Potential Health Risks from the Proposed Sand Processing Plant in Chippewa Falls
Overview of Risks

- Airborne pollutants that can be inhaled.
- Waterborne pollutants that can be ingested.
- Noise pollution that can be heard.
- Light pollution that can be seen.
- Wetland loss that affects local water quality.
- Truck traffic that affects road safety.
- Greenhouse gas generation that increases climate change.
Acknowledgements

- Roger Whiting and Ken Schmitt for an overview of the plant proposal and for providing relevant documents.
- Roger Fritz of the DNR for answering questions about the construction and operation permit.
- Gary Stone of Canadian Sand and Proppants, Inc. for answering questions about the proposed plant.
Many factors contribute to the potential health risks from an industrial operation:

- The type and rates of chemicals being emitted to the air, water, and soil.
- The degree of contact between these chemicals and the public.
- The way that these chemicals cause short-term and long-term damage to people.
The DNR has concluded that the air emissions of chemicals from the proposed plant will meet the National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) standards.

The chemicals they considered are particulate matter (PM), SO$_2$, NO$_x$, VOCs, CO, formaldehyde, benzene, hexane, dichloro benzene, and toluene.
DNR Study Concerns

- This plant would clearly violate the permit condition that “No person may cause, allow, or permit emissions into the ambient air of any hazardous substance in such quantity, concentration, or duration as to be injurious to human health, plant or animal life...” The plant would emit known human carcinogens benzene, formaldehyde, and crystalline silica.
Fugitive dust emissions throughout the proposed plant, including the surge pile, are not well estimated. Dust emissions from the road and surge pile are not included in the DNR analysis. These emissions would include crystalline silica, a known human carcinogen.
Canadian Sand and Proppants, Inc., through their engineering firm, worked with DNR staff to lower proposed emissions so that they would meet air quality standards.
Chemicals of Concern: Particulate Matter (PM)

- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- Decreased lung function;
- Aggravated asthma;
- Development of chronic bronchitis;
- Irregular heartbeat;
- Nonfatal heart attacks; and
- Premature death in people with heart or lung disease.
The plant would generate PM through the gas-fired dryers; surge piles; transferring sand between trucks, railroad cars, and within the facility; and through the “impact crusher,” “scrubber,” “140 mesh” filtering, sand drying, and final screening process.
DNR concluded that the plant would substantially increase the concentration of PM in the air, but that these levels would be below NAAQS and PSD standards. They did not consider most fugitive dust emissions.

The “fugitive dust control plan” would not be required until 60 days after the plant was built.
The DNR assumed that no dust would be coming off the surge piles of sand.
Dust control using water is difficult in freezing weather.
Chemicals of Concern: Crystalline Silica

- Silicosis – a fibrosis (scarring) of the lungs. Silicosis may be progressive and lead to disability and death.
- Lung Cancer – Crystalline silica (quartz) inhaled is classified as a carcinogen.
- Tuberculosis – Silicosis increases the risk of tuberculosis.
- Autoimmune and Chronic Kidney Disease – Some studies show excess numbers of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease.
- Non-Malignant Respiratory Diseases (other than Silicosis) – Some studies show an increased incidence in chronic bronchitis and emphysema in workers.
- Crystalline silica is a common component of sand. However, the percent of crystalline silica in the Town of Howard mine site sand was not measured, nor did DNR consider how much would be emitted by the plant.
Chemicals of Concern: Hazardous Air Pollutants

- Formaldehyde: human carcinogen
- Benzene: human carcinogen
- Hexane: affects the central and peripheral nervous systems.
- Dichlorobenzene: affects the kidneys, blood, liver, mucous membranes, and lungs, and is a possible human carcinogen.
- Toluene: affects the blood, kidneys, liver, central and peripheral nervous systems.
These hazardous air pollutants are not regulated by DNR because they are generated from natural gas combustion.
Chemicals of Concern: “Criteria Pollutants”

Sulfur dioxide (SO₂):
- **Breathing Difficulty** - for people with asthma who are active outdoors, and long-term exposure causes respiratory illness and aggravates existing heart disease.
- **Visibility Impairment** - Haze and reduced visibility.
- **Acid Rain** - damages forests and crops, changes the makeup of soil, and makes lakes and streams acidic and unsuitable for fish.
- **Aesthetic Damage** - SO₂ accelerates the decay of building materials and paints.
Nitrogen Oxides (NOx):

- **Ground-level Ozone (Smog)** - Children, people with lung diseases such as asthma, and people who work or exercise outside damage to lung tissue and reduction in lung function. Reduced crop yields.
- **Acid Rain** - causes lakes and streams to become acidic and unsuitable for many fish.
- **Particulate Matter** – Lung and heart illness (see above)
- **Water Quality Deterioration** - oxygen depletion and reduces fish and shellfish populations.
- **Climate Change** - One member of the NOx, nitrous oxide or N2O, is a greenhouse gas. Increased risks to human health, a rise in the sea level, and other adverse changes to plant and animal habitat.
- **Visibility Impairment** – Haze and reduced visibility.
Volatile Organic Compounds (VOCs):
- Eye, nose and throat irritation
- Worsening of asthma symptoms
- Cancer
- Liver damage
- Kidney damage
- Central Nervous System damage
Carbon Monoxide (CO):

- Headache
- Dizziness
- Decreased hand-eye coordination
- Weakness
- Confusion
- Disorientation
- Lethargy
- Chest pain (in cardiac patients)
DNR found that while the proposed plant would increased the levels of criteria pollutants in Chippewa Falls, the levels would still be below the National Ambient Air Quality Standards.
Global Climate Change:

- Greater spread of mosquito-borne diseases
- More intense tornados and other extreme weather
- Hotter and longer heat waves
- Reduced availability of water in some locations
- Crop damage
The two 25.5 mmBTU/hr sand dryers would emit the CO2 equivalent of 4,400 cars.

DNR did not, and is not currently required to estimate health impacts from CO2 emissions.
Diesel exhaust from truck traffic (20 vehicle trips per hour) and train traffic were not considered. Diesel exhaust is carcinogenic. The DNR uses an inconsistent set of opacity (dirty air) standards (from 7% to 20%) for different sources of PM. Sensitive receptors (children, elderly, those living in health care facilities) were not considered.
The DNR draft permit states that “Use of no precautions where control measures are unnecessary due to site or meteorological conditions” could be used for fugitive PM emissions. This would be up to the plant operators.
Recommendation

- DNR Perform an environmental assessment to include the following:
  - Estimate exposure to crystalline silica
  - Include all fugitive PM emissions
  - Include diesel truck emissions
  - Consider sensitive groups who could be affected
Contact Information

- Crispin Hayes Pierce, Ph.D.
- (715) 836-5589, piercech@uwec.edu