CITIZENS ENVIRONMENTAL QUALITY COMMITTEE

AGENDA ITEM: Air Quality Monitoring Recommendations

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Given discussion at the previous CEQC meeting, following is a draft of potential air quality recommendations:

1. A decision on air monitoring at frac sand facilities should be deferred to the MPCA.
2. The City of Winona should consider interim monitoring for crystalline silica if an answer is not immediately available from the MPCA.
3. Interim monitoring should use an annual average of 3ug/m^3 PM4 as a limit for ambient crystalline silica exposure.
4. Any firm hired to complete monitoring should be selected by the City of Winona or the MPCA.
5. Interim monitoring for crystalline silica should also include baseline particulate monitoring along truck routes.

CEQC members should discuss these recommendations, make any necessary modifications/additions, and take a vote. Committee members may vote on all of the recommendations together as a package or may vote on individual items.

Committee members also had a question about an acute threshold for ambient crystalline silica. According to a report issued by the Wisconsin Department of Natural Resources in 2011, the Texas Commission on Environmental Quality has adopted a one-hour health benchmark of 47ug/m^3 PM 10 (see attachment).

There was also a question about the number of trucks from the proposed Nisbit mine in Saratoga Township. Text from the Environmental Assessment Worksheet is below:

> *The mining activities propose to generate a total maximum of 280 truck trips per day (140 empty trucks in and 140 loaded trucks out). The trucks will have a one-hour round-trip per truck from the Nisbit mine to the Winona load-out. There will also be 6 employee trips per day (3 in and 3 out). This equates to 26 truck trips and 6 employee trips during the weekday peak hours (7:00 - 9:00 a.m. and 4:00 - 6:00 p.m.) for a total of 26 trips in and out. However, plans to generate the total maximum truck trips of 280 per day may occur if market demand increases, otherwise mining activities are planned to operate with 10 trucks per day generating a total of 120 trips per day.*

Attachment: "Health Benchmark Levels for Silica Exposures," from *Report to the Natural Resources Board: Silica Study*. Wisconsin DNR, 2011.

Health Benchmark Levels for Silica Exposures

Health benchmarks and reference exposure levels (RELs) are used interchangeably in this report and are threshold levels for crystalline and amorphous silica that have been established by a number of agencies to assess the health risks from exposure to silica in ambient air. One way to think of them is as "safe" levels of exposure. When concentrations in the air are below these health benchmarks or reference exposure levels, there is negligible risk to health for the general public. When concentrations in the ambient air are above the health benchmark or reference exposure levels, there is an increased potential for health effects. This is referred to as being above a "level of concern."

Crystalline Silica

California's Office of Environmental Health Hazard Assessment (OEHHA) established a non-cancer health benchmark – a REL- of 3 ug/m3 for crystalline silica of a PM4 size fraction. The averaging time for the health benchmark represents an annual exposure level. Below this REL, California estimates there is minimal risk for developing silicosis from exposure to crystalline silica in the ambient air. More information on this reference exposure level can be found at the OEHHA website: http://oehha.ca.gov/air/chronic_rels/pdf/SILICAcREL_FINAL.pdf.

Using a different approach that was based on an assumption that ambient exposures were similar to occupational exposures, US EPA (1996) established a health benchmark for the risk of silicosis from ambient air exposures of 3 ug/m3 (annual average of PM10 sized particles). EPA's approach involved using a mathematical extrapolation, based on occupational exposure data, to estimate an acceptable level of exposure to the public. EPA estimated that approximately 0.03% of the population (0.3 people out of 1,000) have a chance of contracting silicosis at the annual exposure level of 3 ug/m3. At a concentration of 8 ug/m3, the risk was estimated to be 2.3% (23 people out of 1,000). US EPA indicated that their benchmark estimates are probably conservative for the following reasons: 1) silica in the ambient environment is less toxic than in the workplace, primarily because of the larger particle sizes associated with ambient sources; 2) the reduced likelihood of exposure to the public from the more potent "freshly fractured" silica that is found in occupational settings (Fubini, et al. 2003; Castranova et al. 1997); and, 3) less frequent peak exposures than in the workplace (US EPA 1996). However, as pointed out in WHO (2000), the US EPA benchmark did not evaluate the "silicosis risk for persons with respiratory diseases." EPA has not set a National Ambient Air Quality Standard (NAAQS) for crystalline silica.

The Texas Commission on Environmental Quality (TCEQ) (2009) also established acute and chronic ambient air health benchmarks for crystalline silica to protect against non-cancer effects. TCEQ established a chronic health benchmark of 2 ug/m3 for PM4 sized particles based on exposures of up to one year. The TCEQ value of 2 ug/m3 is intended to prevent against silicosis and is fairly close to the California OEHHA derived chronic health benchmark of 3 ug/m3. TCEQ also established a short-term (acute) health benchmark level of 47 ug/m3 of PM10 sized particles, for evaluating one hour exposures. More information on the TCEQ health benchmarks can be found at: http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/october09/silica_crystalline_forms.pdf.

In addition to its non-cancer benchmarks, TCEQ is the only air agency in the US that has established a cancer-based health benchmark for ambient air exposures to crystalline silica. They established an annual ambient air concentration of 0.27 ug/m3 of PM4 size particles in the air as being the level of exposure corresponding to a lifetime cancer risk of one-in-one-hundred thousand. According to TCEQ, these benchmarks are guidelines and air permits for sources that would be expected to cause exposure impacts above 0.27 ug/m3 should be evaluated for inclusion of emissions control requirements to ensure that public health is protected (TCEQ 2009).

In addition to California and Texas, several other air pollution control agencies have adopted health benchmark levels for crystalline silica. Table 2 summarizes health benchmark levels for crystalline silica from these air agencies.

Table 2: Health Benchmark Levels for Crystalline Silica in Ambient Air

Agency	Health effect of interest	Reference Exposure Level/Health Benchmark*	Long-term (L) or short term (S)+	Reference
California Air Resources Board	Silicosis	3 ug/m^3 measured as PM4	L	California OEHHA 2005
Michigan Department of Environmental Quality	Silicosis; cancer	Revoked – see Appendix B	L	Michigan DEQ 2011
New Jersey Department of Environmental Protection	Silicosis	3 ug/m^3 measured as PM10	L	New Jersey DEP 2009
New York Department of Environmental Conservation	Silicosis	0.06 ug/m^3 measured as PM10	L	New York State DEC 2011a, 2011b
Oklahoma Department of Environmental Quality	Chronic disease; cancer	Revoked – see Appendix B	L	Oklahoma DEQ 2010
Texas Commission on Environmental Quality	Lung Inflammation	47.0 ug/m^3 measured as PM10	S (1hour)	TCEQ 2009, 2011b
	Silicosis	2.0 ug/m^3 measured as PM4	L	
	Cancer	0.27 ug/m^3 measured as PM4	L	
US Environmental Protection Agency	Silicosis	3 ug/m3 as PM10	L	US EPA 1996
Vermont Department of Environmental Conservation	Silicosis	0.12 ug/m^3 measured as PM10	L	Vermont DEC 2003a, 2003b

*Reference exposures levels and health benchmarks are used by air pollution agencies to establish an acceptable level of exposure to the public for an air pollutant. Some agencies use them to set an ambient air standard which is not to be exceeded, while other agencies use them as guidelines and evaluate permitted emissions to minimize exposures to the extent possible, but sources may still be permitted if their impact is estimated to exceed the reference exposure level or health benchmark.

+ Long-term reference values and health benchmarks are most often compared to annual average concentrations of air pollutants. Averaging periods for Short-term reference values and health benchmarks are indicated in the table.

Amorphous Silica

Fewer states (Michigan, Vermont and Texas) have established health benchmark levels for exposure to amorphous forms of silica. The Texas Commission on Environmental Quality conducted the most recent review of amorphous silica and revised its health benchmark levels in July 2011 (TCEQ 2011a).

Table 3 summarizes health benchmark levels for amorphous silica from these air agencies.