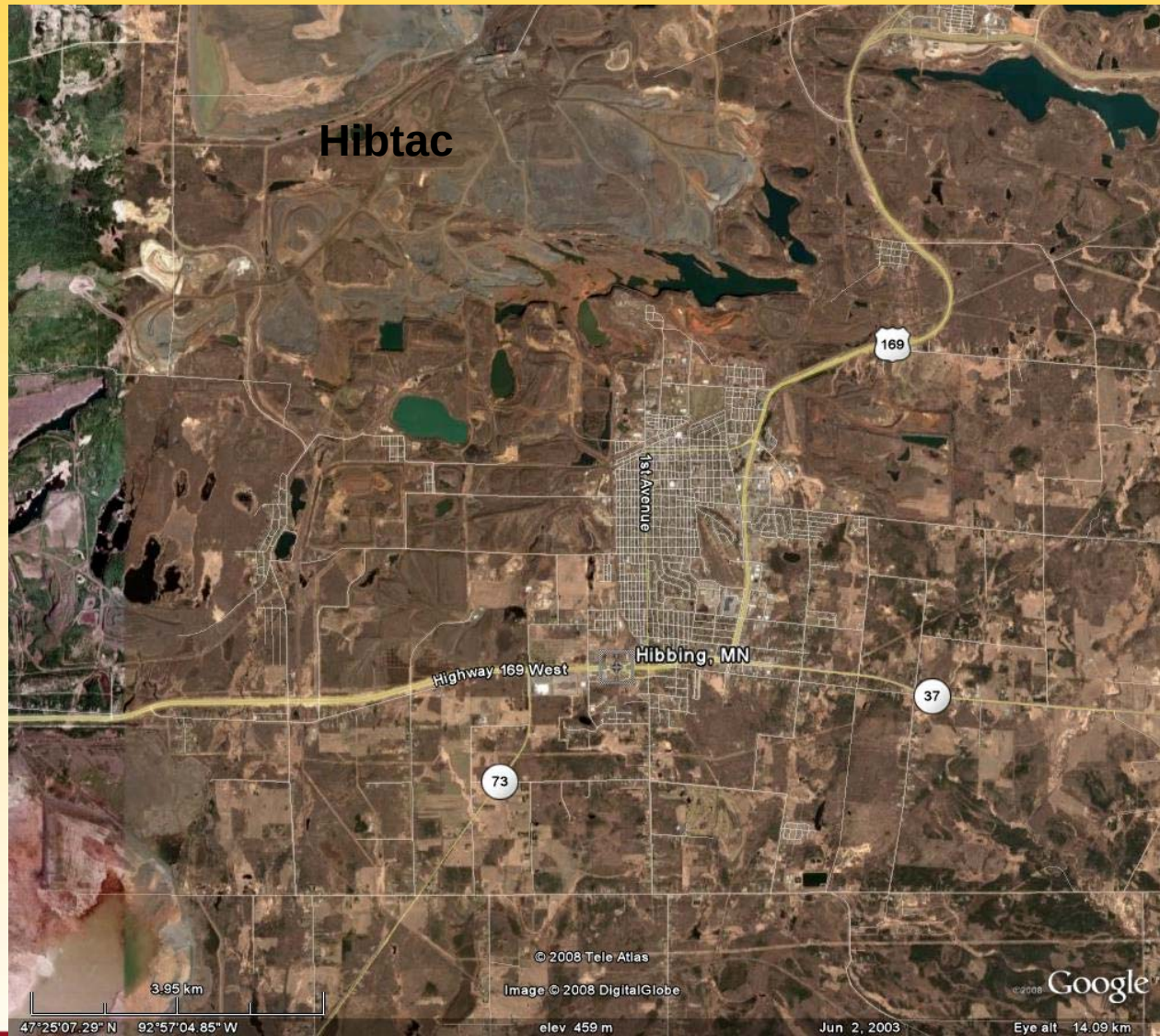
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Sample Analysis

- Filters go back to Dept. of Mechanical Engineering (Twin Cities) to be weighed (total particulates and size distribution)
- Prepped for further analysis in Duluth and examined using scanning electron microscope and X-ray diffractometer at UMD (mineral characterization, and fiber analysis)
- Entire analysis will take several months



Hibbing



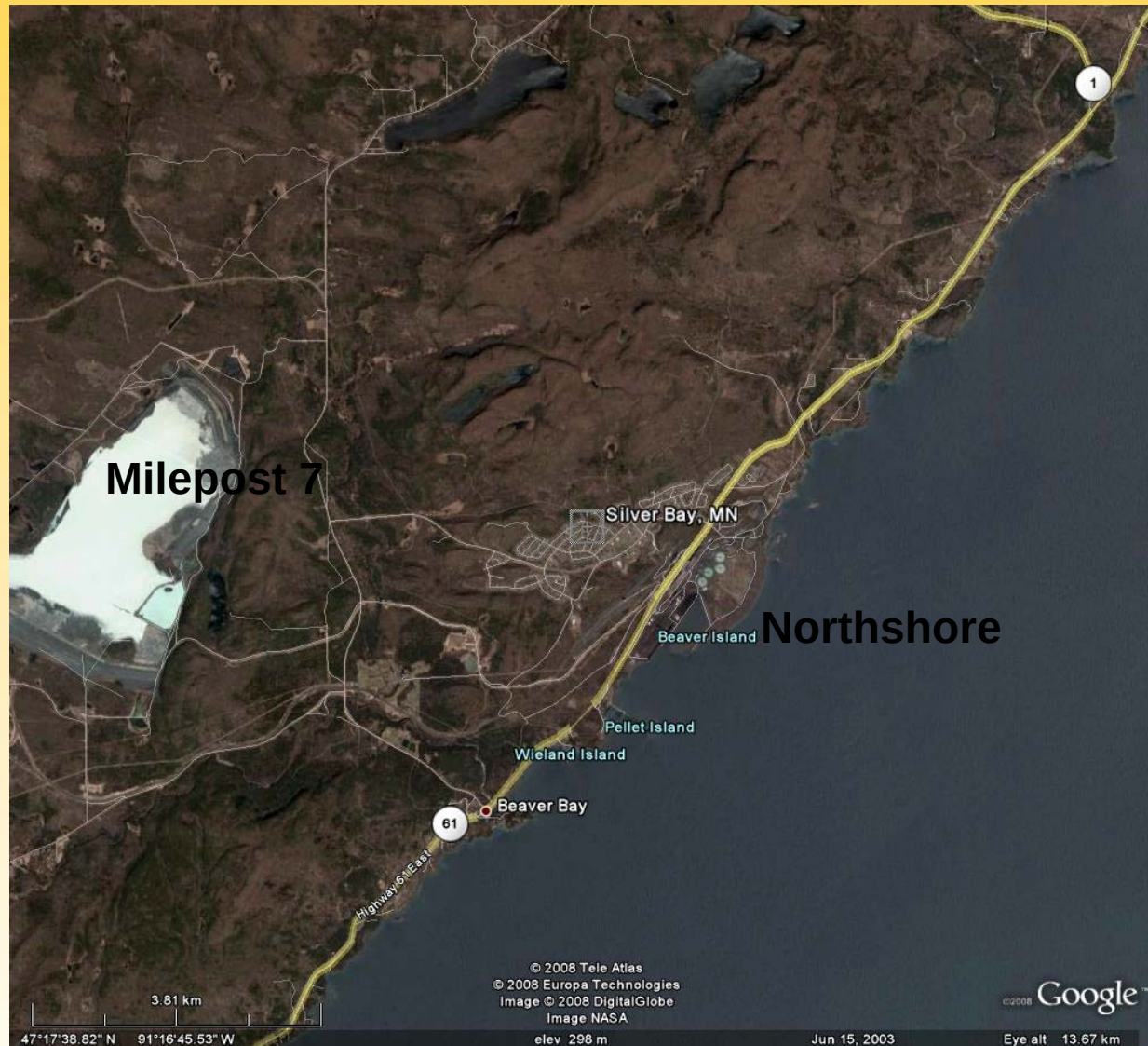
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Hibbing High School



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Silver Bay



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William Kelley High School and Elementary



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Babbitt



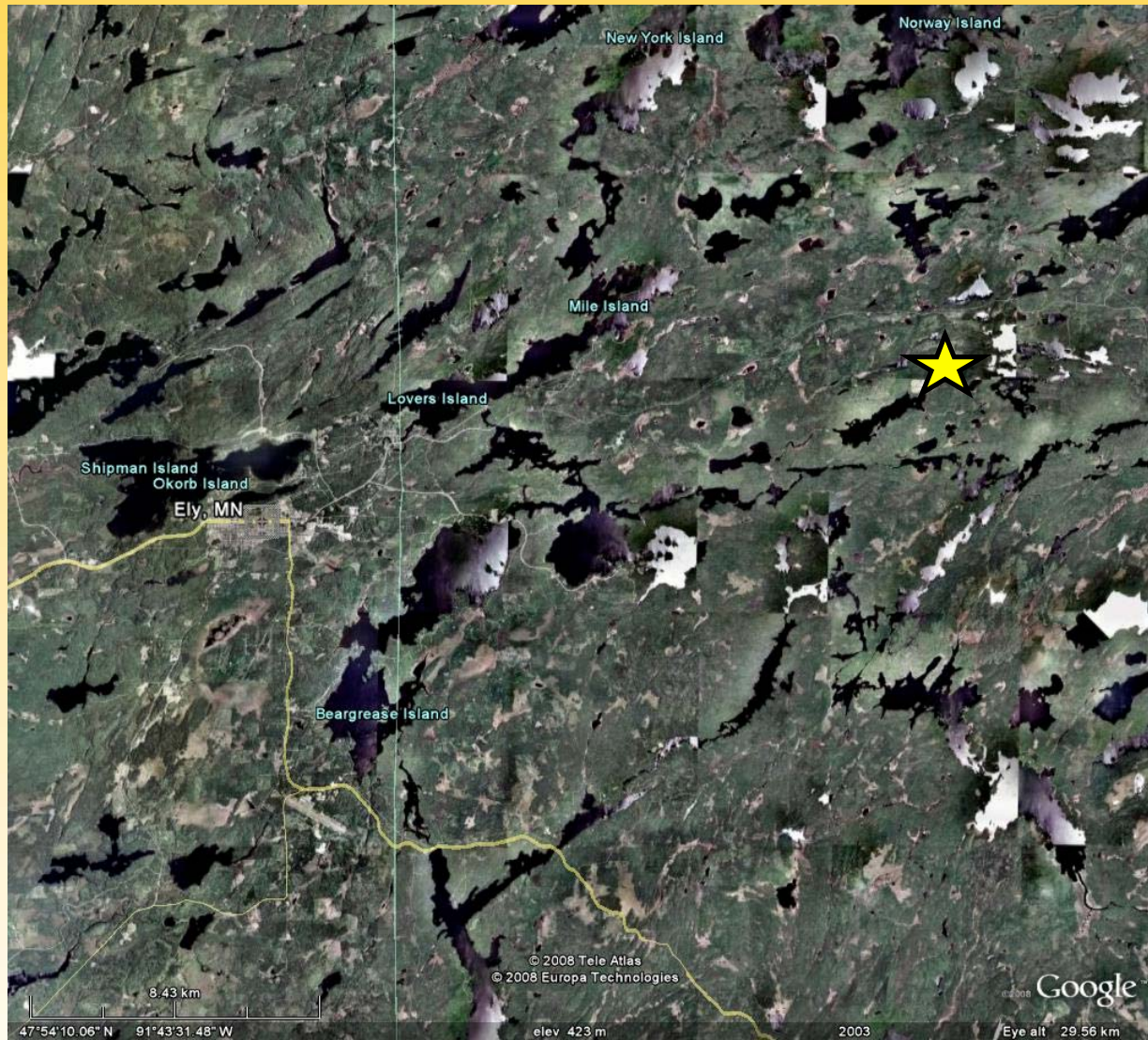
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Babbitt Municipal Center



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Ely



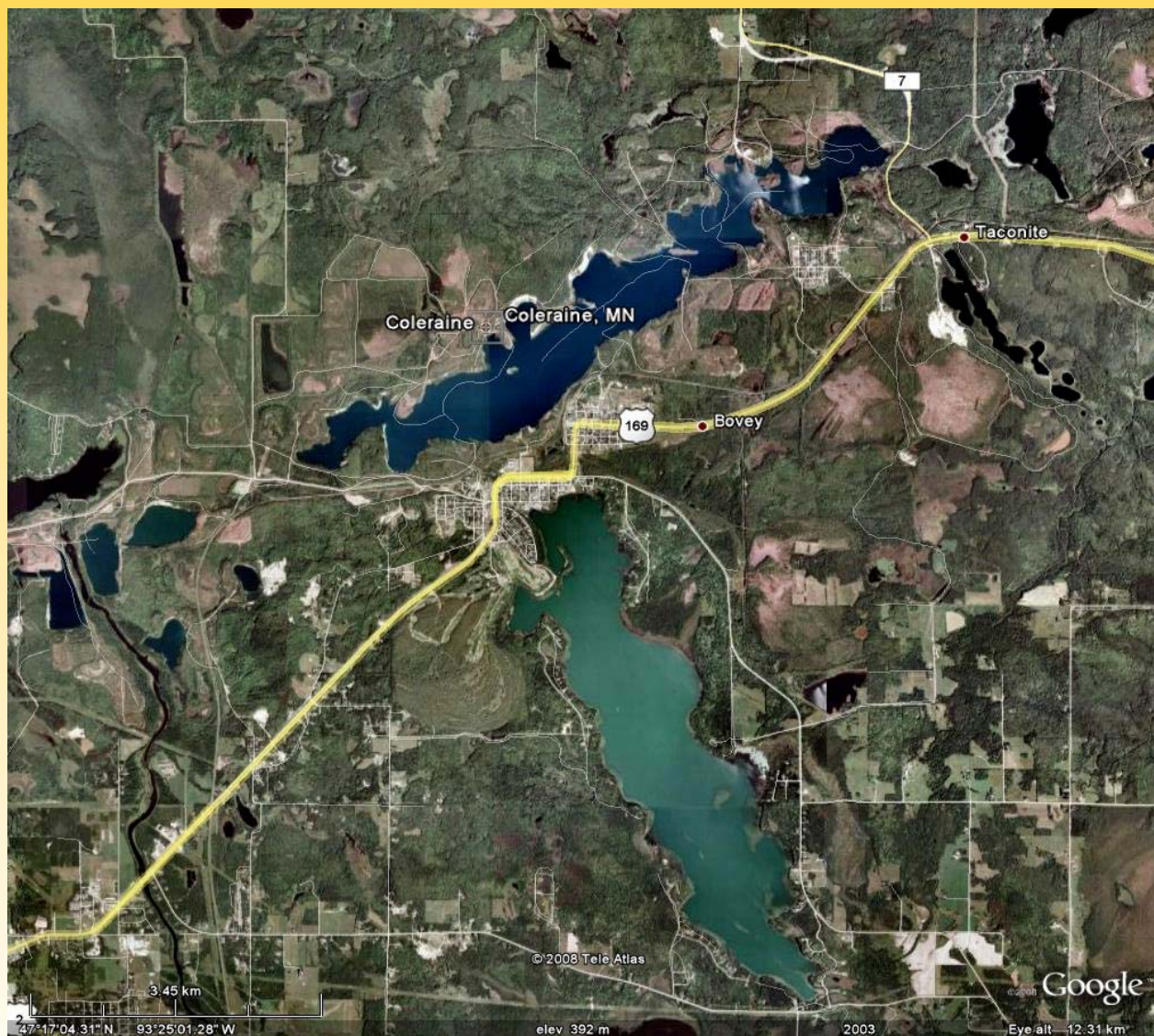
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18 miles
northeast of
Ely



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Coleraine



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Next Steps

- Sample in Virginia, Hibbing, Silver Bay, Babbitt, Coleraine and Ely this summer
- Analysis of these samples in Twin Cities and Duluth
- Identify and obtain access to appropriate sites in Grand Rapids, Keewatin, Chisholm, Mountain Iron, Biwabik, and Hoyt Lakes



Assistance?

- If you know of or can grant access to a site you think may be suitable for sampling in the identified towns and would like to help, feel free to contact me
- Educators: We look forward to sharing aspects of this research with students of all levels. If you're interested in incorporating it into your curriculum, please contact me!

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Taconite Aggregate



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**In February, a citizen asked
the Lung Health Partnership
the following questions:**



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“What, if anything, could you tell me about presence, or not, of asbestos in taconite tailings used as aggregate in road construction? Harmful? Not Harmful? Any testing completed (or underway)? Results so far? Use of the taconite tailings in road construction a good idea? Not a good idea?”



Taconite Rock Properties

- The rock is hard and dense
- It is durable, and compared to conventional highway aggregate products such as limestone and dolomite wears much less
- Taconite rock has been used in highway applications since the 1960s in many different construction situations (a report of these applications is available)



Is it a good idea?

- Taconite waste rock is a by-product of mining
- Vast quantities are available and it is a good construction material
- The use of this material will reduce the needs of new quarries in many parts of the state and allow alternative land use
- Energy has already been expended in the mining process and use of this material will reduce green house gas emissions for the state associated with aggregate mining



What is important to consider, in the context of the issue we are addressing today?

- To make a reasonable assessment, geology, mineralogy, chemistry, physical properties, particle size, shape, and morphology, and intended end-uses must all be taken into account.



Mineralogical and microscopic assessments of taconite tailings and aggregates

- X-ray diffraction (XRD), polarized light microscopy (PLM), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) have been used as follows:
 - 1981: Minnesota Department of Health – TEM
 - 2000-2003: NRRI – XRD, PLM, SEM, TEM
 - 2006: United States Geological Survey – XRD



Results

- All of the results for western Mesabi Range samples showed typical un-metamorphosed Biwabik Iron Formation mineralogy (no amphibole minerals present), while results for eastern Mesabi Range samples indicated the presence of amphibole minerals.



Summary

- Taconite aggregate materials have arguably undergone more asbestos mineral testing than most – if not all – other potential aggregate sources in Minnesota.



- None of the analytical work performed to date on taconite materials sampled from western Mesabi Range sources has shown asbestos minerals to be present.
- However, the project will continue to conduct detailed mineralogical and microscopic assessments of these taconite aggregate materials and the mineral dusts they can generate.
 - Air monitoring will be performed at selected aggregate utilization sites.



- Taconite aggregate materials should be handled with the same safety and industrial hygiene approaches practiced for other aggregate materials that have the potential to generate respirable dust



Ongoing Work

Additional aggregate samples have been sent out for additional microscopic analysis.

Air monitoring will be performed at selected aggregate utilization sites.



Questions/Discussion



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