Conference looks at big picture of sand mining

OCTOBER 14, 2012 12:00 AM • BY JEROME CHRISTENSON | JCHRISTENSON@WINONADAILYNEWS.COM

It really is just sand.


Whether you call it silica sand, industrial sand or by its latest, most controversial appellation — frac sand — it’s big business in southeast Minnesota and western Wisconsin.

Geologists, government regulators and representatives of the sand mining industry and its suppliers met in Brooklyn Park, Minn., earlier this month and spent three days getting down to the industry’s gritty bedrock basics. The conference, sponsored by the Precambrian Research Center of the University of Minnesota-Duluth and the Society of Mining, Metallurgy, and Exploration, explored what silica sand is, how it’s mined and processed, and the environmental and regulatory issues that accompany it.

“It’s typical of the time,” said Jim Miller, co-chairman of the conference organizing committee, acknowledging the controversy that has surrounded the industry.

“People ask if this is pro-mining or anti-mining — it’s neither.”

The controversy surrounding sand mining is of extremely recent vintage, linked to the use of hydraulic fracturing in oil and gas exploration. Sand has been mined in the Winona region for more than 100 years for agricultural and industrial use and to create storage tunnels and storm sewers, said Tony Runkel, the Minnesota Geological Survey’s chief geologist.

In fact, the largest use for industrial silica sand is in glassmaking, and in third place is its use in metal casting as foundry sand — both long-established, long-accepted industries.

The use of silica sand in a mixture of water and chemicals and forced deep underground to release oil and natural gas trapped in shale deposits has created a huge new market for a very specific type of silica sand — the type that underlies much of the upper Midwest.

There’s no fracking going on in Minnesota or Wisconsin — nor will there ever be, because there’s no oil or gas here to frack, Runkel said.

But this is the Saudi Arabia of frac sand.

When an oil or gas well is “fracked,” the high-pressure mix of fluids and sand shatter the rock and is forced into the resulting cracks. The fluids are then pumped out, leaving the sand behind to prop open the cracks, creating a network of pathways for gas and oil to escape and be pumped to the surface. To be effective, the sand grains need to be hard, round and of a consistent and specific size.
The Jordan and Wonewoc sandstone layers that lay under much of the upper Midwest contain a high percentage of sand that meets the precise specifications required of frac sand, Runkel said. The sand is very pure — up to 95 percent silica — round, and course-grained.

But in most places sandstone layers are covered by layers of limestone and glacial debris several hundred feet thick, making them economically inaccessible. Only where the sandstone layers are close to the surface — or, as in the river valleys of southeast Minnesota, exposed by eons of erosion — is frac sand mining feasible.

**Hot topic, but not a new one**

Where it is feasible, it is hardly a new phenomena, said John Letsenberger, a mining engineer since 1970 and consultant to Goodhue County’s mining study committee.

The region has long been dotted with quarries and sand pits and regulations for their operations are already on the books. Problems often arise when mining is proposed or undertaken in areas of higher population density, where noise, dust and traffic become issues with the public.

“The mining industry has tended to overlook its neighbors in day-to-day affairs,” Letsenberger said.

“Regular meetings with citizens will do much to ease their concerns and make living with neighbors much easier,” he said.

Citizen concerns have become a major headache for the industry, several conference speakers noted. Unaddressed concerns have led to a proliferation of moratoriums in Minnesota’s cities and townships, a trend spreading to Wisconsin.

“The hardest part (of starting a new operation) will be your local land-use permit,” said Lisa Hanni, Goodhue County’s land-use director.

Many concerns have been addressed through regulation or by industry best practices, conference speakers said. For instance, frac sand production is often criticized as a “thirsty” process that could result in groundwater depletion or chemical contamination.

Hydrogeologist **Scott McCurdy** acknowledged that sand processing does require a large volume of water, and that “local aquifers are not sufficient to provide this demand … water re-use is a necessary element in the design and operation of facilities.”

Up to 90 percent of all water is re-used, with most of the remainder lost to evaporation or shipped out in loads of damp sand, he said.

With reclamation techniques, water use is about 200 gallons per ton of sand. By comparison, it takes about 1,500 gallons to produce a pound of hamburger.

Air quality standards have been in place for silica and other particulates for 40 years, said Jeff Hedman, an air quality engineer for the Minnesota Pollution Control Agency, and apply to mining and processing operations. The smaller the particle, the greater the health concern, as only the tiniest particles — 10 microns and less — penetrate deep into the lungs. A particle of this size compares to a grain of frac sand as the period at the end of this
sentence would compare to a golf ball.

No one likes the thought of a gaping hole in the ground, but the impact of mine operations on the landscape can be minimized through properly staged reclamation, said Paul Egger, an environmental engineer.

“Reclamation begins before the mine opens,” Egger said. This is explicitly true in Wisconsin, where state statute requires reclamation plans to be in place and funding guaranteed by bonding, before ground is broken.

Topsoil and subsoil are removed and stockpiled before mining begins, then as that area is mined out, it is refilled with subsoil and topsoil from the next area to be opened — with only a relatively small area open and working at any one time, Egger said. Reclamation standards and post-mining land use need to be defined before mining begins and then monitored throughout the duration of operations.

“Reclamation and re-use is very successful,” he said, so long as from the beginning operators and regulators keep in mind “the temporary nature of mining.”

A willingness to negotiate and come to reasonable agreements with counties and other local governments is necessary, said Anders Helquist, an attorney representing a number of mining companies.

“If you’re going to use county roads, you’re going to tear ’em up,” he said, and mining companies may do well to regard road-use agreements and other regulations as a cost of doing business.

“You have to cut a deal with the community,” he said.