

## Before The State of Wisconsin Department of Natural Resources

### PETITION BY CITIZENS FOR THE PROMULGATION OF RULES TO GOVERN RESPIRABLE CRYSTALLINE SILICA EMISSIONS

TO: Cathy Stepp, Secretary of the Department of Natural Resources, and  
The Natural Resources Board  
P.O. Box 7921  
Madison, Wisconsin 53707-7921

The undersigned citizens of the State of Wisconsin hereby petition the Wisconsin Department of Natural Resources (WDNR) and the Natural Resources Board to conduct rule-making proceedings to revise and adopt rules governing the emissions of Respirable Crystalline Silica to the air from all significant sources, including bedrock sandstone mines and associated processing plants. Petitioners also request that these rules include revision of the hazardous air contaminant list to include respirable crystalline silica, promulgation of an emission standard that is protective of human health, and monitoring sufficient to demonstrate compliance with the standard under the authority given to the Department in sections 285.11(1) and 285.27(2)(b), Wis. Stats.

This petition is filed pursuant to the provisions of 227.12 (1) and (2), Wis. Stats., and Wisconsin Administrative Code NR 2.05(2). A petition for rule-making must state the substance or nature of the rule requested, the reason for the request, the petitioners' interest in the requested rule, and a reference to the agency's authority to promulgate the requested rule ( 227.12 (2), Wis. Stats.). This petition fulfills these requirements and describes why rule changes are urgently needed.

#### I. THE NATURE OF THE REQUESTED RULES

The petitioners respectfully request the Department of Natural Resources and the Natural Resources Board to promulgate changes to NR 445, the Air Toxics Rule, that:

1. Revise Table List A of 445.07 to include Respirable Crystalline Silica as a Hazardous Air Contaminant under **NR 445.13**.
2. Establish an emission standard with a time period for the standard and threshold that is at least as stringent as **3 micrograms per cubic meter with a time period of annual**. This standard is consistent with the California Office of Environmental Health Hazard Assessment (OEHHA, CAL/EPA) Reference Exposure Level (REL) **and is a level below which no adverse effects due to prolonged exposure would be expected in the general public**.
3. Require monitoring that the Department deems sufficient to demonstrate compliance with the emission standard.

## EXECUTIVE SUMMARY

Respirable crystalline silica (RCS) has been recognized by WDNR as meeting the criteria of a hazardous air contaminant, as defined by the Air Toxics Rule, NR 445. The *Report to the Natural Resources Board :Silica Study* of August 2011, while five years overdue (NR 445.14 (2)), describes the health effects of silica exposure in the workplace: silicosis, lung cancer, COPD, emphysema, bronchitis, tuberculosis, *cor pulmonale*, scleroderma, rheumatoid arthritis, systemic lupus, Sjogren's syndrome, and glomerular renal disease.

This *Silica Study* documents the establishment of an EPA guideline and adoption of RCS regulatory standards in six states to protect the public. A substantial body of research on the health risks of RCS since the 2004 NR 445 revision (begun in 2000) has become available.

New studies reinforcing the carcinogenicity and potential mechanism of cancer causation, the increased toxicity of “freshly-fractured” silica, silicosis in farm animals, and the apparent lack of a threshold dose causing no harm also support the determination of RCS as a hazardous air pollutant.<sup>1</sup>

While data on ambient RCS exposure are limited, the *Silica Study* provides estimated background levels in urban, suburban, and rural communities. As many new and proposed sand mines and processing plants in Wisconsin join the 2,300 current industrial sources of silica, public exposure to particulates including RCS is increasing rapidly. As a particularly toxic component of particles emitted from industrial bedrock sandstone mining and processing operations, RCS presents special concerns not fully addressed by current regulations.

Listing and regulation of respirable crystalline silica (RCS) as a hazardous air pollutant with an ambient air standard and time period is consistent with the DNR’s mission to protect the public:

“NR 445.03 General limitations. No person may cause, allow or permit emissions into the ambient air of any hazardous substance in a quantity or concentration or for a duration that is injurious to human health...”

Adoption of the well-documented State of California Office of Environmental Health Hazard Assessment standard of 3micrograms per cubic meter and enforcement of this standard on an annual time period will serve this mission. Mandatory monitoring of facilities that emit RCS to comply with the standard would be another important step towards protecting public health in Wisconsin.

<sup>1</sup> The Air Toxics Rule uses the term “Hazardous Air Contaminants.” Throughout this petition the more common term, “Hazardous Air Pollutant” (HAP) is used.

## II. THE PETITIONERS' INTEREST IN THE REQUESTED RULE

**Petitioner Jamie Gregar** resides at 20773 Flatrock Avenue, Tomah, WI 54660. She joins this petition individually and submits the following statement in support of this petition.

“Yesterday it snowed in Tunnel City, a very small town outside of Tomah, Wisconsin. Tunnel City is stunning. With a mix of forest and farmland it was the perfect place to buy a home to raise our new family, a dream home, up on a hill overlooking the beautiful God made landscape. My 4 and 2 year old daughters were very excited! They made me bundle them up to brave the 32 degree weather to go outside and make snow angels. I actually considered taking our 6 month old son out as well but realized that he probably wouldn't enjoy it as much as watching us from the warmth of our fireplace. Sounds perfect, right? It should be... but once outside, all I could pay attention to was the sound of machines ripping apart the trees and vegetation in preparation for a colossal sand mine next to my home.

My name is Jamie Gregar. I am married and have three wonderful children. Both my husband and I are US Army Veterans. In December of 2010 we bought our dream home. We paid, what was for us, a fortune for this home with excitement of the location, the beauty, and thinking about watching our children enjoy the quiet pristine environment we were able to provide for them. My husband was home from his 3rd deployment, two being overseas, and we were happy to start our lives with our children. Then, in June of 2011 we woke up to the news that our beautiful town was going to become a sand mine. Neither of us had ever even heard of a frac-sand mine. That began our journey of learning about sand mining and crystalline silica dust. I have read everything there is out there on silica and silicosis. When I found out the effects of crystalline silica dust on the lungs of those exposed to this carcinogen, I was immediately alarmed for the health of my children. I was thrilled to find out the DNR was doing a study on it. I hoped that the silica dust would be regulated. And when I learned that DNR does not even monitor this cancer causing agent, I was overwhelmed with frustration and fearful for our family's health.

We live across the road from property that a sand mining company (Unimin) has purchased. They have approached our neighbors with offers to buy their land next to us, and they have purchased the rights to prospect for sand on the property right behind us. The company has refused to purchase our home. We have had our once dream home on the market since they refused to buy it with absolutely no bites because of this sand mine going in. We are trapped. We can't afford to walk away from our home, but we also can't afford to live our lives wondering if the air we breathe will cause our children to get cancer. Please help us.”

**Petitioner Ken Schmitt** resides at 4099 120<sup>th</sup> Avenue, Colfax, WI 54730. He joins this petition individually and submits the following statement expressing the nature and basis of his concern.

“As a Chippewa County Board Supervisor, I currently represent the towns of Howard, Cooks Valley, a corner of Wheaton, and a wedge of Tilden. If re-elected in April I will also represent Howard, Cooks Valley, Auburn, south end of Woodmohr, and north end of Eagle Point. My wife Laura and I live with our four young children close to a sand mine, as do many of my current and future constituents. We cannot afford to wait for a lung disease in 20 years to tell us that air WAS NOT safe.

My family and the families I represent are entitled to safe, clean air, and the peace of mind that comes from knowing that protections are adequate to ensure this. The only way to assure the safety of these families, who through no fault of their own are being exposed to crystalline silica, is to list it as a hazardous air pollutant, and then establish and enforce a standard for it. You must also require continuous monitoring for crystalline silica with multiple monitors around these mines and processing plants. The DNR is already behind on this issue due the phenomenal growth of industrial bedrock sand mines and processing plants in western Wisconsin. For the last three years I have been told by many local and state officials and mining company representatives that the DNR will protect our health and air quality. As many of us know this is, at best, an overly optimistic view. Require the monitoring, establish and enforce a standard to assure the families that they are indeed safe, and do not look the other way as the state of Montana did in the towns of Libby and Troy years ago. That action cost Montana and its insurance companies a 43 million dollar settlement, the Federal Government 370 million in clean-up costs so far, 400 residents an early and miserable death, and another approximately 1750 residents chronic health issues. There were less than 3000 residents in Libby. What if over half of the families around these facilities in Western Wisconsin are similarly affected?"

**Petitioner Dr. Crispin Pierce** resides at 1314 S Farwell, Eau Claire, WI 54701. He joins this petition individually and submits the following statement in support of this petition.

"I am an Associate Professor and Fulbright Scholar at the University of Wisconsin-Eau Claire, where I direct the Environmental Public Health Program. My area of specialization is toxicology in which I have numerous publications in the area of biological monitoring of toxicant exposure. For the last three years, research in my laboratory has focused on the measurement and health risk assessment of particulate and crystalline silica exposure from sand mining and processing. I have provided expert testimony and written comments throughout western Wisconsin in response to requests for input by the DNR on specific sand mine and processing plant proposals, as well as to the 2011 *Status Report to the Natural Resources Board: Silica Study*. I have been invited by many town and county boards to give informational presentations on potential health risks associated with sand mining and processing, and have invited collaboration with three industrial sand companies. I am currently sampling up- and down-wind of the Chippewa Falls EOG Resources processing facility for airborne particulates and crystalline silica.

As a public health professional and resident of western Wisconsin, I am very concerned about the rapid permitting of sand mines and processing plants without full consideration of health effects from airborne pollutants. While there are many substantial risks with these industrial operations — increased truck traffic; potential for groundwater contamination; hydrologic changes affecting surface water runoff, groundwater recharge and sufficient stream flow for wildlife; light and noise pollution; aesthetic value and tourism losses; and airborne pollutants — crystalline silica exposure may pose the greatest risk.

A common argument from sand producers is that there are no studies linking silica exposure to silicosis or lung cancer in the general public. This is akin to arguments made by tobacco companies 20 years ago that only smokers, but not families, friends and co-workers exposed to secondhand smoke, are at risk for disease and death. Decades of research has found that silica causes morbidity and mortality in workers (NIOSH estimates 8–18 worker deaths in Wisconsin this year); this does not mean that the public, exposed to lower levels of silica (but potentially 24 hours per day) is not at risk.

As a recognized human carcinogen also causing silicosis, COPD, tuberculosis and kidney disease, crystalline silica is currently not regulated to protect the public in Wisconsin. With the rapidly-expanding exposure to the public through sand mines and processing plants, a standard must be set to protect and reassure the public as well as to provide a clear guideline for industry.”

**Petitioner Wendy Loew** resides at 4364 Cty Hwy B, Colfax, WI 54730. She joins this petition individually and submits the following statement in support of this petition.

“I am requesting that you list crystalline silica as a hazardous air pollutant and that you set a standard to protect the health of the citizens residing around frac-sand plants and mine sites. My husband and I and our four small children own a hobby farm with about 20 beef cattle, chickens, and goats in the Town of Howard. Our farm adjoins the EOG Resources frac-sand mine. We have studied the various impacts of crystalline silica mining and processing in great depth over the last three years.

As a Registered Nurse, I have specifically studied air pollution and the hazardous health effects of airborne crystalline silica dust. I am extremely concerned that citizens in our community and my own children will develop asthma, COPD (emphysema), lung cancer, or silicosis. I worked for 8 years in an Intensive Care Unit. Of the many types of patients under my care, those with lung problems who were having difficulty breathing were the most difficult and heart wrenching of them all. There is nothing that is harder to watch than some one struggling to breathe, with anxiety and panic in their eyes, wondering if they are going to catch their breath or if it is their last. Children are especially prone to health problems from exposure to respirable crystalline silica.

It’s urgent that we add respirable crystalline silica to the list of hazardous air pollutants, establish a health standard for respirable crystalline silica and require adequate monitoring of frac-sand mining sites and processing facilities to protect the health of the citizens of Wisconsin who live near these sites and who must endure the highest risk of exposure to emissions of crystalline silica from all sources at these sites.”

**Petitioner Ronald Koshoshek** resides at 4790 County Hwy N, Chippewa Falls, WI 54729. He joins this petition individually and makes the following statement in support of this petition.

“I am retired from my 30-year job as a professor of ethics, jurisprudence and environmental policy at the University of Wisconsin-Eau Claire. I was a member of the Citizens Advisory Committee to the Public Intervenor Office from 1979-1995 and served as its chair from 1982-91. I have served on numerous boards of local, state and national conservation groups as well as on task forces and advisory committees for DNR and DATCP on natural resource issues. I was a first recipient of the UW-Madison’s *Wisconsin Idea Award* for my 'contributions to natural resource policy' and the *Excellence in Public Service Award* from UW-EC for my 'contribution to the quality of life of all citizens of Wisconsin.' I was also the Wisconsin Wildlife Federation’s *Conservationist of the Year* in 1987 for pioneer work in the on-site detention of stormwater runoff and groundwater recharge systems in urban settings.

As Chair of the Town of Howard Plan Commission, I assisted in the creation of the first non-metallic mining operator’s licensing ordinance in Wisconsin. It has become a model for other townships. I also assisted the Town in negotiating a developer’s agreement with EOG Resources in

2010. Over the past two years, I have been helping residents and board members of several other townships address the public health, safety, and other impacts that frac-sand mining can have on individuals and communities in West Central Wisconsin.

Citizens and Town Boards are very concerned about potentially adverse health impacts of crystalline silica dust and other particulate emissions from bedrock sandstone mining operations and processing facilities. Their concern is supported by the scientific literature, the DNR's own 2011 Silica Study, direct observation of dust conditions at sites already in operation, and common sense. Without a declaration that respirable crystalline silica is a hazardous air pollutant, it is difficult to justify monitoring for it and without a meaningful standard, it is impossible to ascertain when improving the best management practices at these industrial sites is necessary to better protect public health. Historically, at both national and state levels, the creation of standards and laws protective of public health has driven the technological development needed to meet these standards, including what is considered as 'best' management practices, and it has lowered the market costs of the new technologies as they became more readily available and more widely used.

Many of these industrial sites are located in close proximity to residential dwellings. For example, the 100-acre EOG mine in the unzoned Town of Howard, is surrounded by 10 residential homes located within 300 feet of the mine site. The EOG processing facility in Chippewa Falls is located on a 90-acre tract closely surrounded by many small businesses and residences, as well as a major hospital and various medical clinics located within a mile of the site downwind.

Towns and municipalities want to monitor air quality in the locales near mining operations and processing plant facilities. Four modest efforts have been made to require/implement monitoring but without any adequate monitoring system as yet in place or proposed. Nevertheless, the 'good neighbor policy' being adopted by most top tier companies in the industry seems open to monitoring at least for the short term. It is time for DNR to get its act together and fulfill its self-avowed obligation to protect public health in this regard."

**Petitioner Richard Nagler, MD** resides at 786 3 ½ Avenue, Prairie Farm, WI 54762. He joins this petition individually and submits the following statement in support of this petition.

"I am a physician specializing in Internal Medicine, and am currently Chief of Staff at Mayo Health System's Northland Hospital in Barron, Wisconsin. As a member of the non-metallic mining ordinance committee for the town of Prairie Farm, I have researched and helped design an ordinance currently being considered by the town pertaining to a proposed frac-sand mine and processing plant.

My family was informed this spring that our immediate neighbors were leasing their land to Procor, an offshoot of the Canadian company Sanjel that intends to mine silica sand and establish a processing plant less than a quarter mile upwind from our front door.

Of the many concerns I have about the plant, the foremost is respirable silica, an odorless compound invisible to the naked eye, and long known to cause severe, irreversible lung disease, including silicosis and an increased risk of tuberculosis and cancer. The recognition of this fact prompted the regulation of occupational silica exposure, and has greatly reduced the loss of life and health to these diseases. Now that sand mining and processing are becoming common in this part of Wisconsin, the public health hazards of this compound absolutely must be addressed.

Medical history is full of examples of toxic materials that have caused disease and claimed lives years before their risk to the general public was acknowledged by government. A few examples include asbestos, certain pesticides, radioactive materials, and second-hand tobacco smoke. There is a common thread in each case:

- the danger of exposure was known,
- an assumption was made that only the people with the strongest exposure were at risk,
- only after the general public was exposed to the material for prolonged periods of time was any thought given to investigation, regulation and protection, and
- due to this delay, there was needless loss of life and health.

In light of its history, the responsible approach is to recognize respirable silica as a hazardous air pollutant. Only then will the appropriate precautions be taken and the appropriate monitoring be done. Wisconsin must follow the lead of other states that have recognized the danger, including Texas and California, and set tight standards for exposure. Only then will the DNR truly follow its mission statement '...to provide a healthy, sustainable environment... [and to] consider the future and generations to follow.'

I have the health of my neighbors, my community, and my young family to consider. I strongly support the petition."

**Petitioner Elizabeth Allen** resides at 302 9<sup>th</sup> Street, Prairie Farm, WI 54762. She joins this petition individually and submits the following statement in support of this petition.

"I am a internationally published children's book artist. I moved to Prairie Farm both for the natural beauty, and for the clean air. The studio where I live and work, mostly on children's textbooks, overlooks the Hay River. Both in summer and in the silence of winter, the sound of the roaring wind surging over the plain on it's far side, and through the white pine forest is often the only sound we hear.

Before coming here ten years ago, I spent a full year bedridden with a chronic bronchial condition and emphysema. I am finally able to live a full life again, only because the air quality here is pure. I care for my little grand daughter, who was born with chronic lung disease, bronchopulmonary dysplasia, or BPD, which haunts many children later in life. She has lived here with me since she was an infant, and is now 3 yrs. old. Her symptoms have gradually disappeared, but she remains vulnerable to particulates in the air. The wind which tunnels swiftly through the hills will soon carry crystalline silica particles from Procor's planned silica plant and mine, a little more than a mile upwind, directly to the west of my home and workplace.

I have tried to plan for the future, but each time I begin to try to plan for what I must do to avoid this coming threat, I simply cannot find an avenue of escape. Along with many freelancers in this economy, I have no resources with which to replace our home, if we were to abandon it. The future has become unthinkable.

I have lived most of my life believing that I stood in a working democracy, where, when push came to shove, people cared about each other's health and well being, and the future lives of our children. I have trusted that the majority of people who govern us, hold the environmental common good to be sacred, and will prioritize it over short term profits.

I placed that trust in you at the WDNR board when I emailed each of you, pleading for your attention to this life threatening situation. The only response was one welcome call from Preston Cole, but I was left with no further indication of whether the board itself was concerned.

I am most urgently requesting, once again, that respirable crystalline silica be listed as the hazardous air pollutant it is, that standards be set, and that monitoring be enforced with real integrity, for the safeguarding of all our citizens, even and especially the smallest and most health challenged of us.”

**Petitioner James Torseth**, resides at 288 21 <sup>3</sup>/<sub>4</sub> Street, Chetek, WI 54728. He joins this petition individually and submits the following statement in support of this petition.

“I am Chair of the Plan Commission in the Town of Sioux Creek, Barron County, Wisconsin and have held the position since February of 2003. During my tenure as Chair, the Town has adopted its Comprehensive Plan and a very progressive Land Division Ordinance along with several other ordinances.

The issue of frac sand mining arrived in Sioux Creek in early 2011. I have never before in my tenure with the Plan Commission seen an issue be of such major concern to the citizens in Sioux Creek. Literally dozens of meeting hours and hundreds of study and research hours have been devoted to the frac sand topic by others and myself in the Town. One of my major concerns, as well as of numerous other citizens, is the potential hazard to health of airborne fine crystalline silica. The available field of evidence indicates silica sand mining, processing and transport have the potential to create airborne fine crystalline silica particles in quantities harmful to both human and animal health.

For these reasons, I strongly support the petition to add crystalline silica to the list of hazardous substances and establish a standard for fine crystalline silica airborne particulate emissions resulting from frac-sand mining operations, from processing facilities and from the transport of raw and finished materials whether by truck or by rail.”

**Petitioner Roger Norberg**, PE resides at 381 6 <sup>1</sup>/<sub>2</sub> Street, Prairie Farm, WI 54762. He joins this petition individually and submits the following statement in support of this petition.

“I am a father, a grandfather, and an uncle to potential victims of long-term crystalline silica exposure, due to the close proximity of my family’s farms to a planned frac sand wet and dry processing plant.

I grew up on the farm immediately across the road from the planned processing site on County Road P in Prairie Farm Township. My mother stills lives there and my sister in law and nephews are now farming that land and hope to carry on as the next generation. My wife and I own the farm immediately west of my home place, less than a mile from the site, and my son farms there with me now, and hopes to do so for many years to come. Another brother farms just north of the plant site. His home is adjacent to the northern boundary of the mine site. He is a dairy farmer, and his pasture shares a common fence with the plant site.

I am a degreed mechanical engineer and a business owner. My Rice Lake business, TPM, designs and manufactures parts and machines that process food. I require safety to be the highest priority for my employees. In my industry, this requires the establishment and enforcement of standards for the health and safety of the both the workers and the consumer. No less so here. As an engineer I understand that standards should be based on the best available science. As pertains to frac sand mining and processing, standards should protect both the workers and the community. I expect the WDNR to take the same care of WI communities that I take of my workers and customers.

There are OSHA standards that will apply to workers inside the planned plant, but presently the state has no standards for crystalline silica dust, and therefore no way to protect the community. I parallel this exposure to abuse – what men do to one another – mainly to children – who cannot protect themselves.

My wife and I are fortunate to have life experiences that taught us that at critical times in history we desperately need government oversight of what man tends to do to himself, whether through greed, ignorance or malice. The examples are many. This is one of them.

I therefore petition the WDNR to declare crystalline silica to be a hazardous air pollutant, to establish meaningful standards governing silica dust, and to require monitoring to ascertain compliance with those standards.”

**Petitioner Scott McCurdy** resides at E5684 695<sup>th</sup> Avenue, Menomonie, WI 54751. He joins this petition individually and submits the following statement in support of this petition.

“My interest in controlling the levels of RCS (respirable crystalline silica) is the inhalation health hazards from exposure to RCS and my education and experience in environmental health and mineral exploration. I am currently and have been for over 20 years the Environmental Group Director at Cedar Corporation in Menomonie, WI. Cedar Corporation is a medium sized engineering consulting firm that assists municipal, commercial, industrial, and private clients with engineering, environmental, and building design needs primarily in western Wisconsin. I have a Bachelor of Science in Geology, Physics and Mathematics (1973 - Dalhousie University, Halifax, Canada) and a Master of Science in Environmental and Public Health (1992 - University of Wisconsin at Eau Claire). I spent the first 16 years of my career in oil and gas and mining exploration and the last 22 years working as an environmental consultant. Recently I have been involved with various townships and groups presenting basic information on the geology, hydrogeology, and environmental concerns of sand mining and sand processing operations.

My home is 1½ miles northwest of a proposed million ton per year sand processing and transportation loading facility. My son, daughter in law, and their two sons own property on 50<sup>th</sup> Avenue in Cook’s Valley Township, Chippewa County, ½ mile directly east of a proposed 900 acre mine site and 1 to 2 miles east of four other mines, some with processing facilities and others without. They plan to build their home on that property, already purchased, design in process. What was originally an environmental concern has become personal. That my children and grandchildren could be subjected to the potential inhalation of silica dust from operating mines is intolerable and disconcerting.

Exposure to silica dust is as dangerous as exposure to asbestos, more so if you are a bystander in the country on a beautiful windy day, where the sub 10 micron particles could be in the air you breathe without your knowledge and with no defenses against the exposure. The particulate matter enters your lungs like asbestos, causing irritations and infections. Over time continued exposure results in decreased lung efficiency, possible silicosis, lung cancer, and death. This loss of lung function is something that happens over time, there is no direct causal relationship that you can point to one day and see the next. The reduction in lung function affects all of us as there is a reduced quality of life, decreased productivity in the work force, and increased health care costs.

The California OEHHA Final Chronic Toxicity Summary on Silica (Crystalline, Respirable) February, 2005 presents studies of exposures to RCS on a worldwide basis and clearly establishes a relationship between inhalation of silica particulate and silicosis. Should we continue the experiment in Wisconsin so we can determine what exact grain size we should be concerned about? Certainly you would not want members of your family to be the guinea pigs in that experiment as I am clearly not interested in my family being exposed to silica dust. The State of California felt strongly enough to establish a standard for respirable crystalline silica of  $3 \mu\text{g}/\text{m}^3$  which, based on their evaluation, provides a factor of safety for those who are exposed.

The citizens of Wisconsin deserve to be represented and protected. The need for regulations to protect our citizenry has become the responsibility of government by choice. Ignoring your responsibility puts the citizens of the State at risk. I petition you to add respirable crystalline silica on the list of hazardous air pollutants, to establish an air quality standard for respirable crystalline silica of  $3 \mu\text{g}/\text{m}^3$  or less, and to require adequate monitoring procedures to determine air quality in the neighborhoods downwind of large scale sand mines and processing facilities.”

### III. WISCONSIN DNR AUTHORITY TO PROMULGATE THE REQUESTED RULE

1. The Department's general authority to promulgate a rule is found in Wis. §285.11(1). The department's authority to promulgate a rule on a hazardous air pollutant where there is no federal standard is found in Wis. §285.27(2)(b). Wisconsin Administrative Code NR 445.13(2) authorizes the Department to revise the hazardous air contaminant tables in NR 445.07 if the contaminant causes an adverse health effect and meets one of the requirements in NR 445.13(2)(a).

#### **Respirable Crystalline Silica (RCS) meets the definition of a Hazardous Air Pollutant and other necessary conditions for listing in Table A, as delineated in Chapter NR 445.13.**

2. **NR 445.13(2)(a)** requires that to be listed in any of the air contaminant tables a substance must first meet the definition of a hazardous air contaminant. RCS meets this definition because a) it causes adverse health effects when inhaled, b) it is classified as a known carcinogen, and c) the American Conference of Governmental Industrial Hygienists (ACGIH) has established a threshold limit value for this substance.

**a) Inhalation of Respirable Crystalline Silica causes adverse health effects.** In addition to lung cancer, adverse health effects of RCS inhalation noted in the Wisconsin Department of Natural Resources (WDNR) *Report to the Natural Resources Board: Silica Study* (2011),<sup>2</sup> and supported by a substantial body of research literature, are silicosis, silicotuberculosis, Chronic Obstructive Pulmonary Disease (COPD), emphysema, bronchitis, enlargement of the heart, immune system diseases, and kidney damage.<sup>3</sup>

#### **b) RCS has been classified as a known carcinogen by both the International Agency for Research on Cancer (IARC) and the National Toxicology Program.**

- In 1997, the International Agency for Research on Cancer (IARC) classified crystalline silica as a known carcinogen.<sup>4</sup>
- **National Toxicology Program:** "Respirable crystalline silica, primarily quartz dusts occurring in industrial and occupational settings, is known to be a human carcinogen based on sufficient evidence of carcinogenicity from studies in humans. Respirable crystalline silica was first listed in the Sixth Annual Report on Carcinogens in 1991 as *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity from studies in experimental animals; the listing was revised to *known to be a human carcinogen* in the Ninth Report on Carcinogens in 2000."<sup>5</sup>

2. A special study of **crystalline silica** mandated by Chapter NR 445.14(2). The study "shall evaluate the sources and amounts of emissions and alternative strategies for minimizing public health risks. The department staff shall report progress on the studies to the natural resources board by July 1, 2006."

3. Wisconsin Department of Natural Resources (WDNR), August 2011. *Report to the Natural Resources Board: Silica Study*. (hereinafter called the *Silica Study*) Pages 8 and 9. <http://dnr.wi.gov/air/pdf/finalsilicareport.pdf>

4. IARC (International Agency for Research on Cancer) 1997. Silica, some silicates, coal dust and para-aramid fibrils IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, 68:42–242. <http://monographs.iarc.fr/ENG/Monographs/vol68/volume68.pdf>

5. National Toxicology Program, Department of Health and Human Services, 2011 Report on Carcinogens, Twelfth Edition (2011), 377. <http://ntp.niehs.nih.gov/ntp/roc/twelfth/profiles/Silica.pdf>

**c) A threshold limit value (TLV) for Crystalline Silica has been established by the American Conference of Governmental Industrial Hygienists (ACGIH).** In 2006 the ACGIH lowered the TLV for Silica, Crystalline: Quartz and Cristobalite to 0.025 mg/m<sup>3</sup> with the recommendation that air concentrations be maintained as far below the proposed TLV as prudent practices permit.<sup>6</sup>

3. **NR 445.13 (2)(b)** requires that in addition to meeting the definition of a HAP, in order to list a substance in the Tables (NR 413.07) the department must also determine that four additional qualities do NOT apply to the substance. **None of these four qualities apply to RCS.**

4. **NR 445.13(2)(c)** requires the department to consider other regulations that may provide adequate protection for public health or welfare and whether additional information is necessary to fully assess the need to list the hazardous air contaminant in Table A, B or C.

WDNR has considered a substantial volume of additional information in their recently completed *Silica Study* that petitioners find supportive of the need to list and regulate RCS. The *Study* suggests **National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM<sub>10</sub>, PM<sub>2.5</sub>)** as regulations that may provide adequate protection for public health.

However, as supported by research included in the *Study* and in this petition, these regulations do not adequately protect public health or welfare from unsafe levels of RCS exposure.

5. **NR 445.13(2)(d)**, requires the department to evaluate sources in Wisconsin that release or might release the contaminant, the expected population exposure to the contaminant and the related risks, and alternative control strategies that include emission limitations and a consideration of costs before it can list a hazardous air contaminant in Table A, B or C of s. NR 445.07:

In the *Silica Study*, WDNR has determined that there are 2,300 facilities that release silica and that public exposure risk is increasing rapidly from new frac sand (bedrock sandstone) mines in Wisconsin. Suggested possible alternative control strategies are the same as for particulate matter (NAAQS/PM) control and are uncertain to reduce RCS exposures to safe levels.

6. **The department's authority to promulgate a rule for a hazardous air pollutant, where there is no federal standard, is found in Wis. Stat. §285.27(2)(b):** "*Standard to protect public health or welfare.* If an emission standard for a hazardous air contaminant is not promulgated under section 112 of the federal clean air act, the department may promulgate an emission standard for the hazardous air contaminant if the department finds the standard is needed to provide adequate protection for public health or welfare."

However, the department may not find the standard is needed unless it is supported with a) a public health risk assessment characterizing the stationary sources in the state, the population groups at risk, and showing some members of the population will be subjected to unsafe levels of the pollutant if the emissions rules are not promulgated, b) options for managing those risks in a cost effective manner, and c) considering the standards of neighboring states.

6. Silica, Crystalline:  $\alpha$ -Quartz and Cristobalite: TLV<sup>®</sup> Chemical Substances 7th Edition *Documentation*, ACGIH<sup>®</sup>, Publication #7DOC-743

### a) Sources and Population Group at Risk

The WDNR *Silica Study* acknowledges the dramatic expansion in Wisconsin of RCS sources via the increased bedrock sandstone mining for frac sand. Other existing sources of RCS are also covered in the *Study*.

The *Silica Study* references the State of California Office of Environmental Health Hazard Assessment (OEHHA) Reference Exposure Level (REL) of 3 micrograms per cubic meter ***which is a non-occupational level below which no adverse effects due to prolonged exposure would be expected in the general public.***<sup>7</sup> Research studies presented in the *Silica Study* strongly indicate that citizens nearest to frac sand mining operations could be subjected to levels of RCS above this safe standard under existing rules.

### b) Cost of Regulations

NR 445 was last revised beginning in 2000 with adoption of the revisions in 2004. In 2001 the department undertook two complementary cost implementation analyses of the proposed revisions with affected industries.<sup>8</sup> At that time, high implementation costs were expected if silica were to be regulated.

However, petitioners note that frac sand mining companies are showing a willingness to perform monitoring already, but lacking guidance from WDNR, companies cannot plan for these costs. Due to the profitability and scale of this type of mining, compared to smaller traditional Wisconsin silica sources, costs would not be as burdensome as was found in the past analyses. The pattern of costs associated with any new pollution control requirements typically is higher initially with a decline in costs over time.

Health care costs continue to rise with taxpayers funding these increases at the family, federal, state, and county levels. Cost effective methods of controlling the risks to human health must consider costs to the families most likely to be affected if RCS levels are not safe, costs to taxpayers, and costs to the industry. The adverse health effects of crystalline silica can take years to develop and cannot be cured. Children are susceptible to greater harm from unsafe exposures due to their developing lungs and breathing patterns. Consideration of the lifetime health care costs resulting from unsafe silica levels and the costs of lost work from silica exposure related illnesses must be considered in this analysis.

### c) Neighboring States

The *Silica Study* also provides a comparison of the emission standards for hazardous air contaminant in this state to hazardous air contaminant standards in Illinois, Indiana, Michigan, Minnesota, and Ohio. Among Wisconsin's neighboring states, only Michigan currently regulates silica emissions from any source with crystalline silica emissions that are greater than 10% of the total PM emissions. Michigan law does exempt sources such as sand production and processing and mineral extraction and processing.<sup>9</sup>

7. Office of Environmental Health Hazard Assessment (OEHHA), *Adoption of Chronic Reference Exposure Levels for Silica (crystalline, respirable)* [02/10/05]; and [Regul Toxicol Pharmacol](#). 2005 Dec;43(3):292-300. Epub 2005 Sep 23. *Development of a chronic inhalation reference level for respirable crystalline silica.* [Collins JF](#), [Salmon AG](#), [Brown JP](#), [Marty MA](#), [Alexeeff GV](#)

8. WDNR, June 3, 2002 FILE REF: 4533 TO: Natural Resources Board FROM: Darrell Bazzell – AD/5 pp18-20 [http://dnr.wi.gov/air/toxics/nr445/NRBjune02/BACKGROUND\\_MEMO.PDF](http://dnr.wi.gov/air/toxics/nr445/NRBjune02/BACKGROUND_MEMO.PDF)

9. WDNR 2011. *Silica Study*. Page 20.

**Based on all the above, the DNR has clear statutory authority to adopt the requested rules. Petitioners urge the Department to promulgate the requested rules without delay.**

#### **IV. THE REASON (GROUNDS) FOR THIS REQUEST**

There are many compelling and urgent reasons for the department to rapidly proceed with the requested promulgation of rules governing Respirable Crystalline Silica (RCS) emissions.

- A. There is increased public exposure to respirable crystalline silica in Wisconsin due to the rapid expansion of bedrock sandstone mining for frac sand and the associated processing plants.
- B. The principal concern with most hazardous air pollutant emissions, including RCS emissions, is their impact at the local neighborhood level. Ambient air concentrations of RCS are highest near industrial mining and processing activities, and local neighborhood exposures in Wisconsin are increasing.
- C. WDNR has failed to meet the policy objective of NR 445 through...
  1. failure to follow their statutorily mandated time-line for evaluating crystalline silica risks
  2. reluctance to enforce the general limitation of NR 445.03
  3. failure to list RCS as a HAP or to establish a standard that will protect the health and welfare of those citizens most likely to suffer from unsafe exposures to RCS.
- D. Current particulate matter standards (NAAQS) are inadequate to protect the public from exposure to the more highly toxic respirable crystalline silica and there are currently no standards or alternative strategies protecting the public from silica exposure in Wisconsin.
- E. Substantial new data and information on the extent and degree of harmful health impacts to the citizens of Wisconsin that support establishing a health based Recommended Exposure Level (REL) and significantly stronger regulation to adequately protect the public.

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#### **A. There is increased public exposure to respirable crystalline silica in Wisconsin due to the rapid expansion of bedrock sandstone mining for frac sand and the associated processing plants.**

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**A1.** The *Silica Study* states that, "**Mining and rock crushing are among the largest and most well-known sources of crystalline silica.**"<sup>10</sup> Mining sources of RCS are increasing dramatically in Wisconsin, creating much greater public exposure to respirable crystalline silica emissions.

**A2.** This dramatic increase in bedrock sandstone mining activity in Wisconsin is caused by increasing demand for industrial "frac" sand, for use in oil and natural gas extraction. This demand is not expected to diminish over the next fifty years, according to public statements by industry officials.

10. WDNR 2011. *Silica Study*, page 5.

**A3.** As reported in *The Country Today*, at a September 15, 2011 *Frac Sand Briefing* held for Wisconsin State legislators a WDNR representative said, "the number of [frac sand] mining operations has increased to 60 - double the number the DNR had recorded when it last counted the operations. Another 20 have been proposed." This DNR spokesperson suggested a conservative estimate of extracted sand volumes would be in excess of 12 million tons per year. At the same briefing, a Wisconsin Department of Transportation rail supervisor reported that on state funded rail lines alone (not including privately funded lines) rail cars loaded with frac sand have increased from 1800 per year in 2009 to as many as 140,000.<sup>11</sup>

**A4.** Individual rail car capacity for frac sand is commonly reported as 100 tons. Using the WISDOT figure of 140,000 rail cars per year, this would equal 14 million tons of sand shipped by rail per year, not counting sand shipped on privately funded rails, or sand that is trucked to its end user. Because all the sand extracted is not suitable for finished frac sand, more sand is extracted than is ultimately shipped. This indicates that *extracted* sand volumes in Wisconsin *far* exceed the 12 to 14 million tons per year estimate provided at the *Frac Sand Briefing*.

**A5.** Activities generating respirable crystalline silica particles at and near bedrock sandstone mines and their associated processing facilities would be the same as the sources for particulate matter, of which RCS is a subset: blasting, extracting, transfer sites, conveyors, dryer stacks, surge piles, crushers, screeners, and truck traffic. Additional sources are escaped dusts from uncovered or poorly covered trucks along haul routes, from uncovered or poorly covered rail cars, and from trucks hauling waste sand from processing facilities back to mine sites for mining site reclamation. Another source is stockpiles of waste sand returned to mine sites that is placed for extended periods of time prior to reclamation.

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**B. The principal concern with most hazardous air pollutant emissions, including RCS emissions, is elevated concentrations and therefore impacts at the local neighborhood level. Ambient air concentrations of RCS are highest near industrial mining and processing activities, and local neighborhood exposures in Wisconsin are increasing.**

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"The purpose of Chapter NR 445, Wisconsin's Hazardous Air Pollutant regulation, is to protect public health and welfare from inhalation exposure to hazardous air pollutants that are emitted by stationary sources. Unlike criteria pollutants (volatile organic compounds, nitrogen oxides and sulfur dioxide), the concern with most hazardous air emissions are primarily their immediate local impacts. Regional or even countywide emissions are not as great a concern as the impact at the local neighborhood level."<sup>12</sup>

11. *The Country Today*, sep 21, 2011, Jim Massey, *Legislators updated on frac sand industry expansion in Wisconsin*, [http://www.thecountrytoday.com/front\\_page/article\\_00e4828c-e459-11e0-9ac9-001cc4c002e0.html](http://www.thecountrytoday.com/front_page/article_00e4828c-e459-11e0-9ac9-001cc4c002e0.html)

12. WDNR 2002. Background materials for Natural Resources Board: Proposed revisions to chapter NR 445 and related regulations. *The Impact of the Current NR 445 on Wisconsin's Hazardous Air Emissions, Attachment 6*. page 1. [http://dnr.wi.gov/air/toxics/nr445/NRBjune02/ATTACHMENT\\_6.PDF](http://dnr.wi.gov/air/toxics/nr445/NRBjune02/ATTACHMENT_6.PDF)

**B1. Ambient air concentrations of RCS are highest near industrial mining and processing activities.**

- a) The *Silica Study* states, "In circumstances where people live near a source of crystalline silica, data from other air pollution control agencies shows that silica ambient air concentrations could be above a level of concern."<sup>13</sup>
- b) WDNR modeling has determined that ambient air concentrations of RCS are expected to be highest near industrial mining and processing activities (WDNR Construction Permit No.: 08-RAF-226, Operation Permit No.: 609072860-F01, Facility ID No. 609072860). (*See C2.b*)
- c) Respirable crystalline silica (RCS) particles exert the greatest health impact on the local communities in which they are generated. As reported in the *Silica Study*, "More recently Shiraki and Holmen (2002) monitored silica concentrations in PM10 near a sand and gravel facility in central California. One upwind monitor and four downwind monitors were deployed. Upwind silica concentrations in the PM10 particle size fraction were found to be 4.6 ug/m<sup>3</sup>, whereas downwind concentrations ranged from 9.4 to 62.4 ug/m<sup>3</sup>. **The higher concentrations were found closest to the source.**" and, "The percent of crystalline silica, by mass, as a percent of total particulate mass decreased with increasing distance from the source. However, the impact from this source was still evident, even at the furthest downwind monitor - 745 meters [0.46 miles] away."<sup>14</sup>
- d) The American Thoracic Society in their official statement on the *Adverse Effects of Crystalline Silica*, adopted in 1996, state that, "**Individuals may also come into contact with respirable crystalline silica from domestic or environmental exposures even when they do not work in a dusty trade.** Although pulmonary silicosis usually requires exposure to high dust levels for prolonged periods, public concern may be raised about potential health effects from brief exposure to airborne silica or **residence in locations where prevailing winds carry silica particles from natural or industrial sites.**"<sup>15</sup>
- e) Bridge (2009) reviewed available research of non-occupational risk associated with communities living adjacent to peak sites - "sites which are likely to release respirable crystalline silica particles into the nearby air-shed." He concluded, "The available evidence suggests that it is possible that environmental exposures could lead to silica related disease in exposed communities near peak sites." He also noted the research of Ruperto et al (1994,1995) which found silicosis in domestic pigs and water buffaloes downwind of anthropogenic sources of respirable crystalline silica.<sup>16</sup>

13. WDNR 2011. *Silica Study*, page 2.

14. WDNR 2011. *Silica Study*, page 14.

15. American Thoracic Society 1997. *Adverse effects of crystalline silica exposure*: American Thoracic Society Committee of the Scientific Assembly on Environmental Occupational Health *Am J Respir Crit Care Med* 155:761–765.9032226 <http://www.thoracic.org/statements/resources/eoh/506.pdf>

16. Bridge, Ian. 2009. *Crystalline Silica: A review of the dose response relationship and environmental risk*. Found at: <http://www.superquarry.org.au/wp-content/uploads/2011/02/Bridge-2009-environmental-silicosis-risk045.pdf> ; also published in *Air Quality and Climate Change* 2009 vol 43 [1] pp17-23

## **B2. Local neighborhood exposures in Wisconsin are increasing.**

**a)** Many people live in the immediate vicinity of these mines and processing plants and along the haul routes used for transporting the sand. There are no "remote locations." Most of these mining and processing activities are occurring in rural and city neighborhoods without significant buffer zones.

Recognition of this increased exposure risk to RCS caused by the recent and ongoing expansion in the number, size and geographic area of bedrock sandstone mining and sand processing facilities has resulted in high levels of concern among Wisconsin citizens.

**b)** Wisconsin Department of Natural Resources has received a substantial record of letters, electronic communications and public comment from citizens, health professionals, scientists, public officials, and from the City of Chippewa Falls and the Chippewa County Board of Health.

**c)** In particular, on February 18, 2011, a group of physicians and other health care professionals (totaling more than 110 signatures by 2/23/11), responded to the request for public comment to the WDNR *Draft Status Report: Silica Study* by signing a letter of concern for their patients and other citizens:

Anticipating that the sand mining and processing industry will grow rapidly in Wisconsin, we feel that the only way to protect the health of the citizens of Wisconsin is to:

1. List crystalline silica as a Hazardous Air Pollutant
2. Establish and adhere to an enforceable standard for respirable crystalline silica identical to the level established in the California (OEHHA) study; and
3. Monitor the air at multiple sites around processing plants, mines, and transport routes in order to include fugitive dust. . Without monitoring, we do not know our exposure levels or which citizens are at risk.

This letter is included as **Appendix A**.

**c)** The concern of the people of Wisconsin is justified. Citizens recognize the difference between this new type of industrial mining and the often "mom and pop" sand and gravel mining in glacial out-wash areas that has traditionally occurred in Wisconsin. The potential for RCS emissions from the mining and processing of bedrock sandstone is greater due to the more expansive sites, the number of exposure points, the continuous year round occurrence of dust producing activities, and the number of persons at risk for exposure to unsafe levels of silica dust.

**d)** Appendices B and C show the rapid expansion of bedrock sandstone mining activities in just one county - Chippewa.

### **Appendix B: Map**

*Location of NMM in Bedrock Permits & Permit Applications in Chippewa County*

### **Appendix C: Table**

*Recent Non-Metallic Mine Reclamation Permits & Applications (Chippewa County)*

(B2d continued)

The map and table are current as of 10/31/2011. The map shows eight mines that have been established or for which applications have been submitted. Some of these mines extend into Barron county. The Chippewa Sands Mine has actually registered over 1000 acres, although only 176 acres are represented on this map. The rate of development is so rapid that maps need to be adjusted every three months.

The table shows nearly 2500 acres of mines in Chippewa County alone, which is far less than the total acreage that has been leased, but for which the permitting process has not yet begun. **The expectation is that this amount will more than double within six months.**

e) The counties of Dunn, Eau Claire, Barron, Trempealeau, Pepin, Monroe, Marathon, Clark, Wood, and Buffalo are experiencing, or will soon be experiencing, similar expansions of mining and processing facilities. The geological formations of Wisconsin that allow access for mining frac sand are highly prized. They are already intensively prospected and leased, and are rapidly moving from permitting and construction phases to becoming fully operational.

The number of people living near existing or proposed mining and processing activities is growing rapidly. These people deserve the protection that promulgation of the requested rules under NR 445 will provide.

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### C. WDNR has failed to meet the policy objective of NR 445...

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#### C1. ...through failure to follow their statutorily mandated time-line for evaluating crystalline silica risks

a) In 2000 WDNR undertook the first and only comprehensive revision of the Air Toxics Rule, Chapter NR 445. A Technical Advisory Group (TAG) was formed to work on the revision that included participants from the industrial, public health, and environmental communities. The department prepared extensive background materials detailing the intent and purpose of the rule itself and of the proposed revisions. These materials were presented to the Natural Resources Board in June 2002.<sup>17</sup> Evaluating silica dust risks was a significant part of this revision process.

b) Early in the process, more than 30 petitions were received, urging the department to regulate silica dust.<sup>18</sup>

In response, the department *committed* to listing Crystalline Silica in Table A of NR 445.07, exempting it from regulation *on an interim basis*, and completing a special study of this HAP by 2006. The study was to determine if current particulate matter regulations were adequate to protect the public from the adverse health effects of silica dust exposure. If current regulations were found insufficient to protect the public, the department was to determine the most appropriate way to minimize the public health impact. The department said of this approach:

17. WDNR 2002. Background materials for Natural Resources Board: Proposed revisions to chapter NR 445 and related regulations. <http://dnr.wi.gov/air/toxics/NR445/NRBjune02/index.htm>

18. WDNR 2002. Background materials for Natural Resources Board: Proposed revisions to chapter NR 445 and related regulations. *Recommendation to Authorize Public Hearings for Ch. NR 445 Rule Revision Package*. FILE REF: 4533. Page 35. [http://dnr.wi.gov/air/toxics/nr445/NRBjune02/BACKGROUND\\_MEMO.PDF](http://dnr.wi.gov/air/toxics/nr445/NRBjune02/BACKGROUND_MEMO.PDF)

(C1 continued)

"...the studies may recommend regulating emissions of these substances, **may recommend regulations for certain types of sources and other approaches for other sources**, may recommend de-listing the substance because other regulations are adequate, or may recommend a new and innovative approach to minimizing the public health risks."<sup>19</sup>

We citizen petitioners agree with WDNR's recognition that the protection of public health may be best achieved by using different regulatory approaches for different types of sources. As we have already indicated, the **public's risk of a harmful level of exposure to respirable crystalline silica** associated with bedrock sandstone mining operations and frac-sand processing facilities may be significantly different than with sand and gravel mining in glacial outwash areas or other other types of RCS sources.

- c) In August 2002, the department held public hearings on the proposed rule revision.<sup>20</sup>
1. The Wisconsin Department of Health and Family Services offered strong support for the Department's finding that silica and wood dust should be listed in the table of hazardous air pollutants due to their toxicity and the prevalence of human exposure from environmental sources.
  2. The Sierra Club commented that the rule should require the Department to propose regulations at the end of the two year special studies rather than a progress report. The department responded that its intention was to "proceed as expeditiously as possible in determining and recommending how to address silica and wood dust," but that it was not in a position to commit to proposing regulations within 2 years."<sup>21</sup>
  3. Many companies and trade associations commenting opposed listing silica and wood dust without regulating them, suggesting that listing them presupposes that they will be regulated under NR 445.
  4. The Legislative Clearinghouse also opposed listing them while exempting them from regulation. The Department agreed with the Legislative Clearinghouse and the revised rule did not list silica and wood dust in Table A or in the list of exempt emissions.<sup>22</sup>
- d) The final NR 445 rule revision was adopted in 2004. It retained the requirement for special studies of silica dust emissions and mandated that a progress report on the study be made to the Natural Resources Board by July 1, 2006.
- e) At public urging, the progress report on the *Silica Study* was completed in August 2011.

19. Id

20. WDNR 2002. Additional Documents sent to the Natural Resources Board. *Attachment 2: Response to Public Comments*. [http://dnr.wi.gov/air/pdf/attach2\\_final\\_response\\_to\\_comments\\_NR445.pdf](http://dnr.wi.gov/air/pdf/attach2_final_response_to_comments_NR445.pdf)

21. Id at 31

22. Id

## C2. ... through reluctance to enforce the general limitation of NR 445.03

a) The 2011 *Silica Study* provides a comprehensive overview of the health risks of silica exposure and how five states (Texas, California, Vermont, New York, and New Jersey) are currently regulating silica exposure. The study contains valuable information about silica levels in ambient air and suggests alternative strategies (options to policy makers) that could be used to protect public health.

However, the strategies and considerations presented within the document reflect a reluctance to enforce the general limitations of NR 445.03:

**“No person may cause, allow or permit emissions into the ambient air of any hazardous substance in a quantity or concentration or for a duration that is injurious to human health...”**

b) The *Silica Study* emphasizes difficulties in obtaining ambient air measurements of silica, yet fails to note estimates of ambient air concentration of silica at the EOG/CSP sand plant in Chippewa Falls, WI that are above all but one of the state standards listed in *Table 2: Health Benchmark Levels for Crystalline Silica in Ambient Air*.

In the Analysis and Preliminary Determination document for Construction Permit No.: 08-RAF-226, Operation Permit No.: 609072860-F01, Facility ID No. 609072860, the DNR states that (emphasis added),

"According to EPA (Ambient Levels and Noncancer Health Effects of Inhaled Crystalline and Amorphous Silica: Health Issue Assessment. EPA/600/R-95/115) "Data from Goldsmith (1991) indicate that a reasonable estimate of the crystalline silica fraction in off-site fugitive dust from quarrying activities might be 7%..." The modeling analysis indicated the maximum impact of 24-hr PM10 was  $56 \mu\text{g}/\text{m}^3$  at the maximum point of impact (not including emissions from traffic and the storage piles). Half of that impact was background and half from the facility. 7% of  $56 \mu\text{g}/\text{m}^3 = 4 \mu\text{g}/\text{m}^3$  at the maximum point of impact."<sup>23</sup>

The estimation of  $4\mu\text{g}/\text{m}^3$  exceeds the OEHHA REL non-occupational standard of  $3\mu\text{g}/\text{m}^3$ . Furthermore, this calculation is based upon an assumption that only 7% of the PM10 is crystalline silica. The EPA assumes that 10% of PM10 is crystalline silica, and studies presented in the *Silica Study* report findings that near quarries 25% and more of the PM10 can be crystalline silica.

c) The *Silica Study* claims that “Monitoring to specifically analyze for crystalline silica is difficult ...and there is no standard reference method for monitoring crystalline silica in ambient air.”<sup>24</sup>

However, silica monitoring has been done for decades in mining operations using private labs as well as the Wisconsin Occupational Health Laboratory. The lack of a standard reference method for monitoring has not prevented DNR from regulating asbestos, cyanide, and dioxin, among many other typically occupational substances.

23. Permit reviewed on April 14, 2009, page 28/33

24. WDNR 2011. *Silica Study*, page 2.

d) The *Study* further states that "... very little conclusive information exists regarding sources, controls or levels of silica present in ambient air."<sup>25</sup> Yet, the *Silica Study* provides background levels of RCS that could be used as a baseline for determining the contribution of mining sources:

"Wisconsin has some data for elemental silicon from PM2.5 sampling associated with the National Air Toxics Trends Sites (NATTS). Monitoring is conducted at three sites, none of which is near a known silica source. The data from these sites reflect general ambient air concentrations at: 1) a rural background site (Mayville); 2) an urban site (Milwaukee); and 3) a suburban site (Waukesha). The elemental silicon concentration was converted to an equivalent concentration of silicon dioxide (SiO<sub>2</sub>) with the assumption that 100% of the SiO<sub>2</sub> was quartz. This is a conservative estimate of crystalline silica from the monitoring data. The average estimated crystalline silica concentrations were: Milwaukee 0.14 ug/m<sup>3</sup>; Waukesha 0.32 ug/m<sup>3</sup>; and Mayville 0.10 ug/m<sup>3</sup>."

Using the Mayville data as representative of background levels of RCS in rural communities combined with upwind and downwind monitors would allow a method of determining RCS contributions from mining sources.

e) At the same time that the *Silica Study* emphasizes all the difficulties of enforcing the general limitation of NR 445.03, as set forth above, it also states that "Crystalline forms of silica (such as quartz) meet the definition of a known carcinogenic hazardous air pollutant (HAP)."<sup>26</sup>

Lack of information about levels of exposure does not justify lack of protection of the public, and is in fact contrary to the public policy objective of NR 445:

"The fundamental public policy objective of NR 445 is to ensure, to the extent possible, that off-property emissions of hazardous air pollutants from a stationary source are at levels that do not threaten public health." and

"The decision to regulate a substance without knowing whether there is an actual threat to public health in Wisconsin rests on the policy objective of preventing public health problems from occurring, rather than correcting them after they have occurred."<sup>27</sup>

### **C3. ...through failure to list RCS as a HAP or to establish a standard that will protect the health and welfare of those citizens most likely to suffer from unsafe exposures to RCS**

a) Crystalline silica has been known for decades to cause silicosis, tuberculosis and lung cancer in the workplace. The potential for non-occupational exposures to unsafe levels has been known since before WDNR first attempted to list crystalline silica, and has been further substantiated in more recent studies. The lack of comprehensive measurements of silica near significant sources of this HAP is not justification for leaving communities unprotected from potential health risks. DNR should set a standard to protect the public and require industrial sources with the potential to emit significant amounts of silica to measure and control emissions of silica to meet this standard.

25. WDNR 2011. *Silica Study*, page 2.

26. WDNR 2011. *Silica Study*, page 1.

27. WDNR 2002. Additional documents sent to the Natural Resources Board, *ATTACHMENT 2: Response to Public Comments* (from the 2002 Public Hearing on NR 445 proposed revisions). Page 2.

[http://dnr.wi.gov/air/pdf/attach2\\_final\\_response\\_to\\_comments\\_NR445.pdf](http://dnr.wi.gov/air/pdf/attach2_final_response_to_comments_NR445.pdf)

(C3 continued)

**b)** The department has offered solid reasoning in the past why actual exposure measurements should not be a prerequisite to listing known hazardous air pollutants:

- The Department’s responsibility is to protect public health now and in the future. Even if a hazardous air contaminant is not currently being emitted, it may be in the future.
- Emissions of hazardous air contaminants that are not currently regulated are not reported to the Department or the federal government. Consequently, there is very sparse information as to whether there is an actual exposure to them in Wisconsin. If this were the test, the alternative would be to require sources to report all emissions to the department. This would be even more burdensome since there would be no limit to the number or levels of substances to report.<sup>28</sup>

Despite the fact that the *Silica Study* finds that unsafe concentrations of RCS emissions are possible near significant sources of this hazardous air pollutant WDNR has nevertheless failed to list RCS as a HAP or to establish a standard that will protect the health and welfare of those citizens most likely to suffer from unsafe exposures.

### **In the Absence of WDNR Guidance...**

In the absence of DNR guidance for crystalline silica protection, local municipalities are taking steps to protect citizens. The Trempealeau County Environment and Land Use Committee negotiated with Winn Bay Sand to have three air monitors and a “personal goal” of 30 mcg/cubic meter PM 10 established as conditions for a sand mine.

The Town of Sumner Board recently passed two motions to approve rezoning for a proposed sand mine, with the conditions that air, groundwater and surface water be monitored for compliance with DNR standards, and that airborne silica levels be in compliance with the Mine Safety and Health Administration (MSHA) standard.

The Concerned Chippewa Citizens (<http://wisair.wordpress.com/>) have taken it upon themselves to conduct monitoring studies, using particle counters. These are placed in several locations near sand mines in the Western part of the state (Chippewa Falls and Menomonie). This type of monitor does not speciate crystalline silica from total particulate matter but does measure the concentration of particles in the 0.5-2.5 micrometer size range (an estimate of PM2.5).

However, none of these measures provide the same uniform level of protection for the public that a state regulatory standard supported by monitoring would accomplish.

28. WDNR 2002. Background materials for Natural Resources Board: Proposed revisions to chapter NR 445 and related regulations. *Recommendation to Authorize Public Hearings*. Pages 26 and 27.

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**D. Current particulate matter standards are inadequate to protect the public from exposure to the more highly toxic respirable crystalline silica and there are currently no standards or alternative strategies protecting the public from silica exposure in Wisconsin.**

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**D1. Particulate Matter (PM10 and PM2.5) Regulations Do Not Adequately Protect Public Health from Unsafe Levels of Exposure to Crystalline Silica**

The *Silica Study* states, "Wisconsin has regulated PM for 40 years. The controls for PM are the same controls for crystalline silica. This means that for those crystalline silica sources where PM is controlled, crystalline silica emissions are also reduced." (p.2)

Silica emissions from industrial operations can be substantial: the Shiraki and Holmen monitoring study of silica concentrations near a sand and gravel facility cited in the *Silica Study* found downwind concentrations of 62.4 ug/m<sup>3</sup>. (p. 14) While measures to control PM emissions are expected to also lower RCS emissions, these measures may not be sufficient to reduce RCS exposure to safe levels.

Average silica concentration in PM 10 from industrial sources is 10%, but can range up to 25.5%; therefore, adherence to the NAAQS 150 ug/m<sup>3</sup> PM 10 standard would result in silica exposures of 15–38 ug/m<sup>3</sup> silica. Such exposures are higher than five of the six EPA and state exposure standards cited in the *Silica Study*.

Annual exposure to PM 2.5 is currently regulated under EPA NAAQS with a standard of 15 micrograms per cubic meter. The most toxic component of this fine particulate matter from industrial sand operations is crystalline silica, with EPA guidance and states regulations of 0.27–3 micrograms per cubic meter of respirable size (PM 4). Given the uncertainty of silica percentage of PM 2.5 emissions from sand plants, use of the PM 2.5 NAAQS standard **could result in an exposure to RCS of up to 15 micrograms per cubic meter (assuming 100% RCS in PM 2.5), or 5–55 times the safe levels.**

**D2. Inadequacy of Fugitive Dust Control Measures and Modeling Requirements**

As the DNR has found for coal dust, "Fugitive dust regulations do not assure protection of public health."<sup>29</sup> DNR does not include fugitive emissions in modeled PM10 and PM2.5 impacts, yet a recent DNR analysis and preliminary determination (construction permit 11-MHR-041) found that inclusion of fugitive emissions would double total PM emissions (Table 17) in a case where total 24-hour PM 2.5 concentrations would be 93% of the NAAQS standard **without** including fugitive dust sources ("Model Results" table).

Failure to include fugitive dust in modeling particulate or silica emissions and concentrations results in an under-estimation of the real health risks. A further difficulty in calculating the contribution of fugitive dust to ambient air concentrations is that crystalline silica particles tend to be resistant to environmental breakdown and can re-suspend following deposition.<sup>30</sup>

29. Slide 13 of WDNR 2002 presentation to to NRB.

<http://dnr.wi.gov/air/toxics/nr445/NRBjune02/NRBpresentation.pdf>

30 Husar R., *Global and Local Dust over N. America Observations and Analysis Tools* 2nd Workshop on Mineral Dust, Paris 2003

The proposed wetting of sand piles and air opacity observations commonly included in fugitive dust plans do not provide assurance that PM 10 particles (including silica), invisible to the eye, will be adequately controlled. Furthermore, not all companies follow the same standards in control of fugitive dust.

Therefore, inclusion of fugitive dust emissions in ambient exposure modeling, adoption of a regulatory standard that is protective of human health, and upwind-downwind monitoring of PM10, PM2.5 and RCS to assure compliance with the standard are needed.

### **D3. Monitoring Regulations are Inadequate**

By statute, WDNR can require monitoring at mines and processing plants, but exemptions can be requested by sources and are typically granted. To assure that sources are not emitting RCS above safe levels, both upwind and downwind monitoring must be required without exemption.

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### **E. Substantial new data and information on respirable crystalline silica have become available since the 2000-2004 revision of NR 445 that support establishing a health based Recommended Exposure Level (REL) and significantly stronger regulation to adequately protect the public.**

---

Expectations that the hazardous air contaminant Tables of NR 445 would need periodic updating based upon scientific advances was inherent in the rule's development. As scientific and medical knowledge advance more chemicals are found to be harmful to human health, some hazardous substances are found to be more toxic than originally thought, and toxicologists learn more about the risk factors associated with carcinogens.<sup>31</sup>

### **E1. Knowledge related to the Health Risks of Silica Exposure that was current prior to 2000**

**a)** It has long been established that silica particles become dangerous to human health when particles small enough to be inhaled into the deepest parts of the lungs are deposited there. The human body's normal mechanisms for removing offending substances are incapable of removing silica particles from the lungs. Inflammatory reactions within the lungs are set up as these mechanisms attempt and fail to remove the silica particles. These areas of inflammation are eventually walled off into fibrous nodules - a disease called Silicosis, the most common type of pneumoconiosis. Silicosis may take years to develop, can occur even after exposure to silica dust has ceased, and stopping exposure to the substance will not necessarily prevent the disease from progressing. The full progression of the disease moves from shortness of breath to air hunger to eventual respiratory, and possibly, cardiac failure. The number of silicosis cases is not known due to under-reporting and because radiological tests do not detect silicosis as effectively as autopsies.

**b)** The relationship between silica exposure and tuberculosis has long been known with some sources indicating people exposed to silica but without silicosis have three times the risk of developing TB compared with the non-exposed general population.

31. WDNR 2003. *Recommendation for Adoption of the Ch. NR 445 Rules Revision Package*, page 2. FILE REF: 4533 found at: [http://dnr.wi.gov/air/pdf/final\\_background\\_memo\\_NR445.pdf](http://dnr.wi.gov/air/pdf/final_background_memo_NR445.pdf)

c) The argument is often made that Silicosis and related silica exposure illnesses are only an occupational concern. However, in 1999 WHO issued this statement to the contrary: "Although Silicosis is a typical occupational disease, it can be and often is diagnosed as a non-occupational condition."<sup>32</sup>

## E2. New Information Since the NR 445 Revision Process of 2000 -2004

### a) ESTABLISHMENT OF A HEALTH BASED NON-OCCUPATIONAL STANDARD:

In 2005 the California Office of Environmental Health Hazard Assessment (OEHHA, CAL/EPA) established a non-cancer health benchmark Reference Exposure Level (REL) of **3 micrograms/cubic meter - a non-occupational standard meant to protect public health - a level below which no adverse effects due to prolonged exposure would be expected in the general public.**<sup>33</sup>

### b) More Protective Occupational Standards Established, Pending, or Needed due to Greater Toxicity of RCS than Previously Known

1. From the 2002 National Institute for Occupational Safety and Health (NIOSH) Hazard Review, *Health Effects of Occupational Exposure to Respirable Crystalline Silica for Silicosis*: "Although the reported mortality associated with silicosis has declined over the past several decades, many silicosis-associated deaths still occur....In addition, ***the number of silicosis associated deaths among persons aged 15 to 44 has not declined substantially.***"<sup>34</sup>
2. Both OSHA (Occupational Safety and Health Administration) and MSHA (Mining Safety and Health Administration) recognize their current standards and rules for crystalline silica are not protective and need updating:

OSHA's proposal was submitted to the Office of Management and Budget for review in February 2011. In their report, OSHA states, "Exposure studies and OSHA enforcement data indicate that some workers continue to be exposed to levels of crystalline silica far in excess of current exposure limits."<sup>35</sup> From the OSHA Lawblog: "OSHA has evidence that exposure to crystalline silica at the current permissible exposure limit (PEL) causes silicosis and other diseases."<sup>36</sup>

32. WHO/SDE/OEH/99.14 , 1999. *Hazard Prevention and Control in the Work Environment: Airborne Dust*, page 23, found at: [http://www.who.int/occupational\\_health/publications/en/oehairbornedust3.pdf](http://www.who.int/occupational_health/publications/en/oehairbornedust3.pdf)

33. OEHHA 2005. *Adoption of Chronic Reference Exposure Levels for Silica and Development of a chronic inhalation reference level for respirable crystalline silica.* Collins et al.

34. NIOSH 2002. DHHS (NIOSH) Publication No. 2002-129, found at: <http://www.cdc.gov/niosh/docs/2002-129/pdfs/2002-129.pdf>

35. OSHA RIN: 1218-AB70, *Occupational Exposure to Crystalline Silica*, [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=UNIFIED\\_AGENDA&p\\_id=6502](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=UNIFIED_AGENDA&p_id=6502)

36. OSHA Law Blog, February 22, 2011 by Brad Hammock . *OSHA's Crystalline Silica Rule at OMB for review.* <http://www.oshalawblog.com/tags/silica/>

(E2b continued)

In their Spring 2011 publication, MSHA says, "MSHA standards are outdated; current regulations may not protect workers from developing silicosis. MSHA intends to use OSHA's work on the health effects and risk assessment, adapting it as necessary for the mining industry."<sup>37</sup>

3. In **2006**, in recognition of the increased risk of silica overexposure, the ACGIH lowered the TLV for Silica, Crystalline: Quartz and Cristobalite to 0.025 mg/m<sup>3</sup> recommending the following:

“Because the time between exposure and signs of fibrosis is characteristically very long, as much as 30 to 40 years, the margin of safety for exposure to crystalline silica at the proposed TLV-TWA is not known precisely. Given the observed association between silicosis and lung cancer, it is recommended that air concentrations be maintained as far below the proposed TLV as prudent practices permit. The recommended TLV-TWA of 0.025 mg/m<sup>3</sup>, respirable particulate mass, is intended to prevent pulmonary fibrosis that may be a risk factor for lung cancer.”<sup>38</sup>

4. Park et al. (2002) re-analyzed data from a cohort of California diatomaceous earth mining and processing workers who were exposed to silica dust, mainly as cristobalite. They found significant increases in non-cancer lung mortality and silicosis in workers exposed to diatomaceous earth. The study concluded, "**Current occupational health standards for crystalline silica permit risks of lung disease other than cancer far in excess of what is usually considered acceptable by the Occupational Safety and Health Administration** (a lifetime risk of less than one in a thousand deaths).<sup>39</sup>

### **E3. New Information on Health Risks and Increased Toxicity of RCS**

**a)** New research showing the toxicity of silica at a cellular and sub-cellular level which can cause changes in DNA and thus be precursors to cancer was presented in 2007.<sup>40</sup>

**b)** In **2003** Hnizdo and Vallyathan concluded that “chronic levels of silica dust that do not cause disabling silicosis may cause the development of chronic bronchitis, emphysema, and/or small airways disease that can lead to airflow obstruction, even in the absence of radiological silicosis.”<sup>41</sup>

37. MSHA **RIN**: 1219-AB36, Spring 2011. <http://www.msha.gov/REGS/UNIFIED/July2011/1219-AB36.asp>

38. Silica, Crystalline:  $\alpha$ -Quartz and Cristobalite: TLV<sup>®</sup> Chemical Substances 7th Edition *Documentation*, ACGIH®, Publication #7DOC-743

39. Park R, Rice F, Stayner L, Smith R, Gilbert S, Checkoway H, 2002 Jan;59(1):36-43, *Exposure to crystalline silica, silicosis, and lung disease other than cancer in diatomaceous earth industry workers: a quantitative risk assessment*. [Occup Environ Med](#).

40. Huaux, Francois, 2007. *Immunol*. 2007;7(2):168-173. © 2007 Lippincott Williams & Wilkins

41. Hnizdo E, Vallyathan V. 2003. *Chronic obstructive pulmonary disease due to occupational exposure to silica dust: a review of epidemiological and pathological evidence*. *Occup Environ Med*. 60(4):237-43.

c) In a study of 1,595 cases of occupationally-induced lung cancer, Vida et al. (2010) found a statistically-significant increase in lung cancer risk across all concentrations of respirable silica in the workplace. **"This suggests that the burden of cancer induced by silica may be much greater than previously thought."**<sup>42</sup>

d) Nelson et al. (2010) obtained results offering further confirmation of the earlier work of Corbett et al. (1999) who found that mini X-ray diagnosis of silicosis was less effective than autopsy in identifying silicosis in mine workers. Hnizdo et al. (1993) found when using standard size radiographs of gold miners, "a large proportion of those with a moderate and marked degree of silicosis were not diagnosed radiologically." These studies suggest an underestimation of silicosis when X-ray films — the most common diagnostic tool — are used to diagnose disease.<sup>43</sup>

#### E4. Size and Shape of Crystalline Silica

"The main health effect concerns from silica focus on particles that are small enough to get into the deepest parts of the lung. The 'RESPIRABLE SIZE FRACTION' is defined as particulate matter less than four microns, also referred to as particulate matter 4 or PM 4. PM 4-sized particles are what occupational health professionals measure to evaluate respiratory impacts of crystalline silica in the workplace. These respirable sized particles can penetrate in the deepest parts of the lung, where gas exchange occurs."  
( *Silica Study* p.7)

The smaller the particle, the deeper it can travel into the lungs and the more damage can occur. Characteristics of respirable crystalline silica causing toxicity are the small particle size (< 4µm), chemical reactivity (particularly with "freshly -fractured" silica) and crystalline shape, making removal by normal lung clearance processes very limited. Small particle damage for PM 2.5 in general, without the pathogenic shape of RCS, has been discussed in the medical literature recently.

In 2006 an eight year extension of the Harvard Six City Study was completed. One of many findings was that for each increase of 10µg/m<sup>3</sup> of PM2.5 there was an 8-18% increase in cardiovascular mortality. They also found that lung cancer mortality was positively associated with average PM 2.5 of all types.<sup>44</sup>

In the New England Journal of Medicine (2009; 360:376-386), it was found that life expectancy increased by 0.61 years for every decrease in PM2.5 of 10µg/m<sup>3</sup>.

42. Vida S, Pintos J, Parent ME, Lavoué J, Siemiatycki J. Cancer Epidemiol Biomarkers Prev. 2010 Jun;19(6):1602-11. Epub 2010 May 25.

43. Nelson G, Girdler-Brown B, Ndlovu N, Murray J 2010. Three Decades of Silicosis: Disease Trends at Autopsy in South African Gold Miners. Environ Health Perspect 118:421-426. <http://dx.doi.org/10.1289/ehp.0900918> Hnizdo E, Murray J, Sluis-Cremer GK, Thomas RG. (1993) Am J Ind Med. Oct;24(4):427-45. Correlation between radiological and pathological diagnosis of silicosis: an autopsy population based study.

44. Laden, Francine et al , American Journal of Respiratory and Critical Care Medicine, 2006. *Reduction in Fine Particulate Air Pollution and Mortality - Extended Follow-up of the Harvard Six Cities Study* January 2006, Vol. 173.pp.667-672

## E5. Freshly Fractured Silica

“Freshly-fractured” crystalline silica is generated through drilling, tunneling, cutting, sandblasting and milling of silica-containing sediments — bedrock sand mining activities including blasting and crushing would be expected to have similar effects. Animal studies have demonstrated that freshly-fractured crystalline silica is five times more reactive with lung tissue with a decrease in this reactivity over the next 4–5 days (half life of 30 hours). If Iron is present with the silica, it is even more inflammatory in the lung.<sup>45</sup> Evidence that freshly fractured silica is more toxic than aged silica is driving future research by the scientific community and OSHA has considered the data in its current ongoing review of the silica standard.<sup>46</sup>

In **2008** the United Kingdom's Health and Safety Executive (HSE — similar to OSHA in the U.S.) issued a guidance document which utilizes the "*RCS Potency Matrix*" in evaluating the fibrogenic potency of freshly fractured (fragmented) crystalline particles in comparison to aged, or weathered, silica particles and the circumstances that may alter this potency.<sup>47</sup>

In 2000, Kirkhorn reported, "the weathering effects upon respirable quartz dusts generated by agriculture are considered to be less pathogenic than the freshly fractured quartz dust generated by industrial processes such as mining, quarrying, and sandblasting."<sup>48</sup>

While the presence of a freshly fractured surface contributes to the toxicity of crystalline silica particles, it is only one determinant. Guidotti (1998) established the **primary determinants of silica toxicity** as: **concentration and duration of dust exposure, particle size distribution, the crystalline isomorph** (alpha-quartz, tridymite, cristobalite, in increasing order of potency), **and the presence of a freshly fractured surface.**<sup>49</sup> All these factors determining the toxicity of silica are of significant concern with the mining of bedrock sandstone and strongly support this petition for the promulgation of rules governing the emissions of respirable crystalline silica.

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45. Bridge, 2009. page 4

46. NIOSH Respiratory Diseases Research Program(RDRP), 3.2e *Processes that Generate Freshly Fractured Silica are Associated with Highly Reactive Dust Evidence Package for the National Academies' Review 2006-2007*, found at <http://www.cdc.gov/niosh/nas/rdrp/ch3.2e.htm>

47. Health and Safety Executive - UK Governmental, *Silica dust guidance on risk and enforcement*, March 09, 2008. <http://www.hse.gov.uk/foi/internalops/sectors/manuf/030809.htm> , Based upon Meldrum, M. and Howden, Peter, *Crystalline Silica: Variability in Fibrogenic Potency*, Ann. occup. Hyg., Vol. 46, Supplement 1, pp. 27–30, **2002** [http://annhyg.oxfordjournals.org/content/46/suppl\\_1/27.full.pdf](http://annhyg.oxfordjournals.org/content/46/suppl_1/27.full.pdf)

48. Kirkhorn, Steven R. and Vincent F. Garry, "Agricultural Lung Diseases." *Environmental Health Perspectives, Supplements* Volume 108, Number S4, August 2000, found at: <http://ehp03.niehs.nih.gov/article/Article.action?articleURI=info:doi/10.1289/ehp.00108s4705>

49. Guidotti, Tee L. and Niels Koehncke 1998. *Silica and Silica Related Disease*. University of Alberta Edmonton, Alberta, Canada, found at: <http://envepi.med.uoeh-u.ac.jp/icoh/SILICA%20Document.html>

**Appendix A - Physicians and Healthcare Providers letter to WDNR**

Physicians Letter to WDNR: Page 1 of 4

FROM: Physicians and Health Care Providers of the Chippewa Valley

TO: Mr. Jeff Meyers  
Wisconsin DNR – AM/7  
P.O. Box 7921  
Madison, WI 53707-7921

RE: Letter submitted in response to WDNR Draft Status Report: Silica Study

February 18, 2011

Dear Mr. Myers,

Please consider this an official response by the signatories below to the request for public input to the Draft Study on Silica release on December 2010.

Since February of 2009, members of the medical and scientific community of the Chippewa Valley have raised concerns related to health risks associated with exposure to respirable crystalline silica. Increase in this Hazardous Air Pollutant may occur from sand mining, processing , and transporting in Northwestern Wisconsin. Our concerns were presented to the Wisconsin DNR and to local governments affected by this expanding industry. Included in this record are:

Email exchanges between Drs. Peter Holm and Crispin Pierce and the WDNR

Public comment at the DNR Air Quality Hearing in Chippewa Falls

A letter from 30 Physicians to the Chippewa Falls City Council and Planning Commission asking for rescission of the Conditional Use Permit for a sand processing plant until the WDNR completed and established air quality standards for crystalline silica

A letter from 17 Physicians in the Chippewa Herald Telegram in October 2009 requesting a delay in the CUP until further studies could be done pertaining to air pollution

Public presentation by Dr. Crispin Pierce at Chippewa Falls Middle School

In addition to the above, on August 17, 2009, the Chippewa Falls City Attorney, Robert Ferg, sent a letter to the WDNR urging them to complete their studies on silica so that, “we are appropriately advised of and understand any potential health risks which our citizens might experience as a result of a sand processing plant.” He stated that, “if you have not yet undertaken any studies, you are encouraged to do so as soon as possible.” As Physicians and those concerned with health care, we agree with Mr. Ferg’s request.

The Draft Study for Public Comment released by the WDNR in December 2010

(<http://dnr.wi.gov/air/pdf/DraftForPublicComment-SilicaStudyStatusReport.pdf> ) makes clear that WDNR recognizes the potential for harm to human health from crystalline silica. Health risks noted in the report are: cancer, silicosis, increased tuberculosis, pulmonary disease, immune

system interference, heart enlargement, and kidney damage. Also acknowledged by WDNR is that Crystalline Silica meets the requirements for listing it as a Hazardous Air Pollutant (*pp.7-11 in DRAFT for Public Comment, Status Report to the Natural Resources Board: Silica Study, December*

2010). However, the Study stops short of recommending the official listing of respirable crystalline silica (RCS) as a Hazardous Air Pollutant (HAP), a critical and required first step for setting a safe standard for RCS. As Physicians and other health care providers, we feel that the study's failure to do either of these may expose the population to health risk.

An inhalation chronic non-cancer reference exposure level for silica, a level below which no adverse effects due to prolonged exposure would be expected in the **GENERAL PUBLIC** was established by the Air Toxicology and Epidemiology Branch, Office of Environmental Health Hazard Assessment (OEHHA) of the California EPA (*Regulatory Toxicology and Pharmacology 43 (2005) 292-300, Collins, et. al.*). This level was based upon evidence from thousands of people exposed over decades to air borne silica in industry. That level is 3 micrograms/ cubic meter. In lay terms, this means that if respirable silica levels are less than this level, we would not expect to see non-cancer adverse effects, and above it we would.

For Wisconsin to carry out similar studies would take decades and may expose citizens to potentially hazardous levels of silica in the communities involved while waiting for the results of our own study. For example, on page 12 of the Draft, the third paragraph under the heading, "Ambient Air Concentration," the differences in the silica levels as a percentage of PM 10 ranges from 6% to 25% at various sites depending upon their relation to the source of the silica. The US EPA uses a 10% national average. The true levels are unclear. The Draft further states that, "It is difficult to generalize a percent of PM10 that is crystalline silica and source testing data is an important data gap in our current knowledge of emissions profiles from Wisconsin sources."

On p. 23 in the Draft, a study by Shiraki and Holmen (2002) monitored silica concentration near a sand and gravel facility in Central California is referenced. In this study, downwind concentrations from the facility ranged from 9.4 micrograms/cubic meter to 62.4 micrograms/cubic meter. These levels are well above the 3 microgram/cubic meter established by California OEHHA. They are also extremely variable.

Repeating studies similar to those mentioned above would entail costs which the State may not be in the fiscal condition to handle. By adopting the standards established by this sentinel study, or perhaps even the stronger standards established by Texas to protect against cancer risks (0.27 micrograms/cubic meter or PM4), the State would save an enormous amount of time and money.

As Physicians and health care professionals, anticipating that the sand mining and processing industry will grow rapidly in Wisconsin, we feel that the only way to protect the health of the citizens of Wisconsin is to:

1. **List** crystalline silica as Hazardous Air Pollutant
2. Establish and adhere to an enforceable standard for respirable crystalline silica identical

to the level established by Collins in the California (OEHHA) study

3. Monitor the air at multiple sites around processing plants, mines, and transport routes in order to include fugitive dust. The variable levels depending on location to the facilities, found by the research in the Draft Study, mentioned above, are why monitoring is so important for the protection of our citizens. Without monitoring, we **don't** know our exposure levels or which citizens are at risk.

On page 13 of the Draft, the most promising method for monitoring appears to be one being considered by air agencies in California using X-ray diffraction techniques to quantify the amount of crystalline silica in the ambient air. It is our understanding that this method may be available in the Wisconsin Occupational Health Lab in Madison, Wisconsin. This would be much more reliable than the current standard using a 10% fraction of PM 10, and we encourage the WDNR to adopt this method.

Knowing the potential for harm to health and the huge variability in actual levels of silica related to sand mining and processing, it would seem extremely important for the WDNR to find a way to fund the monitoring of this Hazardous Air Pollutant. It is our understanding that the mining company operating in Maiden Rock, Wisconsin is funding monitors for their site. This would be an excellent means for the WDNR to pursue monitoring in other locations. EOG has publicly stated that they want to be “good neighbors.” Helping to defray the costs to monitor RCS would be a valuable demonstration to fulfill that statement.

We once again urge you to establish standards listed above to protect the environment and the health of the citizens of our state.

### **Signatory Page Attached**

#### **Signatories to Letter from Physicians and Health Care Providers of the Chippewa Valley**

#### **Submitted as public comment to WDNR on the Draft Status Report: Silica Study**

Jim Allen, MD – Ophthalmology  
 Siobhan Beeksma, OD – Optometry  
 Troy Berg, MD - Orthopedics  
 Jeffrey Brown, MD - Ophthalmology  
 Thomas Chisholm, MD - Open Door Clinic, General Surgery  
 David Cook, MD - Urgent Care/Family Medicine  
 Fred Cook, MD - Anesthesia  
 Steven Cook, MD - Emergency Medicine  
 Erik Dickson, DO – Family Practice  
 John Drawbert, MD - Orthopedics  
 E. L. Ebert, DO - Pulmonary Medicine  
 John Evans, - MD Anesthesia

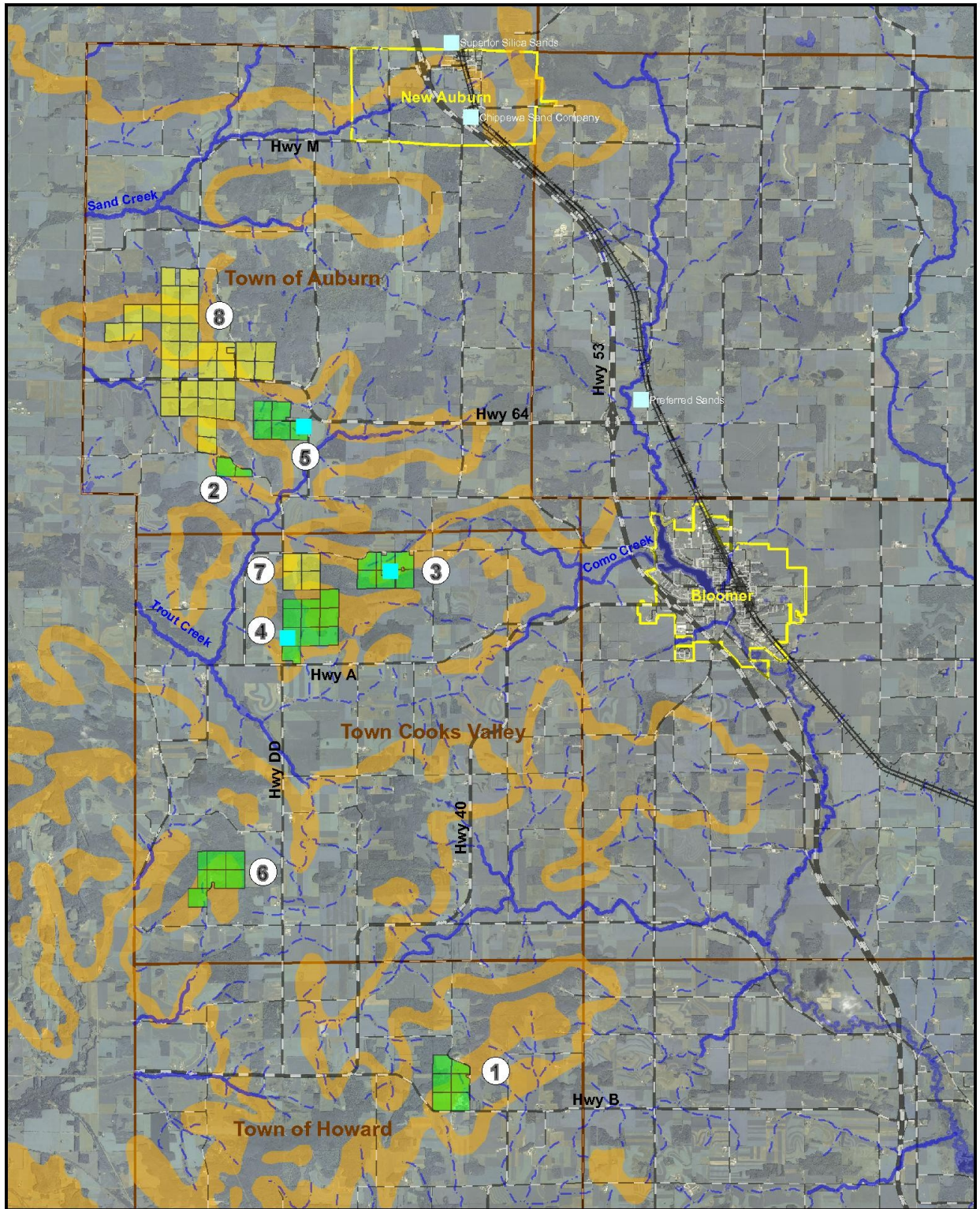
Crispin Pierce, Ph.D - Environmental Toxicology  
 Tom Pederson, MD – Ophthalmology  
 Cecilia Placencia, DO,MPH - Family Medicine, Public Health  
 Fred Proett, MD – Orthopedics  
 RV Ridenour Jr, MD – Pathology  
 RV Ridenour III, MD – Pathology  
 Mark Roberts, DO - Internal Medicine  
 Kathryn Schaus, MD – Pediatrics  
 Karla Schlimgen, MD - Pediatrics  
 Mahhmond Sharaf, MD – Cardiology  
 Steven Steinmetz, MD - Family Medicine  
 Jan Stauss, MD - Radiology

Physicians Letter to WDNR: Page 4 of 4

George Fleming, MD – Orthopedics  
 Sandra Froehling, MD – Internal Medicine  
 Kristie Gering, MD - Family Medicine  
 Steve Hansen, MD - Emergency Medicine  
 Jill Hasenberg, DO - Family Medicine  
 Greg Heiler, MD - Pathology  
 Bernard Herzog, MD - General Surgery  
 Lee Hofer, MD - Ophthalmology  
 Peter Holm, MD - Ophthalmology  
 Steven Immerman, MD - General Surgery  
 Paul Ippel, MD - Family Medicine  
 Heidi Jarecki, MD – Ophthalmology  
 David Johnson, MD - Anesthesia  
 Scott Julian, MD - Obstetrics and Gynecology  
 Anton Kidess, MD - Pulmonary Medicine  
 Mary Landwehr, MD - Family Medicine  
 Robert Lea, MD - Family Medicine  
 John Lindstrom, MD – Orthopedics  
 Chris Longbella, Obstetrics and Gynecology  
 P. Macken, MD - Internal Medicine  
 Reynaldo Maniquiz, MD - Family Medicine  
 Terrance McCanna, MD - Ophthalmology  
 William McDougall, MD - General Surgery  
 Diane Meyer, MD - Dermatology  
 Subramanian Nataratan, MD - General Surgery  
 Sal Obaid, MD - Critical Care & Pulmonary Medicine  
 Thomas Paulsen, MD - Internal Medicine  
 S Q Paulson, MD - Internal Medicine

Nate Stewart, MD – Orthopedics  
 Michel Sultan, MD – Gastroenterology  
 Aaron Topliff, MD - Anesthesiology  
 Marcia Wirt, MD - Pediatrics  
 Brent Wogahn, MD – Surgery  
 Kristin Wogahn, MD – Family Medicine  
 Margaret Zander, MD - Pediatrics  
 John Zeimer, MD - Family Medicine  
 Mary Bernklau, RN  
 Shelly L. Ekblad, CRNA, MS, APND  
 Cynthia L. Eckes, Family Nurse Practitioner  
 Laurie Fashingbauer, LPN  
 Jean Glidden, LPN  
 Cindy Gumness, RN  
 Marcy Hageness, RN  
 Billie Hague, Nurse Practitioner  
 Cathy M. Heil, CMA  
 Cindy Hopkins, RN  
 Sandra Jensen, RN  
 Peggy Joyner, RRT  
 Jess Karpenske, RRT?  
 Tim Karpenske, RRT  
 Wendy Loew, RN  
 Judy Nehring, LPN  
 Sally Nicholson, RN  
 Karen Stevens, RN  
 Ky Terrill, Pharmacy  
 Carolyn Weibel, RN

## Location of NMM in Bedrock Permits & Permit Applications in Chippewa County



**Legend**

	State Highways		City - Village
	County Highways		Towns
	Town Roads		Permitted Mine Parcels
	Intermittent Stream		Plan Review In Process
	Perennial Stream		Dry Processing
	Bedrock Formations		Wet Processing



Date : 10/31/2011

## Appendix C

RECENT NON-METALLIC MINE RECLAMATION PERMITS & APPLICATIONS  
Chippewa County Department of Land Conservation & Forest Management

October 31, 2011

## Status of Permit Applications

#	Permit Number	Applicant	Owner(s)	Mine Name	Total Size (acres)	Engineering Firm	Publically Noticed	Public Hearing	Permit Issued
1	2009-01	EOG Resources	Robert Schindler Jeff Sikora	S & S Mine	185	SEH	1-20-2009	Yes	4-29-2009
2	2009-04	Western Wisconsin Sand Company	Lary Boese	Boese Mine	28	SEH	9-5-2009	No	10-7-2009
3	2011-01	Preferred Sands	Sam LaGesse Don Prill James Springer	LaGesse Mine	225	Sunde	3-26-2011	Yes	6-8-2011
4	2010-01	Chippewa Sand Company	Jeff Buchner, Robinson Panosian Mining, LLC	Buchner/ Robinson Mine	176	SEH	2-12-2011	No	5-10-2011
5	2011-02	Superior Silica Sands	Anthony Glaser, et al.	Glaser Mine	135	SEH	3-23-2011	No	5-6-2011
6	2011-03	EOG Resources	Dennis Schindler	DS Mine	234	SEH	8-25-2011	Yes	10-14-2011
7	-----	Preferred Sands	Rogge	Rogge Mine	+160	Barr	-----	-----	-----
8	-----	Preferred Sands	Clark, Reimer, Hughes, Stuckert, Hoyer, Weber, Dahlka, Boese	Stuckert Mine	+1200	Barr	-----	-----	-----

Other applications are likely forthcoming but have not applied for a reclamation permit as of October 31, 2011.

### Additional Recent References on the Adverse Health Effects of Crystalline Silica

- California Office of Environmental Health Hazard Assessment (California OEHHA). 2005. Chronic Reference Exposure Level (REL) for Silica (Crystalline, Respirable). (California Office of Health Hazard Evaluation - [www.COEHHA.ca.gov/air/chronic\\_rels/silica\\_final.html](http://www.COEHHA.ca.gov/air/chronic_rels/silica_final.html)).
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